



Getting Started

RAID Array 310 V3.1 for HP-UX

Installation Guide

EK-SMRAB-IG. B01

Digital Equipment Corporation
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Revision Record

This Revision Record provides a concise publication history of this manual. It lists the manual revision levels, release dates, and reasons for the revisions. It also describes how the changes to affected pages are marked in the guide.

The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the Revision Level column, with the last entry denoting the latest revision. This publication supports the StorageWorks RAID Array 310 Subsystem.

Revision Level	Date	Summary of Changes
EK-SMRAB-IG. A01	March 1996	Original release.
EK-SMRAB-IG. B01	April 1997	Updated to add support for HSOF V3.1 and StorageWorks Command Console (SWCC) V1.1B.

About This Guide

This section identifies the audience of this guide and describes the contents (chapter by chapter) and structure. In addition, this section includes a list of associated documents and the conventions used in this guide.

This guide provides the following:

- Getting Started
- Unpacking and setting-up the RAID Array 310 Subsystem
- Creating an initial controller interface using the Command Line Interpreter (CLI)
- Preparing the HP 9000 for use with the RAID Array Controller
- Installing Command Console Agent and Client

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Intended Audience

This guide is intended for administrators of StorageWorks RAID Array 310 Subsystems. Installing the StorageWorks RAID Array 310 Subsystem requires a general understanding of UNIX system administration and product installation procedures

Document Structure

This guide contains the following chapters:

Chapter 1: Unpacking and Setting Up Your RAID Array 310 Subsystem Components

This chapter describes the site preparation and unpacking procedures for the RAID Array 310 Subsystem. It also describes the procedure to recharge the controller cache battery.

Chapter 2: Creating an Initial Controller Configuration

This chapter contains instructions for creating an initial configuration for your RAID Array Controller using the Command Line Interpreter (CLI). It briefly describes the CLI and how to access it. The configuration steps include verifying the default configuration, adding drives, creating and initializing RAIDsets, identifying the storageset as a unit to the host, and verifying and recording your final configuration.

It also describes setting up an initial LUN to be used for communication with the Command Console GUI.

Chapter 3: Preparing the HP 9000 Series Systems for Use with the StorageWorks Controller

This chapter describes the steps for installing the required device drivers onto HP 9000 Series systems running HP-UX 10.01 or higher. The installation steps include loading the device driver(s) to communicate through the SCSI Adapter to the StorageWorks RAID Array Controller.

Chapter 4: Installing 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 systems connected to StorageWorks RAID Array 310 subsystems. You can install and configure the CC Agent automatically, using a script, or manually by copying files from the CC Agent distribution CD-ROM and editing Agent configuration and your host system ASCII files.

Chapter 5: Installing the Command Console Client

This chapter describes how to install a copy of the Command Console (CC) Client on each of your client systems.

Appendix A: Configuration Records – Blank Forms

This appendix contains a copy of the tables used in Chapter 2 to record the configuration of your system. If additional copies are required, this table can be reproduced as necessary.

Appendix B: Configuration Guidelines

This appendix contains a list of guidelines that will assist in optimizing the performance of your RAID Array 310 Subsystem.

Appendix C: Upgrading Controller Software

This appendix contains the procedures for backing up and upgrading the controller software.

Appendix D: Configuring STRIPEsets, MIRRORsets, and Striped MIRRORsets

This appendix supplements Chapter 2 and contains instructions for configuring STRIPEsets, MIRRORsets, and Striped MIRRORsets.

Associated Documents

In addition to this guide, the following documentation is useful to the reader:

Table 1 Associated Documents

Document Title	Order Number
<i>RAID Array 310 for HP-UX Release Notes</i>	<i>AA-QWTFa-TE</i>
<i>RAID Array 310 Configuration and Maintenance Guide</i>	<i>EK-SMCS2-UG</i>
<i>RAID Array 310 Deskside Subsystem Hardware User's Guide</i>	<i>EK-SMCPL-UG</i>
<i>RAID Array 310 Command Console V1.1 User's Guide</i>	<i>AA-R24LA-TE</i>

Conventions

This guide uses the following documentation conventions:

Table 2 Style Conventions

Style	Meaning
boldface monospace type	To be input by the user and filenames
plain monospace type	Text
<i>italic type</i>	For emphasis and manual titles
#	Represents the HP-UX system prompt. Do not type it as part of information given here as to be input by the user.

In addition, the following naming convention is followed in describing RAID levels:

Table 3 Nomenclature Conventions

RAID Advisory Board Description	RAID Array 310 Usage
RAID 0	STRIPESet
RAID 1	MIRRORset
RAID 0+1	STRIPED MIRRORset
RAID 5/3	RAIDset

Getting Started

This section provides an overview for preparing and installing RAID Array 310 for HP-UX. Detailed information is contained in Chapters 1 through 5.

Thank you for purchasing a StorageWorks RAID Array 310 Subsystem. The following is an overview of the installation steps that are required.

NOTE

Installing the StorageWorks RAID Array 310 Subsystem requires a general understanding of the following:

- HP 9000 Series 800 and 700 Computer Systems
- HP-UX 10.01, 10.10, or 10.20
- A fast, wide differential SCSI interconnection on the HP machine
- Basic hardware installation procedures

Or, contact your service representative for installation assistance.

Installation Roadmap

This section provides an overview/road map of the major steps required to install a RAID Array 310 Subsystem. See the specified chapters for detailed procedures. (Depending upon your specific configuration requirements, you may not need to perform all the tasks listed.)

1. Perform the pre-installation steps listed below.
2. Unpack the RAID Array 310 Subsystem (Chapter 1)
3. Create a communications LUN (Chapter 2).
4. Install the SCSI Adapter in your HP system (if necessary)
5. Mount the software medium. The RAID Array 310 software and HP-UX support files are provided on a CD-ROM.
6. Install the Command Console Agent (Chapter 4)
7. Plan your storage sets, which means “mapping out” your Stripeset, Mirrorset and/or RAIDset configuration for the disks to be configured as your RAID Array. A useful tool for this purpose is the blank configuration record forms provided in Appendix A.
8. Create your storage configuration using either the Command Line Interpreter (CLI) or the Command Console Client Graphical User Interface (Chapter 5).

Pre-Installation Steps

Before starting your installation, follow these steps:

- Verify the availability of user-supplied hardware and software.
- Inventory the contents of the StorageWorks RAID Array 310 Subsystem platform kit.
- Inventory the contents of the StorageWorks RAID Array 310 Subsystem.
- Follow your normal procedures to back up your system files.

Verify User Supplied Hardware and Software

The StorageWorks RAID Array 310 Subsystem requires:

- A 9000 Series System that supports one of the following fast wide differential (FWD) SCSI adapters:
 - Built-in,
 - HP-PB 28696A
 - GSC A4107A
 - HSC A4107A
 - HSC A2969A
- The associated system hardware manual
- Appropriate tools to service your computer
- The HP-UX operating system V10.01 or higher
- If version 10.00 is running, upgrade to 10.01 before installing the RAID Array 310

Inventory the StorageWorks RAID Array 310 Platform Kit and Subsystem Components

The Storage Works RAID Array 310 Platform Kit contains the following components:

- This guide.
- Release Notes
- A BN21G-xx SCSI cable with two straight high-density 68-pin connectors
- RAID Array 310 Controller Firmware License Keys
- Optional HP-PB 28696A FWD controller, depending on the type of platform kit

NOTE

Retain the Firmware License Keys information in a safe place.
It may be required to re-initialize the RAID Array Controller.

The StorageWorks RAID Array 310 Subsystem provides the following components:

- *RAID Array 310 Configuration and Maintenance Guide (EK-SMCS2-UG)*
- *RAID Array 310 Deskside Subsystem Hardware User's Guide (EK-SMCPL-UG)*
- The StorageWorks RAID Array 310 Subsystem
- Serial cabling kit (see Section 1.7.1) for connecting the maintenance port of the controller to the serial port of the host computer, a personal computer, or a terminal
- Power Cables (2)
- Enclosure Keys

Perform a System Backup

Follow normal procedures to backup your system before installing the subsystem.

Unpacking and Setting Up Your RAID Array 310 Subsystem Components

This chapter describes the site preparation and unpacking procedures for the RAID Array 310 Subsystem. It also describes the procedure to recharge the controller write-back cache battery and making the CLI interface connection between the subsystem and the host system or maintenance terminal.

1.1 Introduction

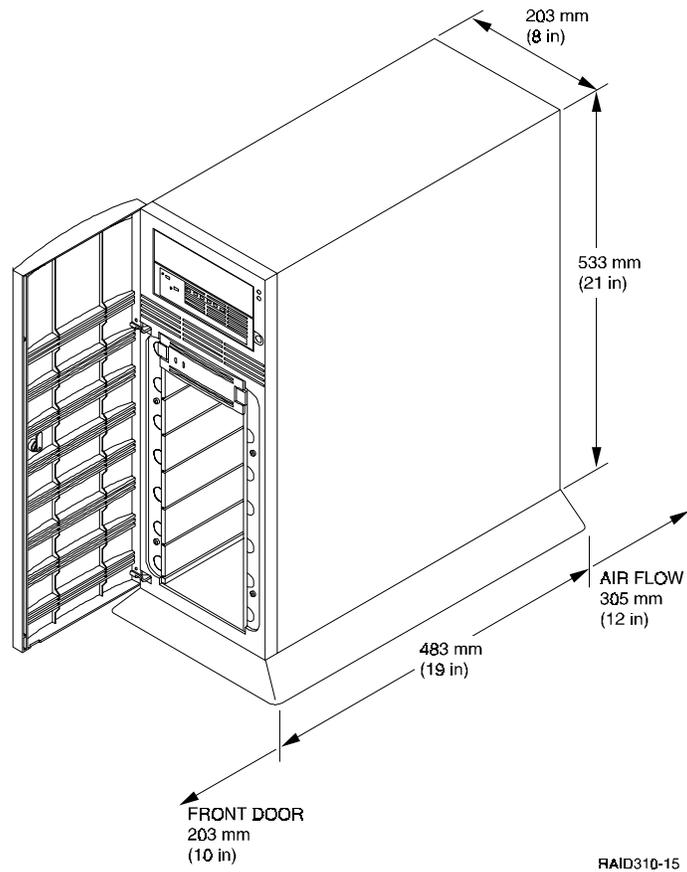
The installation of your RAID Array 310 subsystem is accomplished by performing the following seven major steps:

- Unpacking and setting up the mechanical configuration (*Chapter 1*)
- Connecting ac power and recharging the controller cache battery (*Chapter 1*)
- Making the serial interface connection between the RAID Array 310 and the host system or maintenance terminal (*Chapter 1*)
- Creating an initial RAID array controller configuration (*Chapter 2*)
- Preparing the HP9000 for use with the RAID Array Controller (*Chapter 4*)

1.2 Site Preparation

Before installing the subsystem, make sure that adequate space is available in front of the enclosure for opening the front door (10 inches clearance) and around the enclosure for adequate airflow. See Figure 1–1 for specific space requirements.

Figure 1–1 Minimum Installation Clearance Measurements



1.3 Unpacking the RAID Array 310

The shipping containers provide maximum protection for the subsystem and all components. We recommend that you unpack the subsystem in the installation area.

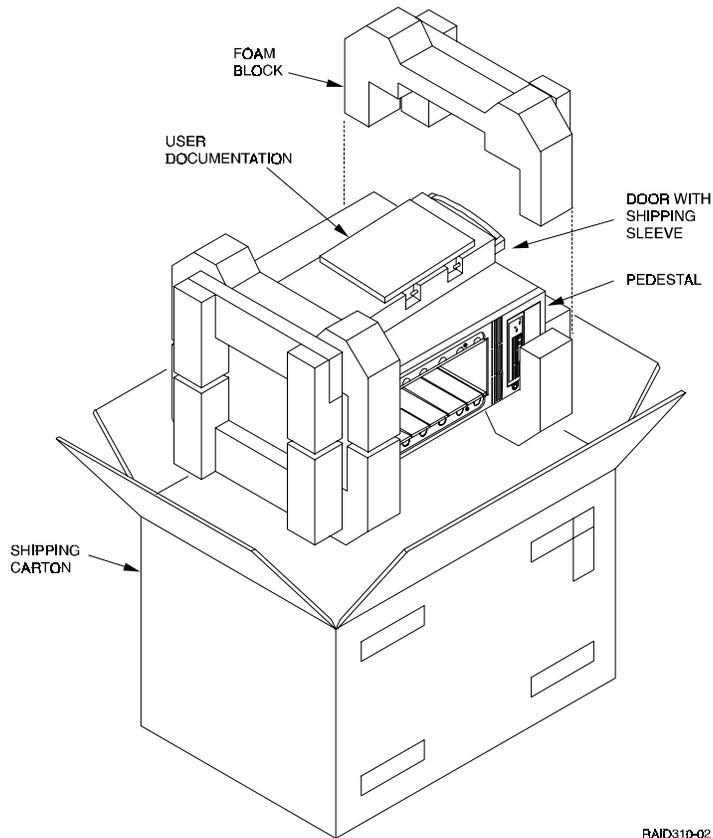
NOTE

Before unpacking the equipment, inspect the shipping carton for signs of external damage. Report any damage to the local carrier and to your reseller.

Refer to Figure 1–2 and complete the following procedure to unpack the subsystem:

1. Orient the shipping container as shown.
2. Open the container to remove the subsystem and packing material.
3. Remove the top foam blocks.
4. Remove the door.
5. Remove the subsystem.
6. Replace all packing material in the shipping container and store it for future use.

Figure 1–2 Unpacking the RAID Array 310



RAID310-02

1.4 Preparing the RAID Array 310 for Operation

Preparing the RAID Array 310 for operation involves the following procedures:

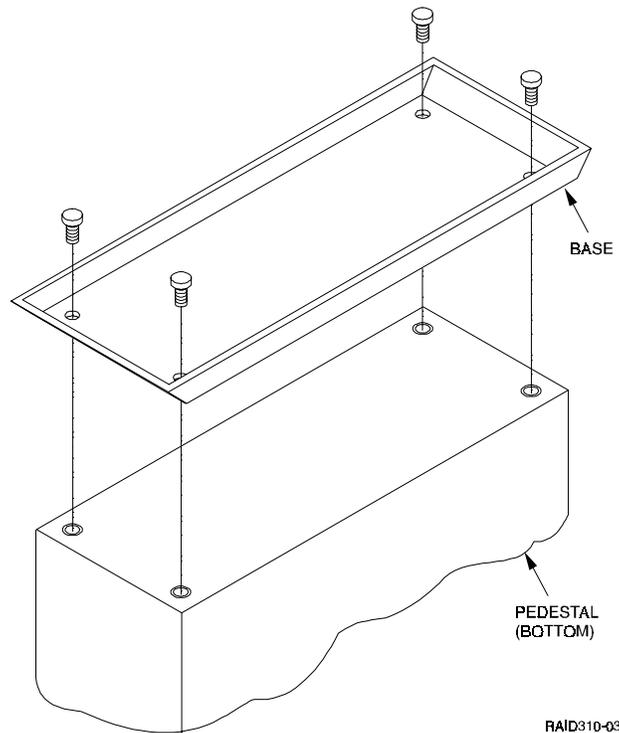
1. Mounting the base as described in Section 1.5.
2. Mounting the door.
3. Installing the disk Storage Building Blocks (SBB's).
4. Connecting the power, SCSI bus, and CLI serial cables.
5. Configuring the RAID Array 310.
6. Charging the controller cache battery.
7. Checking the subsystem for proper operation.

1.5 Mounting the Base

Mount the stabilizing base to the subsystem as follows:

1. Place the subsystem on its top.
2. Align the base with the bottom of the subsystem as shown in Figure 1–3.
3. Install the four hex-head screws through the base into the subsystem and tighten the screws using a 3/16 (5 mm) hex-head or flat-head screwdriver.
4. Set the subsystem on its base and continue the installation process.

Figure 1–3 Mounting the Base



1.6 Connecting the Subsystem Power Cords

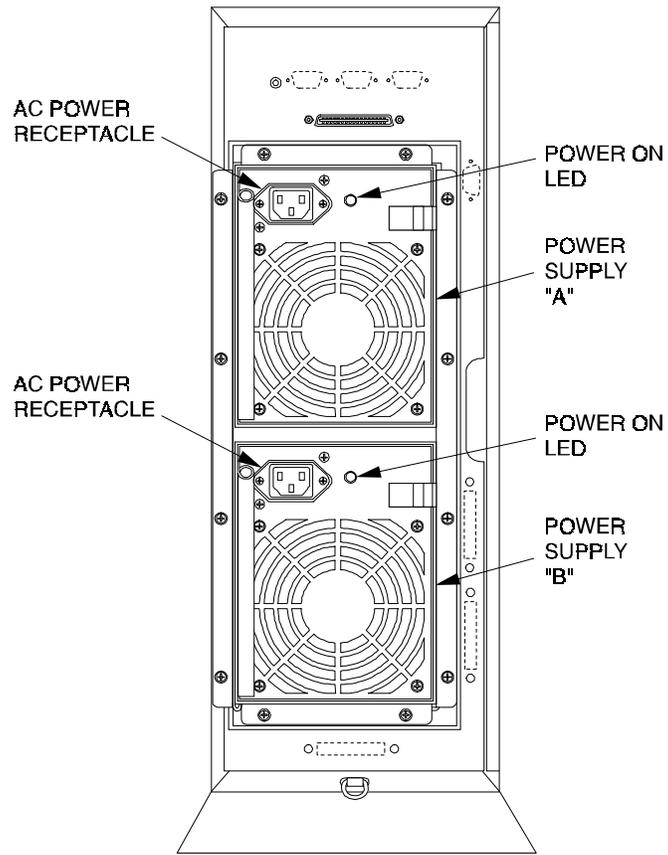
The subsystem contains two identical power supplies which provide redundant power to the RAID Array 310. Each supply is equipped with an ac power receptacle for connection to a 125 or 250 Vac power source. The power supply automatically senses and switches itself to accommodate either power source. Table 1–1 lists and describes the Digital power cords available for the subsystem. Since these cords are country-specific, ensure that your cords match those listed in Table 1–1 for your installation.

Obtain the correct power cords for your ac power source and connect them between the ac receptacles on the power supplies (Figure 1–4) and the ac outlets (the power supply automatically senses the voltage level and will work with either voltage). For optimal fault tolerant operation, connect the supplies to independent ac sources.

Table 1–1 Country-Specific Power Cords

Country	Length	Order No.
Australia	2.5 m	BN19H-2E
C. Europe	2.5 m	BN19C-2E
Denmark	2.5 m	BN19K-2E
India	2.5 m	BN19S-2E
Ireland	2.5 m	BN19A-2E
Israel	2.5 m	BN18L-2E
Italy	2.5 m	BN19M-2E
Japan	2.5 m	BN27S-2E
N. Zealand	2.5 m	BN19H-2E
S. Africa	2.5 m	BN19S-2E
Switzerland	2.5 m	BN19E-2E
U. K.	2.5 m	BN19A-2E
U. S.	2.5 m	BN27S-2E

Figure 1-4 Subsystem AC Power Receptacles

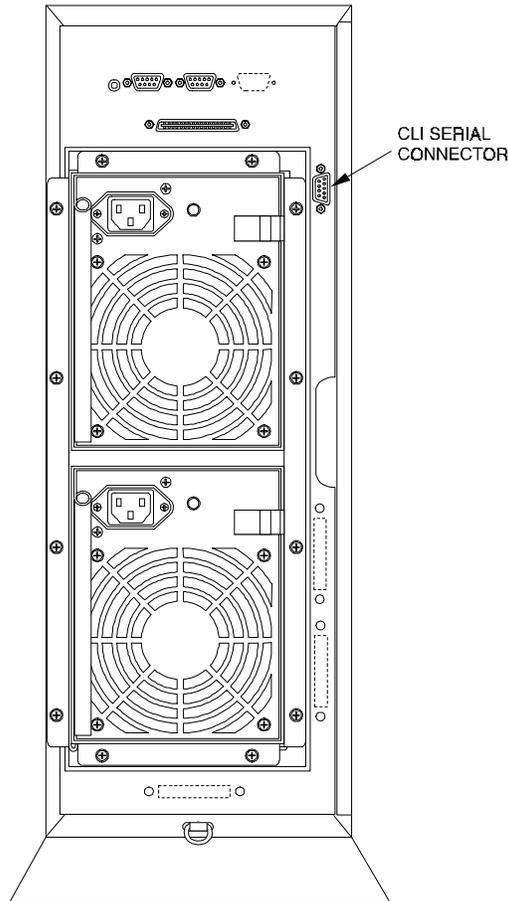


RAID310-13

1.7 Connecting the CLI Serial Interface

The RAID Array 310 requires a terminal or terminal emulation program connected to the CLI serial connector on the rear panel of the subsystem (see Figure 1–5). The serial interface default settings are 9600 baud, with 8 data bits, 1 stop bit, and no parity.

Figure 1–5 Subsystem CLI Serial Connector



RAID310-35

1.7.1 Cabling Kit

Locate and open the cabling kit that was shipped with your RAID Array 310 subsystem. The kit should contain the following components:

Table 1–2 Cabling Kit Components

Qty	Digital Part No.	Wiring	Description
1	BC16E-10	NA	10-foot Terminal Cable
2	H8571-J	Straight through	DB-9-pin "J" Female to Cable Connector
1	H8575-A	Straight through	Cable to 25-pin Female Connector
1	H8575-D	Crossed	Cable to 25-pin Male Connector
1	H8575-E	Straight through	Cable to 25-pin Male Connector

1.7.2 Serial Connection

From the components listed in Table 1–2, construct a cable to connect the DB-9 CLI serial connector on the subsystem to your terminal or the host serial port as follows:

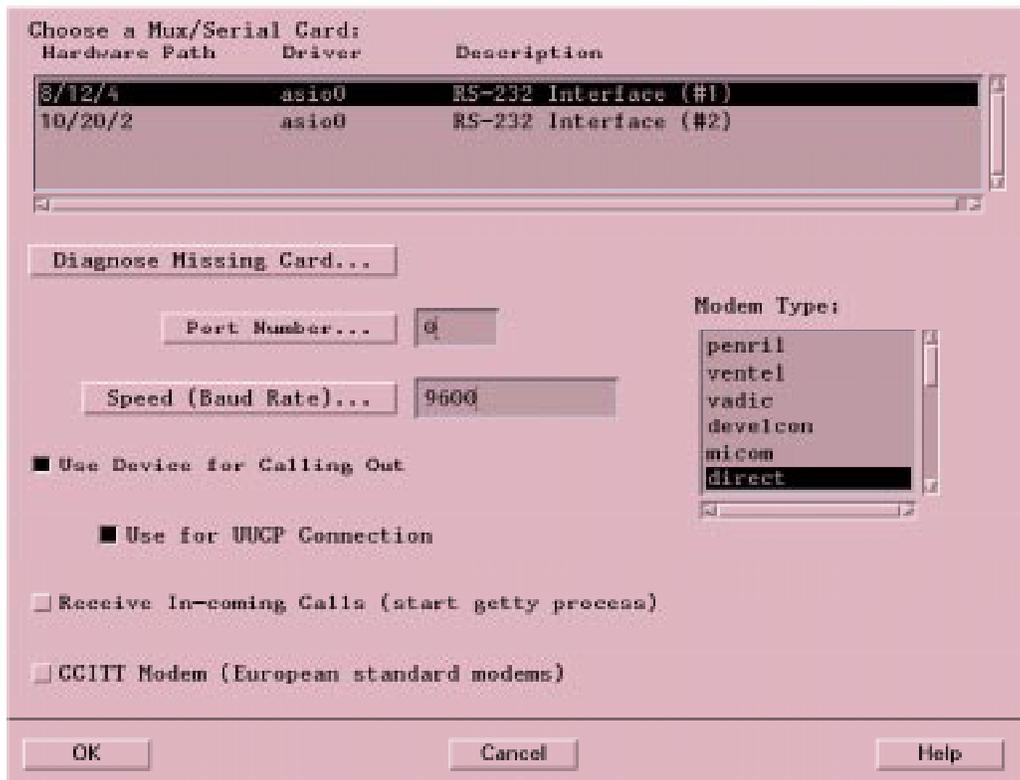
- If making a connection to an 800 server serial interface use the BC16E cable, a 9-pin H8571-J connector, and a 25-pin H8575D connector.
- If making a serial connection to a 700 series workstation use the BC16E cable and two H8571-J connectors.

1.7.3 Terminal Connection

Refer to your terminal documentation for terminal setup instructions.

1.7.4 Setting-up the Serial Line using SAM

Start the System Administrator Utility, SAM, by logging on to the HP system as superuser and typing `sam<CR>`. Select the `<Peripheral Devices>` and then the `<Terminal and Modems>` menu options and enter the Terminal and Modem configuration section. Check if any terminals or modems have been defined on the line to be used for the CLI connection. If any have been defined, delete them via the `<Option>` menu. Next, add a modem via the `<Action>` menu. The following window appears:



Select the options indicated in the window and then select OK.

The following window appears:



Establish the connection with the controller.

1. Now you can access the RAID Array 310 with the command:

cu -l cu10p0 (note that this is the first entry from the list shown above).

2. Press the Enter key. You should see the CLI prompt, which looks similar to: HSZ20>. If no prompt is seen, the serial port may be misconfigured or used by another application. See the “Installing Terminals and Modems” section in HP manual *Installing Peripherals*.

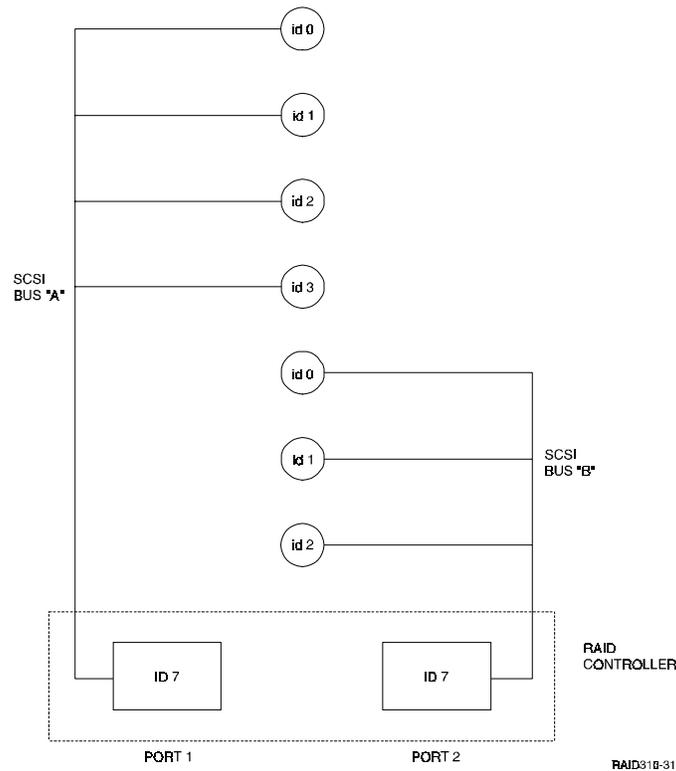
1.7.5 CLI Serial Interface Verification

Entering the CLI command “SHOW THIS_CONTROLLER” causes the controller to display its description banner verifying the serial connection.

1.8 Installing Disk SBBs in the RAID Array 310 Enclosure

You may install the disk drive SBBs into the RAID Array 310 enclosure at this time. To install an SBB, hold it in both hands, insert it into the guide slots, and firmly push it into the shelf until the mounting tabs snap in place. Figure 1–6 shows a layout of the SCSI bus ports and corresponding SCSI ID assignments in the enclosure. Refer to *Chapter 3, Configuration Rules and Restrictions*, included with your system.

Figure 1–6 StorageWorks SCSI Bus Port and Default SCSI ID Assignment



1.9 Charging the RAID Array Controller Cache Battery

The Cache Module in the controller contains a battery that may have discharged since the time it was factory-installed.

CAUTION

Loss of power before the write-back cache battery is fully charged may result in the loss of data.

We recommend that you take this opportunity now to recharge the batteries. This is accomplished by doing the following:

Apply power to the controller by pressing the power switch on the front of the subsystem. You should hear a momentary audible tone (beep), and see the indicator LEDs illuminate. In addition, a green LED on the front panel of the subsystem should flash at approximately one Hz. Power on the subsystem for a minimum of 6 hours to fully charge the battery.

NOTE

The controller cache battery LED will continue to flash after the subsystem is powered off.

Creating an Initial Controller Configuration

This chapter contains instructions for creating an initial configuration for your RAID Array Controller. It also briefly describes the CLI (Command Line Interpreter) and how to access it. The configuration steps include verifying the default configuration, adding drives, creating and initializing RAIDsets, declaring the storagesets as units to the host, and verifying and recording your final configuration.

2.1 Introduction

The RAID Array 310 controller can be configured with CLI commands using a terminal or a PC terminal emulator. The emulator should be connected from the PC to the RAID Array serial interface or via the Command Console GUI interface.

Before configuring the storagesets, an initial check using the CLI interface must be made on the state of the controller. For setting up the GUI, you will also need to set up an initial configuration using the CLI interface. Sections 2.1 through 2.5 describe this process.

The Command Console GUI runs on an Intel-based PC with either Windows 95 or Windows NT. It can be used via the serial interface to the RAID Array 310 or by using a networked connection (TCP/IP) to the host with which the RAID Array is connected. In that case, an agent must be installed on the host system. Chapter 4 describes this process.

The agent communicates with the RAID array through a SCSI interface. At least one storage device must be configured on the RAID Array so that the GUI can communicate with the RAID Array via the agent. Sections 2.5 through 2.7.3 describe this procedure.

2.2 What is the CLI?

The Command Line Interpreter (CLI) is the user interface to the RAID Array Controller. Using a connection between the controller's maintenance port and a Maintenance Terminal, the CLI can be used to view and modify the controller's configuration. The CLI can also be used to access reports and diagnostic tools. This chapter specifies the CLI commands required to create an initial configuration for the controller.

See "Command Line Interpreter" in the RAID Array 310 Configuration and Maintenance Guide for detailed descriptions of all CLI commands.

NOTE

The Maintenance Terminal can be any VT100 compatible terminal or terminal emulator. e.g.:

PC with a terminal emulation program, such as the Microsoft Windows Terminal program. You can also use most commercially-available communications programs. DEC VT100 or compatible terminal. On UNIX systems, 'tip', 'kermit', or 'cu' (see man pages) can be used as terminal emulation program.

2.3 Accessing the CLI

Access the CLI using a maintenance terminal. As an example we will describe the use of a PC with a terminal emulation program being used as a maintenance terminal. Refer to Section 1.7 in Chapter 1 of this guide (*Connecting the CLI Interface*) for a description of how to connect the maintenance terminal to the RAID 310 controller if necessary.

2.3.1 Start the Communications Program

1. Start the 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:
 - 9600 baud
 - 8 bits
 - 1 stop bit
 - No parity

2.3.2 Establish the Connection with the Controller

From your communication 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

```
HSZ20>
```

2.4 Show Initial Configuration

Enter the following command to verify the controller's parameters:

```
HSZ20> SHOW THIS_CONTROLLER FULL
```

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

```

CONTROLLER:
    HSZ20 CX44332211 FIRMWARE V27Z-0, HARDWARE A02
    SCSI ADDRESS 7
    TIME: NOT SET
HOST PORT:
    SCSI TARGET(S) (0, 1, 2) NO PREFERRED TARGETS
CACHE:
    16 MEGABYTE WRITE CACHE, VERSION 2
    CACHE IS GOOD
    BATTERY IS GOOD
    NO UNFLUSHED DATA IN CACHE
    CACHE_FLUSH_TIMER = DEFAULT (10 SECONDS)
    CACHE_POLICY=A
    HOST FUNCTIONALITY MODE=A
LICENSING INFORMATION:
    RAID (RAID OPTION) IS ENABLED, LICENSE KEY IS VALID
    WBCA (WRITEBACK CACHE OPTION) IS ENABLED, LICENSE KEY IS
VALID
    MIRR (DISK MIRRORING OPTION) IS ENABLED, LICENSE KEY IS
VALID
EXTENDED INFORMATION:
    TERMINAL SPEED 9600 BAUD,EIGHT BIT,NO PARITY,1 STOP BIT
    OPERATION CONTROL:0000004 SECURITY STATE CODE:85780
    CONFIGURATION BACKUP DISABLED

```

Examine the display to verify the following information:

Controller SCSI target number is recommended to be set to 0.

If the target number is not 0, use the following commands to set the SCSI target ID for the controller (ensure that there are no other SCSI devices using the same IDs as configured for the RAID Array 310 controller):

```

HSZ20> SET THIS_CONTROLLER ID=0
or
HSZ20> SET THIS_CONTROLLER ID=(0, 1, 2)

```

If you want to use multiple SCSI IDs (as is done in the following examples).

Cache condition should be GOOD

If the Cache condition is BAD then call your sales person for unit service.

Battery condition should be GOOD

If the battery condition is LOW, allow the battery to charge with the subsystem power on for up to 6 hours. The battery must be fully charged to protect the data in the Write Back Cache. If the battery condition is still LOW after 6 hours of charging, then call your sales person for unit service.

NOTE

The subsystem can be configured with the battery condition LOW, however the Write Back Cache cannot be initialized.

You can use the ADD RAIDSET and ADD MIRRORSET commands, regardless of the write-back cache battery condition. However, if the CACHE_POLICY is set to A and the battery is low, the controller does not allow access to any RAIDsets or mirrorsets. CACHE_POLICY A requires that the cache batteries be fully charged before you can use RAIDsets or mirrorsets.

CACHE_POLICY should be A

```
HSZ20> SET THIS_CONTROLLER CACHE_POLICY=A
```

Host function mode must be set to A for HP-UX

```
HSZ20> SET THIS_CONTROLLER HOST_FUNCTION=A
```

License key should be VALID

If the License key is INVALID then enter the following:

```
HSZ20> RUN FLS
```

and follow the menu driven program to enable the license. You will need the WRITE-BACK CACHE, RAID5, and MIRROR License Key page that is provided in the subsystem documentation package.

Configuration backup can be enabled or disabled

Configuration backup will keep RAID Array controller configuration stored on disk, for detailed information regarding configuration backup see the *RAID Array 310 Configuration and Maintenance User's Guide*.

To cause the changed settings on the controller to take effect, restart the controller by:

```
HSZ20> RESTART THIS_CONTROLLER
```

NOTE

Up to 14 devices can be supported by the RAID Array 310 controller, the controller can represent up to 4 target ID's on the Host SCSI-bus.

You can increase the number of addressable units by setting the controller to respond to up to 4 target ID's, as long as those IDs are not used by any other device on the host bus. For example,

```
SET THIS_CONTROLLER ID=(0,1,2,3)
```

would set the controller to respond to any of the four IDs. If you set the controller to more than one ID, you must enclose the numbers with parentheses and separate them with commas.

After the RESTART command is initiated, it can take up to 60 seconds for the "CLI" prompt to re-appear.

2.5 Add Disks to the Configuration

The CONFIG utility locates and adds disks to the controller configuration. Run the CONFIG utility whenever you add new disks to the controller. Enter the following command to start the configuration utility:

```
HSZ20> RUN CONFIG
```

The controller responds with a display similar to that shown below. The disk numbers will correspond to the disk locations for your subsystem. (See Figure 2-1.)

```
Config Local Program Invoked
```

```
Config is building its tables and determining what devices exist  
on the subsystem. Please be patient.
```

```
add disk100 1 0 0  
add disk110 1 1 0  
add disk120 1 2 0  
add disk130 1 3 0  
add disk200 2 0 0  
add disk210 2 1 0  
add disk220 2 2 0
```

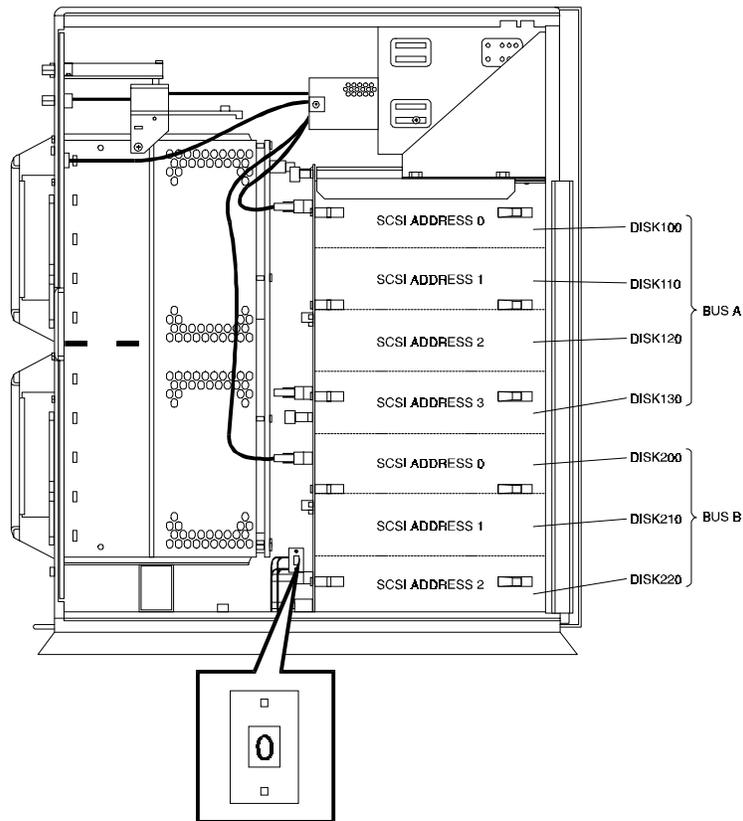
```
Config - Normal Termination
```

In the previous example, the controller has located 7 new disks. The 3 digit number associated with each disk corresponds to Bus Number, Target Number and Logical Unit Number (LUN). The LUN is always 0. DISK100, in this example, corresponds to the disk located on Bus 1, controller Target 0, and LUN 0. DISK210 corresponds to the disk located on Bus 2, controller Target 1, and LUN 0.

If you want to create a RAIDset for RAID 5, follow the guidelines in Section 2.7. For other raidsets, as listed below, follow the guidelines in Appendix D:

- STRIPESet refers to RAID 0
- MIRRORset refers to RAID 1
- Striped MIRRORset refers to RAID 0+1

Figure 2–1 Distribution Example



RAID310-09

2.6 Setting Up a Communications LUN for a Command Console

Before installing the agent on the host system, at least one storage device must be configured on the RAID Array 310. This can be any type of storage device.

Select a storageset that you plan to configure and that is not likely to change. This storageset will also be used by the agent to communicate with the RAID Array. Deleting this storageset (LUN) later will break the connection between the agent and the RAID Array. Create the communications LUN as described in section 2.7 or Appendix D, depending on the type of storageset you want to use.

If an HP 800 system is used with a HP-PB bus SCSI adapter (HP 28696A), a special SCSI driver is needed for the agent to communicate with the RAID Array. This driver is attached to a storage device (SCSI ID, LUN) of the RAID Array. Using this driver prevents the use of that storageset as a normal data device. In order to prevent the loss of a complete storageset as a data device, that set can be broken into partitions. Using a partition with the size of one block for the communication LUN will minimize the loss of storage for data.

Installing and configuring this driver is described in Chapter 3.

DIGITAL recommends using the partitioning scheme for other situations as well.

2.7 Create a RAIDset

The next sections contain examples of two different sets of configuration. Create a RAIDset, Mirrorset, and Stripeset show one set and Create a Striped Mirrorset shows the second set.

If your site requires RAIDsets for storage, you must assign disks to each RAIDset. RAIDsets must have at least three members, and can have as many as fourteen. This example creates one 3-member RAIDsets using the ADD RAIDSET command.

```
HSZ20> ADD RAIDSET RAIDS1 DISK100 DISK200 DISK110
```

In this example, “RAIDS1” is the name 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-defined. Performance of your RAIDsets will be optimized if each RAIDset includes disks from different buses as shown in Figure 2–1. The example above contains disks from two different buses.

2.7.1 Initialize the RAIDset

You must initialize RAIDsets before you can put them into service.

When you initialize a RAIDset, you can specify a chunksize. A chunksize is the number of blocks of data that is transferred to a raidset member at one time. By using the default chunksize, the controller will select a chunksize that works well for most site requirements. Refer to the *RAID Array 310 Configuration and Maintenance Guide* for the specific default chunksize. When no chunksize is specified, the default value is used.

```
HSZ20> INITIALIZE RAIDS1
```

or if the save configuration option is used,

```
HSZ20> INITIALIZE RAIDS1 CHUNKSIZE=DEFAULT SAVE_CONFIGURATION
```

NOTE

Valid chunksizes are 16–682 blocks. You should use a larger chunksize for applications that make a lot of I/O requests. Use a smaller chunksize for applications that make relatively few I/O requests but need to move large amounts of data with each request. When no CHUNKSIZE is specified, the default value is automatically used. Refer to *the RAID Array 310 Configuration and Maintenance Guide* for more detailed information.

The SAVE_CONFIGURATION option can be used to save the controller configuration on the disk(s) defined in the containerset. In case of a controller failure, it is possible to retrieve the configuration information from the failed controller to the new controller. It is advised to use this option on more than one disk in different containersets so that the information is stored in a redundant manner. For detailed information describing this option and the way of retrieving controller information in case of a controller replacement, refer to the *RAID Array 310 Configuration and Maintenance Guide*.

2.7.2 Add the RAIDset as a Logical Unit

To make a RAIDset available to the host computer, you must add it as a host logical unit with a unique unit number. The unit number is a one or three digit number preceded by “D”, such as “D0” or “D102”. The unit number consists of the controller’s target ID and the Logical Unit (LUN) of the RAIDset for the target. Each target ID can have up to eight LUNs, numbered 0–7.

- Units identified with controller target ID 0 have a single digit number which corresponds to the LUN number. For example, D5 would be target 0, LUN 5.
- Units identified with all other controller targets (1–7) use a 3 digit number. The first digit corresponds to the controller target number, the second digit is always 0 and the third digit is the LUN number. For example, D205 would be target 2, LUN 5.

The steps to be taken to configure a partitioned storageset are as follows:

```
HSZ20> create_partition RAIDS0 blocks=1
HSZ20> add unit d0 RAIDS0 partition=1
```

This creates a partition with the size of one block on a storageset named RAIDS0. D0 means SCSI ID 0 LUN 0, which may be different for your particular situation.

This new unit can now be used as a communications LUN during the installation of the agent as described in Chapter 4.

Now create a data partition:

```
HSZ20> show RAIDS0
```

Using this output, you can see the remaining free blocks available for the data part of the storageset.

```
HSZ20> create_partition RAIDS0 blocks=xxxx
```

Where `xxxx` represents the number of free blocks of RAIDS0 identified by the `show` command:

```
HSZ20> add unit D1 RAIDS0 partition=d
```

Where `d` represents the partition number created in the previous command

D1 means SCSI ID 0 LUN 1, which may be different for your situation.

2.7.3 Set Writeback Cache

The final step in creating a RAIDset is to enable the writeback cache. A single CLI command enables that feature for the each RAIDset:

```
HSZ20> SET D0 WRITEBACK_CACHE
```

Where `D0` represents the host logical units of the RAIDsets created above.

2.7.4 Verify and Record Your Configuration

NOTE

Your configuration may be saved on disk using the `SAVE CONFIGURATION` command. Refer to the *RAID Array 310 Configuration and Maintenance Guide* for a detailed description of this command.

You have now completed all the steps required to create an initial configuration on your controller.

Preparing the HP 9000 Series Systems for Use with the StorageWorks Controller

This chapter describes the steps for installing the required device drivers onto HP 9000 Series systems running HP-UX 10.01 or higher. The installation steps include loading the device driver(s) to communicate through the SCSI Adapter to the StorageWorks RAID Array Controller.

3.1 Installing Hardware

Fast wide differential (FWD) host adapters manufactured by HP can be used with the RAID Array 310 and your HP platform. Install the host adapter in your HP system using the instructions provided with the host adapter documentation before preparing the system to interface with the RAID Array 310. FWD SCSI connectors on add-on or existing host adapters are labeled on the rear panel of your 9000 Series computer.

Do not connect or disconnect the SCSI bus cable with the host powered on as it could damage the host adapter or disrupt system operation. If you need to install a host adapter, do it at this time. Perform the usual back-up and shutdown procedures for your host platform. Turn off power to the host and complete the necessary hardware tasks. Then, power on and reboot the host.

Prevent SCSI bus ID conflicts. The host adapter ID is usually 7 and, if other equipment is connected to the external bus, avoid the used SCSI ID's. Use the *ioscan* command described below to determine available device IDs. For optimum RAID array performance, other devices should not be routinely in use on the SCSI bus.

3.2 Installing the Host Device Driver

The procedures for installing HP-UX device driver(s) require you to be familiar with following Hewlett-Packard technical manuals:

- *Installing Peripherals*
- *System Administrator Tasks*
- *How HP-UX Works: Concepts for the System Administrator*

Installing the disk driver on HP-UX requires the following major steps:

- Determine the interface required (Section 3.2.1)
- Verify the availability of the required device driver (Section 3.2.2)
- Reboot the system and verify the successful installation (Section 3.2.5)

3.2.1 Determine the Device Driver Required

The device drivers you will need for the StorageWorks RAID Array Controller are listed in Table 3–1. This driver is software configurable and is a standard part of the HP-UX operating system. Device files are automatically created for each RAID Array 310 device when you follow the procedures listed in this section.

If you use SAM, you will not need more detailed information than given in the following table. However, if you intend to customize your system's configuration, you will need to refer to "*Setting Up Devices Using HP-UX Commands*" in the *Installing Peripherals* manual. If you need more information on minor numbers, see "*Device Files and Minor Numbers*" in the *Installing Peripherals* manual.

Table 3–1 HP 9000 Drivers

HP FWD SCSI Adapters	Drivers
28696A	disc3, scsi3
built-in, A4107A, or A2969A	sdisk, c720

3.2.2 Verify Host Adapter and Driver

Verify that you have the required SCSI Host Adapter and Drivers available to your system.

On a Series 800 System (except for D or K Class machine), type:

```
# ioscan -f -d scsi3
```

The output from this command will be similar to:

Class	I	H/W Path	Driver	S/W State	H/W Type	Description
ext_bus	0	8	scsi3	CLAIMED	INTERFACE	HP 28696A, Fast/Wide SCSI Inter- face

On a Series 700 System, C, D, J or K Class machine, type:

```
# ioscan -f -d c720
```

The output from this command will be similar to:

Class	I	H/W Path	Driver	S/W State	H/W Type	Description
ext_bus	0	8/7	c720	CLAIMED	INTERFACE	GSC built-in, Fast/Wide SCSI Inter- face

3.2.2.1 Editing the Kernel Using SAM

1. Execute SAM.
2. Highlight and open Kernel Configuration
3. Highlight and open Drivers
4. Add the necessary drivers

Use SAM's help system to complete the task or refer to "Adding Device Drivers Using SAM" in the *Installing Peripherals* manual.

3.2.2.2 Editing the Kernel Using Commands (if not using SAM)

1. Edit the kernel configuration file using a text editor.
2. Reconfigure the kernel using the **uxgen** command.

Refer to “*Setting up Devices Using HP-UX Commands*” in the *Installing Peripherals* manual.

3.2.3 HP-UX Series 800 Patch Installation (10.01 only)

Series 800 systems running HP-UX 10.01 require HP kernel patch PHKL_8616 to prevent the SCSI bus from hanging under intensive SCSI I/O conditions. Contact your HP service provider for details about obtaining and installing the patch. Patches and information about the latest patches for HP-UX can be found at HP’s web page:

<http://support.mayfield.hp.com/patches/html/patches.html>

HP also distributes patches on a regular basis.

3.2.4 Set the SCSI Bus Address of the RAID Array Controller

The SCSI bus address for the RAID Array Controller is set by the CLI in Chapter 2 “*Creating an Initial Configuration Using the Command Line Interpreter*.”

3.2.5 Reboot the System and Verify the Successful Installation

NOTE

Before proceeding, the RAID Array Controller must be configured. See “*Creating a Communication Logical Unit*” in Chapter 2.

1. Shutdown the HP system and ensure that all power switches on the RAID Array Controller and on the host computer system are in the off position.
2. Connect the cable between the SCSI adapter’s connector on the back of the HP System and the connector on the front of the RAID Array Controller. This cable is a differential to differential connection and is 3 meters in length.
3. Turn on the power to the RAID Array 450 system.
4. Turn on power to the HP System.
5. During the boot process, device “special” files are created for each logical unit configured on the RAID Array Controller and a Logical Unit (LUN) number is assigned to each storageset configured on the RAID Array Controller.

After rebooting the new kernel, run `ioscan -f` to verify that the drivers are installed, the host adapter status is OK and all the target LUNs are identified.

Installing 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 systems connected to StorageWorks RAID Array 310 subsystems. You can install and configure the CC Agent automatically, using a script, or manually by copying files from the CC Agent distribution CD-ROM and editing Agent configuration and your host system ASCII files.

4.1 Introduction

Command Console (CC) Agent for HP-UX 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 storage subsystems. CC Agent runs on your host system as a server application. It connects to CC Client sessions via the TCP/IP network protocol.

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 subsystem and provides local and remote notification in the event of a failure. Local notification can be made via E-mail 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 subsystem, use of the CC Client or the CLI would be required.

CC Agent provides a network connection between a host storage subsystem and any number of CC Client sessions running on remote systems. Agent provides access protection on a network address-by-network address basis. You can configure Agent to allow, for instance, one Client session complete configuration access to the storage subsystem, and another Client session might only monitoring capability.

Agent also provides asynchronous fault notification. The program monitors your host's storage subsystems and sends notification messages to all Client sessions connected to it the moment a fault occurs. You can configure Agent to use TCP notification to Client and SNMP notification to an SNMP-compatible monitoring application.

4.2 Minimum System Requirements

Agent requires the minimum host system resources shown in Table 4-1. The program is designed to operate with Command Console Client Version 1.0 for Windows NT[®] and Windows 95[®].

Table 4–1 Minimum System Requirements

Host Feature	Requirement
Architecture	HP 9000 Series 800, 735, 755, C, D, J, or K-class computer, 2 MB free space in /tmp directory, and 4 MB free space for Agent installation directory
Operating System	HP-UX version 10.01, 10.10 or 10.20
Controller Compatibility	StorageWorks 2 or 6-port controller running operating firmware Version 3.0, 5.0 or higher.

4.3 Installing and Configuring CC Agent for HP-UX®

CC Agent is the CC Client's (the Graphical User Interface) network assistant. You must install and run CC Agent for HP-UX on each host system you wish to connect to the CC Client over the network.

Before you can install an Agent:

- Your host's system resources must meet the minimum requirements specified in Section 4.2.
- You must have created at least one volume (unit) on each storage subsystem to which you want to connect. If your subsystems do not each contain at least one volume, see Chapter 2 to use the controller's command line interpreter (CLI) software to create one. Subsystems without at least one volume are invisible to Agent and the host operating system.

The fastest and most user-friendly method of configuring an Agent is to use the configuration script. Use of the script is the recommended method for Agent configuration. To install automatically, using the script, go to Section 4.4.

If you wish, however, you can manually configure the Agent by editing the Agent's configuration files with a text editor. To configure the Agent manually, go to Appendix C.

4.4 Installing and Configuring Automatically

The install program performs the installation at the local host. You must have access to the superuser (root) account on the host.

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

1. Place the Command Console CD-ROM in your local system's CD-ROM drive.
2. Mount the CD-ROM. (e.g., `mount /dev/dsk/c1t2d0 /cdrom`).
3. Change directories to /tmp. Type, `cd /tmp`.
4. Unpack the `stm_hp.tar` file in /tmp. Type,
5. `tar xvf /mount_point/AGENTS/STM310_HP.TAR`
6. To start the installation and configuration scripts, type, `./stgwrks.sh`

The installation program begins, displaying the following:

At the copyright screen, press the ENTER key and the installation menu is displayed.

```

*****
*   Agent and SCSI pass-through driver   *
*           Installation Script           *
*****
1.  Install the SCSI pass-through driver
    for 800 series NIO systems.
NOTE: SYSTEM WILL NEED TO BE REBOOTED
2.  Install Agent for all HP-UX systems.
3.  Configure the Agent.
4.  Exit.

```

NOTE

The boxed entries in the following example are inquiries from the platform. The text following the entries is a suggested response for the initial install.

Select **1** to install the SCSI pass-thru driver in 800 series NIO systems. Do not select for other HP series 9000 platforms. If you are not sure select **1** and the software will check your machine and exit back to the menu if selection **1** does not need to be run. If the install should be done, the session will continue as follows:

```

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

Current user is root.

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

```

Type **y**, then the **ENTER** key.

```

You are running an 800 NIO system.

Do you want to continue adding a pass-
through driver for a new device? [Y,n] :

```

Type **y** then the **ENTER** key.

```

Available Host Adapters:
ext_bus 0 8 scsi3 CLAIMED INTERFACE HP 28696A- Wide SCSI ID=7
Please enter the H/W Path of the host
adapter that the RAID array is connected to. ---->

```

From the ioscan line display for this example, Type **8**, then the **ENTER** key. Check this digit position on your display.

```

Please enter the Target of the pass-through device. ---->

```

This is the SCSI target assigned to communicate with the SCSI pass-thru driver (the communication LUN that was created previously, see Chapter 2 for details). For this example, Type **0**, then the **ENTER** key.

```
Please enter the LUN of the pass-through device. ---->
```

This is the SCSI LUN assigned to communicate with the SCSI pass-thru driver in Chapter 2. For this example, Type **0**, then the **ENTER** key.

```
The H/W Path of the host adapter device is: 8
The Target of the pass-through device is: 0
The LUN of the pass-through device is: 0
Do you want to make any changes? [y,N]
```

Type **n**, then the **ENTER** key.

```
Building new kernel...
Compiling conf.c...
Loading the kernel...

Old kernel is saved as /stand/vmunix.prev
Do you want to reboot? [Y,n] :
System needs to be rebooted to use new kernel.
```

If you don't reboot, the install script again displays the menu (note that you must reboot the system before you can start the CC Agent).

If you do reboot, restart the installation and configuration script.

Example: `/opt/steam/bin/stgwrks.sh`

Next, install the Agent; type **2** the **ENTER** key.

After the copyright, select install agent (2) from the main menu.

After the copyright message, the user is checked for root privilege.

When root user has been determined, the script confirms:

```
Current user is root.

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

Type **y**, then the **ENTER** key.

```
Enter the name for the passthrough device special file.
This will be created as /dev/rdisk/_____
default is spt.
```

The install script prompts for the name of the device special file. Type the **ENTER** key to keep the name `spt` or type the `NEW_NAME` then **ENTER**.

```
Enter the target of the passthrough RAID device.

If the target is not known then see the Getting Started Manual on creating a
communications LUN.
Target :
```

For this example, type **0**, then the **ENTER** key.

```
Enter the LUN of the passthrough RAID device.

If the LUN is not known then see the Getting Started Manual on creating a
communications LUN.
LUN :
```

For this example, type **0**, then the **ENTER** key.

```
Waiting...
Class      I  H/W Path  Driver    S/W State H/W Type  Description
ext_bus    0  8         scsi3     CLAIMED   INTERFACE HP 28696A - Fast/Wide SCSI
Interface
ext_bus    2  16        scsi3     CLAIMED   INTERFACE HP 28696A - Fast/Wide SCSI
Interface

Enter the hex Instance number of the host
adapter that the array is connected to.
(Column I in table above)
Instance #:
```

For this example, type **0**, then the **ENTER** key.

```
The special file /dev/rdsk/spt will be created
for Instance 0, target 0, LUN 0.
Do you want to make any changes [y,N] :
```

Type **n**, then the **ENTER** key.

Pass-through driver special file /dev/rdsk/spt has been created. Press **ENTER** to continue.

```
Enter a target directory for installation
or press return to use the default (default = /opt) :
```

Type **/opt**, then the **ENTER** key.

Change this only if you want to install to other than the default area /opt. Type the **ENTER** key.

```
Installing the STEAM Agent in /opt/steam.

Is this okay? [Y,n]
```

Type **y**, then the **ENTER** key.

```
Adding an entry to /etc/services for the Client using port 4998 Is this OK? [Y,n]
```

Specifies the port number the installation program will assign for the Command Console Client GUI to communicate with the Command Console Agent. If the default port is already used, press N and specify a new even-numbered port. Type **y**, then the **ENTER** key.

```
Adding an entry to /etc/services for STEAM AGENT using port 4999 Is this OK? [Y,n] y
```

Specifies the port number the installation program will assign for the Command Console Agent to send notifications to the Command Console Client GUI. If the default port is already used, press N and specify a new port (port specified above + 1).

Type **y**, then the **ENTER** key.

```
Updating inittab file...done
```

The Install program updates the *inittab* file so that every time the host system boots the Agent starts.

```
Enter the directory which contains the device special files .
```

Type **/dev/rdsk**, then the **ENTER** key.

```
Enter a password for use with the STEAM Agent (4->16 characters):
Verify the password :
```

To Configure the subsystem using the Command Console GUI, you need to setup a password. The install program does not echo what you type.

```
The STEAM Agent can operate with other SNMP applications. For this reason, it needs
information about the Agent manufacturer and the Enterprise object identifier for
use with its MIB.
```

Enter the name of the Agent manufacturer (no default) :

Type, **Digital Equipment Corp.**, then the **ENTER** key.

```
The Enterprise OID can be customized. Note that this value
must be consistent with the Agent's MIB!
The default vendor-specific setting is "36.2.15.21."
```

Would you like to enter a new value? [y, n] :

Type **n**, then the **ENTER** key.

```
Adding a Client system
-----
Enter the host name of the Client system :
```

In the event of a component failure, the CC Agent is capable of providing local or remote notification. Local notification is provided via e-mail and a system error log. Remote notification is provided to the command console for display or paging. Users that wish to only have local HP platform notification can disable messages to the client by entering the following information during CC Agent installation or Agent Maintenance (Adding a Client System):

Enter the host name of the Client System: **local host**

Enter the Access Level: **0**

Enter the notification Level: **0**

```
Specify names for the hosts from which you will run the GUI.
Enter the host name of the Client system :
```

Type "host_name" of the machine running the GUI, then the **ENTER** key.

```
Enter the subsystem access privilege (which controls the level of access a client
has for communicating with the storage subsystems).
The possible options are:
```

- 0 = Overall Status
 Monitor Event Changes with Notification
- 1 = Detailed Status
 View Event Changes with the GUI
- 2 = Configuration

All of the options in this category

Enter Access Level (0, 1, 2) :

Type **2**, then press the **ENTER** key.

```
The Agent server can notify a client when an error condition occurs.
Notification schemes available are:
```

- 0 = No Error Notification
 (Still have E-Mail and Syslog)

```
1 = Notification via a TCP/IP Socket
(E-Mail, syslog, GUI shows color status indications.)
2 = Notification via the SNMP protocol
(E-Mail, syslog, and Informed of only predefined events)
3 = Notification via both TCP/IP and SNMP
(All of the options in this category)
Enter Error Notification Level (0, 1, 2, 3) :
```

Type **1**, then the **ENTER** key.

```
Adding client--
name: <host name>
access level: 2
error notification: 0
Is this information correct? [Y,n]
```

Verify the information then type **y** or **n**, and then **ENTER** key.

```
Would you like to add another client? [y,N]
```

Type **n**, then press the **ENTER** key.

```
Adding a storage subsystem
-----
Enter subsystem host name :
```

Enter the subsystem name, e.g. **hp_storage1**, and then press the **ENTER** key.

```
Enter the character special file name for accessing the storage subsystem
(e.g. "rrzal9c" or "spt" or "hdisk4")
```

Enter the device name e.g. **spt** and press the **ENTER** key.

```
Enter monitoring interval, in seconds (0 => no monitoring):
```

Type **120**, then the **ENTER** key.

Enter the interval of the notification in seconds.

```
Adding subsystem--
name: hp_storage1
access device: /dev/rdisk/spt
monitoring interval: 120
Is this information correct? [Y,n]
```

Verify the information type **y** or **n**, and the **ENTER** key

```
Would you like to add another subsystem? [y,N]
```

Type **y** or **n**, and then the **ENTER** key.

```
Would you like to enable mail notification? [Y,n]
```

Type **y**, then the **ENTER** key.

```
Adding a User for Mail Notification
Enter the e-mail address of the user:
```

Type the User e-mail address, then the **ENTER** key.

```
Enter the error notification level for this user.
The user will be notified of errors at this level and above.
The possible options are:
1 = Fatal Errors
2 = Warning and Fatal Errors
3 = Info, Warning and Fatal Errors
Enter Notification Level (1, 2, 3) :
```

Type **1**, then the **ENTER** key.

```
Adding Notification User-- name:
Error Notification Level: Fatal Errors
Is this information correct? [Y,n]
```

Type **y**, then the **ENTER** key.

```
Would you like to add another user? [y,N]
```

Type **n**, then the **ENTER** key.

```
Authorized mail notification list
Username      Notification Level
-- Hit RETURN to continue --
The STEAM Agent package has been successfully installed.
Would you like to execute the Agent now? [Y,n]
```

Type **y**, then the **ENTER** key.

```
The STEAM Agent has been started.
The installation process is complete.
*****
* Enterprise Storage Management (steam) *
* Agent and SCSI pass-through driver *
* Installation Script *
*****
1. Install the SCSI pass-through driver
   for 800 series NIO systems.
   NOTE: SYSTEM WILL NEED TO BE REBOOTED
2. Install Agent for all HP-UX systems.
3. Configure the Agent.
4. Exit.
-----
Select a number :4
```

Type **4**, and then the **ENTER** key.

The StorageWorks and Command Console Agent Installation and Configuration Menu. You can make configuration changes at any time by typing:

```
/installation_directory/steam/bin/stgwrks.sh
```

This allows changes to be made to the configuration and operation of the CC Agent. When the Agent Maintenance Option is selected and changes are made to the CC Agent, it must be restarted for changes to become effective. The changes which require a restart of the CC Agent include:

- Change Agent Password
- Change SNMP Enterprise OID
- Add, Remove or Modify a Client
- Add, Remove or Modify a Subsystem
- Toggle Error Log Notification

To restart the CC Agent from the Agent Maintenance Menu:

- Select Start/Stop the Agent from the Agent Maintenance Menu
- If STEAM Agent is Running is displayed, enter **y** to terminate the Agent. Then repeat the menu selection and enter **y** to start the Agent.
- If STEAM Agent is Not Running is displayed, enter **y** to start the Agent.

Type **y**, then press the **ENTER** key.

```

                                RAID Array 310 v3.1 Configuration Menu
                                -----
Agent Admin Options                Storage Subsystem Options
-----
1) Change Agent Password           12) View Subsystems
2) Change SNMP Enterprise OID      13) Add a Subsystem
3) Start/Stop the Agent            14) Remove a Subsystem
4) Toggle Agent Startup on Boot    15) Modify a Subsystem
5) Uninstall Agent

Agent Notification Options          Client Options
-----
6) Toggle Error Log Notification    16) View Clients
7) Toggle Mail Notification         17) Add a Client
8) View Mail Notification List      18) Remove a Client
9) Add User to Mail Notification List 19) Modify a Client
10) Remove User from Mail Notification List
11) Modify Mail Notification List

Exit:
----
    Q) Quit
    
```

For example to stop the Agent type **3**, then the **ENTER** key.

```

Agent Start/Stop
-----
The STEAM Agent's current state is : RUNNING
Would you like to terminate it? [Y,n]
    
```

NOTE

If you type “y”, the output is shown below. Be sure to re-enter the configuration menu and restart the Agent.

Type **y**, then press the **ENTER** key.

```
The STEAM Agent has been terminated.  
  
-- Hit RETURN to continue --
```

The Agent configuration menu is displayed again.

Type **q**, then the **ENTER** key to return to the main menu.

4.5 Running CC Agent

Your Agent program was automatically started when you installed it, and it was installed to restart automatically if 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 “swcc”.

4.6 Reconfiguring CC Agent

You can reconfigure previously-installed Agents using the configuration program. To reconfigure an Agent, execute the “config.sh” Bourne-shell script in the “/installation_directory/steam/bin” subdirectory and follow the prompts.

4.7 Uninstalling CC Agent

You can remove any Agent program using the uninstall program. You have two options to remove an Agent:

- Run the Agent configuration script on the host and Select Option 5. Run the “config.sh” script in the “/installation_directory/steam/bin” subdirectory.
- Run the Agent uninstall script on the host. Execute the command:

```
# /installation_directory/steam/bin/uninstal.sh /installation_directory
```

If you do not know what the location is, examine the file “/etc/.STEAMDIR”.

4.8 What To Do Next

The HP-UX operating system has now been modified to communicate with the RAID Array Controller. In order to use the RAID Array from the HP System, you must do the following steps:

1. Create new storagesets on your RAID Array and assign SCSI target and LUN IDs to each storageset created. You can use either the CLI (see Appendix C) or the Command Console Client (see Appendix D). LUNs created on the Array must be assigned consecutively starting with LUN 0.
2. To make the storagesets available to the HP-UX System do the following:
3. At the system prompt, type **ioscan -f**, then press the **ENTER** key. Verify that the HP System acknowledges the new hardware.

4. Type **insf -e**, then press the **ENTER** key. The HP system will create the device special files needed to communicate with each storage set. (Use **ioscan -nf** to verify).

Use SAM to set up the filesystem or refer to the *System Administration Tasks* manual for instructions on the following tasks:

- Adding the RAID storage set to volume groups
- Creating file systems or swap area in logical volumes
- Determining the mount point directory on your system
- Using the **mount** command to mount the device on your system
- Editing the */etc/checklist* file if you want this device mounted each time you boot the system.

NOTE

If changes are made on the RAID Array 310 before they are removed from the system, they cannot be removed from the system with SAM. If configuration changes are required in the RAID Array 310 that affect the file system, make the changes in the following order:

Back up your filesystem.

Unmount the units that are changing in the file system.

Remove the changed areas from the file system. Use SAM or operating system level commands.

Re-configure the RAID array.

Add the new configuration to the file system.

Restore your back up to your new file system.

If you wish to install the Command Console Client at this point, proceed to Appendix B.

Installing the Command Console Client

This chapter describes how to install a copy of the Command Console (CC) Client on each of your client systems.

5.1 Introduction

The Command Console (CC) Client is the Graphical User Interface (GUI) for configuring and monitoring your StorageWorks RAID Array 310 subsystem. It runs only on an Intel PC with Windows 95 or Windows NT. Install the Client software on your system using the information described below.

5.2 Installing the Client Program

NOTE

The version of Command Console that is bundled with StorageWorks RAID Arrays is licensed to manage a single array on one host server. To manage multiple hosts from a client management station, Command Console Plus must be purchased.

Install a copy of the Command Console Client program on each of the Intel-based systems on your network from which you want to configure or monitor a StorageWorks RAID Array 310 subsystem.

Before you can install Client, make sure that the system you'll be installing it on meets the minimum requirements listed in Table 5-1.

Table 5-1 Minimum CC Client System Requirements

Architecture	Intel 486/66 MHz, 16 MB memory, 10 MB free disk space, CD-ROM drive
Operating system	Windows NT 3.51 (build 1057 or later) or Windows 95 (build 950 or later)
Graphics Subsystem	SVGA or better. 800 x 600 minimum screen resolution.
Input devices	Keyboard, mouse
Modem	Optional
Serial port (for connection via serial port only)	Standard, PC serial port capable of at least 9600 baud.
Network adapter	TCP/IP-compatible network .
Controller compatibility	Controller running operating firmware Version 3.1 or higher.

NOTE

To ensure a complete installation, uninstall Command Console before replacing it with another version.

To install Command Console on Windows NT:

1. Place the RAID 310 CD in the CD-ROM drive.
2. Open the File menu in the Program Manager.
3. Select the RUN option.
4. In the text box, type **drive_letter:\client\install** and click OK.
5. Follow the instructions in the setup program to complete the installation.

To install Command Console on Windows 95:

1. Place the CD in the CD-ROM drive.
2. Select “My Computer”.
3. Double click on the CD-ROM drive icon.
4. Double click on the “client” icon.
5. Double click on “install.bat” icon.
6. Follow the instructions in the setup program to complete the installation.

Your Client program is installed!

Repeat these steps to install a copy of CC client on each of the systems from which you want to configure and monitor a StorageWorks RAID Array 310 subsystem.

This completes the installation of the Command Console Client. Refer to Appendix D to start it.

5.3 Uninstalling Command Console

To uninstall Command Console, click the “Remove Command Console” icon in Windows NT. In Windows 95, use the “Add/Remove Programs” utility in the Control Panel.



Configuration Records – Blank Forms

This appendix contains copies of the two tables used in Chapter 2 to record the configuration of your system. If additional copies are required, these tables can be reproduced as necessary.

Configuration Guidelines

This appendix contains a list of guidelines that will assist in optimizing the performance of your RAID Array 310 Subsystem.

Use the following guidelines, as appropriate, to optimize you system performance.

1. Evenly distribute the devices across separate ports. This permits parallel activities on the controller's available ports to the attached devices.
2. Intermix higher and lower performance devices on the same port, that is, use 7200 rpm and 5400 rpm drives on the same port.
3. Evenly distribute logical units across separate targets, that is, use different SCSI IDs, if possible. RAID Array 310 supports a maximum of four SCSI IDs.
4. Avoid configuring multiple mirrorsets with the first members being on the same port. That is use:

```
add mirrorset m1 disk100 disk200
add mirrorset m2 disk210 disk110
```

Instead of using:

```
add mirrorset m1 disk100 disk200
add mirrorset m2 disk110 disk110
```

The default mirrorset read selection algorithm will choose the first member of the mirrorset if the mirrorset does not already have a read queue.

5. If write performance is important, the writeback cache should be turned ON for each unit. The default value is OFF.
6. If transfer sizes are small (less than 8 KB), use the default maximum_cached_transfer size (32). Transfers that exceed the default maximum_cached_transfer size will never go into the cache. For most random access benchmarks, it is best to set this number high (for example, 1024).



Upgrading Controller Software

This appendix contains the procedures for backing up and upgrading the controller software.

C.1 Backing Up Your System

Before performing the upgrade, backup all data and files from your RAID Array 310 subsystem.

C.2 Saving the RAID Array 310 Configuration

In the following steps, you need to record your configuration for use in the event that the configuration is not correctly preserved during the software upgrade.

First, record the controller configuration. Display the controller info by using the CLI command:

```
HSZ20> show this_controller full
```

Record the following information in the blanks below (SCSI Targets, Preferred Targets, Cache Flush Timer, Cache Policy, and Host Functionality Mode):

Fill in the blanks below.

```
Controller:
  ZG43700116 HSZ20 Controller Software, Hardware  A02
  Not configured for dual-redundancy
  SCSI address 7
  Time: NOT SET
Host port:
  SCSI target(s) _____ Preferred target(s) _____
Cache:
  16 megabyte write cache, version 2
  Cache is GOOD
  Battery is GOOD
  No unflushed data in cache
  CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
  CACHE_POLICY = _____
  Host Functionality Mode = A
Licensing information:
  RAID (RAID Option) is ENABLED, license key is VALID
  WBCA (Writeback Cache Option) is ENABLED, license key
  is VALID
  MIRR (Disk Mirroring Option) is ENABLED, license key
  is VALID
```

Extended information:

Terminal speed 9600 baud, eight bit, no parity, 1 stop
bit
Operation control: 00000004 Security state code:
95018
Configuration backup disabled

C.2.1 Record Logical Units

List the Logical Units by entering:

HSZ20> **show unit full**

LUN	Uses
D100	S28
Switches:	
RUN	NOWRITE_PROTECT READ_CACHE
WRITEBACK_CACHE	
MAXIMUM_CACHED_TRANSFER_SIZE = 32	
State:	
ONLINE to this controller	
Not reserved	
PREFERRED_PATH = THIS_CONTROLLER	
Size: 20547350 blocks	
D200	M1
Switches:	
RUN	NOWRITE_PROTECT READ_CACHE
WRITEBACK_CACHE	
MAXIMUM_CACHED_TRANSFER_SIZE = 32	
State:	
ONLINE to this controller	
Not reserved	
PREFERRED_PATH = THIS_CONTROLLER	
Size: 4109470 blocks	

Record, and mark when enabled, the information in the following table. The top line shows how to record entries for D100 of the sample.

C.3 Upgrading Controller Software Using Windows NT

To upgrade software on these subsystems to Version V31Z, copy a new version of the software image from the CD-ROM, on which the new software image was distributed, to the controller. To do this, you need the following:

- The software distribution CD-ROM that came in the StorageWorks RAID Array 310 upgrade kit.
- Windows 3.1 or 3.11, Windows for WorkGroups, Windows NT, or Windows 95 running on a PC with a CD-ROM drive and a serial connection to the RAID Array subsystem.
- A terminal emulation program that runs the Kermit protocol and supports binary transfers.

In addition, stop any terminate-and-stay-ready (TSR) programs, such as screen savers, that may be running on that server.

It takes approximately 40 minutes to download the new software image at 19200 baud. To begin upgrading the controller software, start and setup the terminal emulation program as specified below.

NOTE

If you are using Windows 95 or Windows NT 4.0, skip to section C.5.

C.4 Windows NT 3.51 Procedures

1. Open the Windows *Accessories* and click to highlight the *Terminal* program.
2. Select *File* from the menu bar and click *Copy* or *F8* to copy the Terminal icon. Change the group name from Accessories to RAID Manager or Command Console. (This step is optional).
3. If you copied Terminal to either the RAID Manager or Command Console group, go to that group now.
4. Click on *Terminal* to highlight the icon.
5. Click *File* from the menu bar followed by *Properties*. From the Properties menu:
 - Change the icon description name from Terminal to HSZ Term.
 - Press the Tab key which highlights **TERMINAL.EXE**. Now press the right arrow cursor key once. Next, press the spacebar and type: *HSZ.TRM*. Click the OK button.

6. Double-click the HSZ term icon. You should receive the error message, “Cannot find the settings file HSZ.TRM”. Click *OK*. After the Terminal Program starts, select the *Communications* option from the *Settings* menu. Set these communication parameters:
 - Baud rate = 9600
 - Data Bits = 8 (default)
 - Stop Bits = 1(default)
 - Parity = None (default)
 - Flow Control = Xon/Xoff (default) or None
 - Connector = (appropriate Com port)
7. Click *File* from the Terminal menu bar and choose *Save As...*. Type in HSZ.TRM. Click *OK*.

NOTE

It is recommended that the window be maximized while upgrading the firmware or when running other diagnostics.

Click *OK* when you complete the settings.

Press the Enter key and the default prompt appears.

8. Set the controller prompt by typing:

```
set this_controller prompt=HSZ20>
```

NOTE

Wherever “HSZ20>” is the string, it should be 1 to 16 characters long and enclosed in quotes.

9. To change the controller's baud rate to 19200, type:

```
set this_controller terminal_speed=19200
```

10. Change the Terminal program’s baud rate to match the controller's.

NOTE

Remember to change the Command Console software baud rate from 9600 to 19200.

11. Press the Enter key and the HSZ20> prompt appears. Now you are ready to begin downloading the software.

C.4.1 Downloading the Software

To download the new software, follow these steps:

1. Insert the distribution CD-ROM containing the binary file of the new software image into a CD-ROM drive of a computer connected to the RAID Array controller.
2. Copy the firmware image from the CD-ROM software directory (\firmware\v3.1) into a temporary directory on the system disk.
3. Start the terminal program with the communications settings as specified above.
4. Press the *Enter* key to get to the HSZ20> prompt.
5. Invoke the CLCP utility, at the HSZ20> prompt, type: **run clcp**.

```
Select an option from the following list:
```

```
Code Load and Patch Utility Main Menu
```

```
0: Exit
```

```
1: Enter Code LOAD utility
```

```
2: Enter Code PATCH utility
```

```
Enter option number (0..2) ? 1
```

6. Type: **1** and press Return. The utility displays the following message:

```
You have selected the Code Load Utility. This utility is used to
load a new software image into the program card currently inserted
in the controller.
```

```
Type ^Y or ^C (then RETURN) at any time to abort code load.
```

```
The code image may be loaded using SCSI Write Buffer commands
through the SCSI Host Port, or using KERMIT protocol through the
Maintenance Terminal Port.
```

```
0: Exit
```

```
1: Enter the SCSI Host Port
```

```
2: Use the Maintenance Terminal Port
```

```
Enter option number (0..2) [0] ? 2
```

7. Type: **2** and press the Return key. The utility displays the following message:

```
-----
```

```
Perform the following steps before continuing:
```

```
*get new image file on the serial line host computer
```

```
*configure KERMIT with the following parameters:
```

```
terminal speed 19200 baud, eight bit, no parity, 1 stop bit
```

```
It will take approximately 35 to 45 minutes to perform the code load
operation.
```

```
WARNING: proceeding with Code Load will overwrite the current
content of your program code with a new image. Enter Y (then RETURN)
to continue
```

```
[N] ? y
```

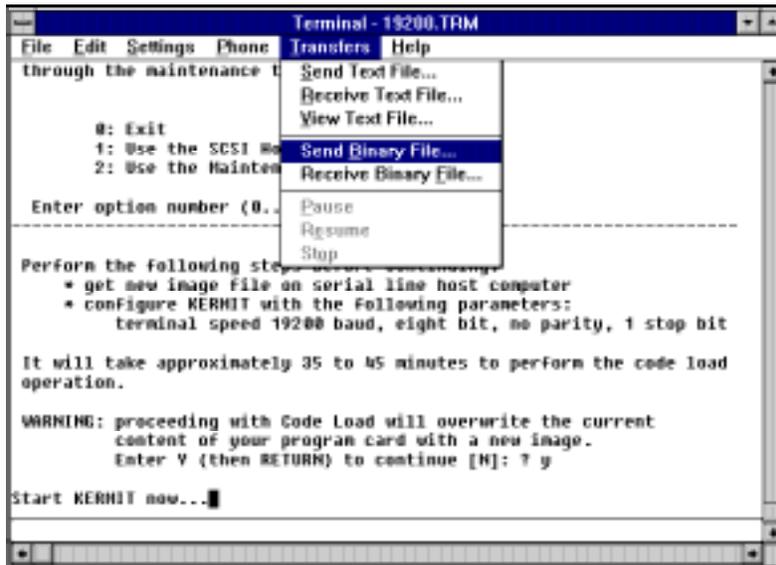
```
Start KERMIT now...
```

8. Exit any MS-Windows sessions and select *Binary Transfers* from the *Settings* menu to start Kermit.
9. Select *Kermit* and click *OK*.
10. Select *Send Binary File* from the *Transfers* menu to begin downloading the new software as shown in Figure B-1

CAUTION

You must use a binary transfer mode. Failure to use a binary transfer mode will result in corruption of the controller software.

Figure C-1 Select Send Binary Files from the Transfers Menu

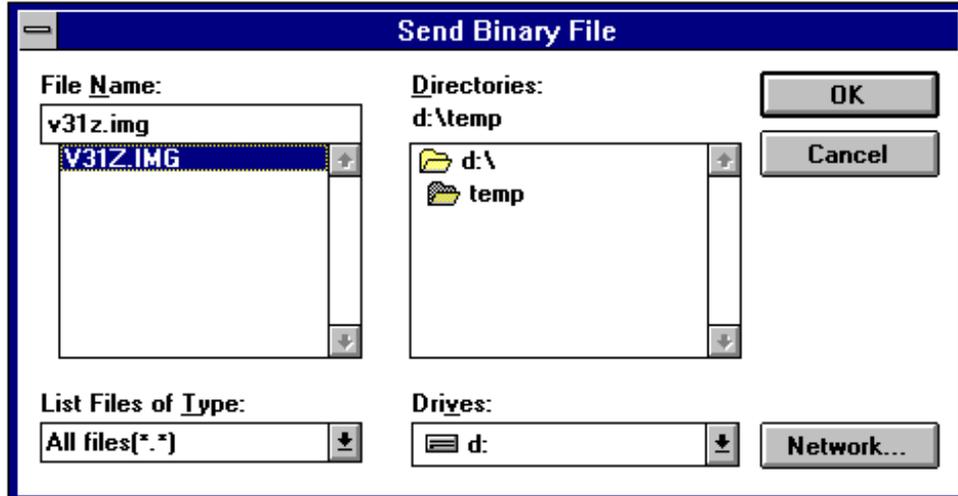


11. Select the V31Z.IMG file and Click *OK* as shown in figure C-2.

NOTE

The following figures show a sample software version level and not the software version level that you will actually download. The correct software version level is specified in the text of this procedure.

Figure C-2 Select the V31Z.IMG File



When the download completes, the utility displays the following message before reprogramming the controller's program care:

CAUTION

Do not interrupt the power to the RAID subsystem while the CLCP Utility reprograms the controller. The CLCP utility saves the software in non-volatile RAM on the controller. Any interruption of this procedure will result in the inability of the subsystem to reboot.

```
KERMIT file transferred successfully.
Program card is being re-programmed with new file.
```

```
*** Do not interrupt this step ***
```

```
Manufacturer code read from memory card= 8989
```

```
Device Code read from memory card= bdbd
```

12. If the main menu appears, press 0 to exit the utility.
13. Verify that this process successfully copied the new version of the software onto the controller.

At the CLI prompt, type :

```
HSZ20> show this_controller
```

The CLI displays information indicating the current software version of the controller similar to the following:

```
Controller Model: HSZ20
Serial Number: CX54300265 Hardware version: A02(02)
Software Version:V31Z
Informational Report
Instance Code: 0102030A
Last Failure Code:86000020 (No Last Failure Parameters)
Controller:
    HSZ20 CX54300265 Software V31Z, Hardware A02
    Not configured for dual-redundancy
    SCSI address 7
    Time: NOT SET
Host Port:
    SCSI target(s) (0, 1, 2, 3), Preferred target(s)
    (0, 1, 2, 3)
    TRANSFER_RATE_REQUESTED = 10MB
Cache:
16 megabyte write cache, version 2
Cache is GOOD
Battery is GOOD
No unflushed data in cache
CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
CACHE_POLICY = A
Host Functionality Mode = A.
```

C.5 Firmware Upgrade Procedures for Windows 95 and Windows NT 4.0

Before beginning, connect a serial line between the com port on your PC and the serial port on the RAID Array 310. To begin upgrading the controller software, start and set up the terminal emulation program as specified below:

1. Click the *Start* button and cursor to the Program menu. At the right of the menu bar, highlight *Accessories*.
2. To the right of *Accessories*, select *Hyperterminal*. Click the *Hyperterminal* menu to create a new terminal session.
3. Enter *HSZ Term* as the Connection Description name. Press the *Tab* key once and select the *OK* icon.

- At the “Connect To” menu, change the connection settings for your particular system setup by pressing the *Enter* key. Choose the appropriate com port for your system and click *OK*.

NOTE

COM1 is the default connection setting.

- Change the Port Settings baud rate from 2400 to 9600 bits per second.
- Select *Xon/Xoff* or *None* as the Flow Control setting. Click *OK*. This will return you to your newly-created Terminal session.
- Press the *Enter* key again and you should receive the default prompt. At the prompt, type ?. The controller will provide a list of available commands.

NOTE

For a list of additional command options, type the command followed by a space plus a ?.

- Click *File* at the menu bar. Choose *Save*, to save the configuration you have just created.
- Set the controller prompt by typing at the prompt:

```
set this_controller prompt="HSZ20>"
```

NOTE

Wherever the controller prompt is HSZ20>, its string should be 1 to 16 characters long and enclosed in quotes.

- Change the controller’s baud rate to 19200 by typing:

```
HSZ20> set this_controller terminal_speed=19200
```

- Change the Terminal’s baud rate to match the controller’s.

CAUTION

Remember to change the Command Console software baud rate from 9600 to 19200.

- Press the *Enter* key and the HSZ20> prompt appears. Now you are ready to begin downloading the software.

C.5.1 Downloading the Software

To download the new software, follow these steps:

NOTE

The Code Load/Code Patch (CLCP) Utility messages shown are for a RAID Array 310 Subsystem. The CLCP Utility messages for other RAID Array subsystems are similar.

1. Insert the distribution CD-ROM containing the binary file of the new software image into a CD-ROM drive of a computer connected to the RAID Array controller.
2. Copy the firmware image from the CD-ROM software directory - *D:\firmware\v31z.img* onto a temporary directory on the system disk.
3. Start the terminal program with the communications settings as specified above.
4. Press the *Enter* key to get to the HSZ20> prompt.
5. Invoke the CLCP utility, at the HSZ20> prompt, type: **run clcp**.

Select an option from the following list:

Code Load and Patch Utility Main Menu

- 0: Exit
- 1: Enter Code LOAD utility
- 2: Enter Code PATCH utility

Enter option number (0..2) ? 1

6. Type: 1 and press the Return key. The utility displays the following message:

You have selected the Code Load Utility. This utility is used to load a new software image into the program card currently inserted in the controller.

Type ^Y or ^C (then RETURN) at any time to abort code load.

The code image may be loaded using SCSI Write Buffer commands through the SCSI Host Port, or using KERMIT protocol through the Maintenance Terminal Port.

- 0: Exit
- 1: Enter the SCSI Host Port
- 2: Use the Maintenance Terminal Port

Enter option number (0..2) [0] ? 2

7. Type: 2 and press the Return key. The utility displays the following message:

Perform the following steps before continuing:

- get new image file on the serial line host computer
- * configure KERMIT with the following parameters:
- terminal speed 19200 baud, eight bit, no parity,
- 1 stop bit

It will take approximately 35 to 45 minutes to perform the code load operation.

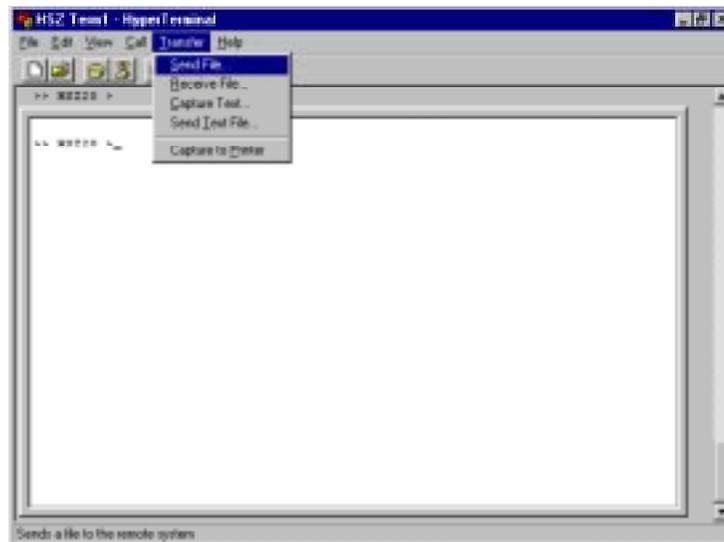
WARNING: proceeding with Code Load will overwrite the current content of your program code with a new image. Enter Y (then RETURN) to continue

[N] ? y

Start KERMIT now...

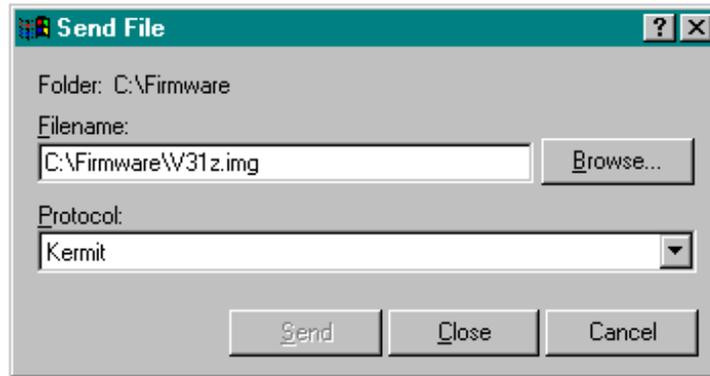
8. Select *Send File* from the *Transfer* menu.

Figure C-3 Select Send File from the Transfer Menu



9. Type the location of the firmware image file (V31Z.IMG) in the Filename box. Select *Kermit* in the Protocol box and click the *Send* button.

Figure C–4 Select the V31Z.IMG File



When the download completes, the utility displays the following message before reprogramming the controller's program care:

CAUTION

Do not interrupt the power to the RAID subsystem while the CLCP Utility reprograms the controller. The CLCP utility saves the software in non-volatile RAM on the controller. Any interruption of this procedure will result in the inability of the subsystem to reboot.

```
KERMIT file transferred successfully.  
Program card is being reprogrammed with new file.
```

```
*** Do not interrupt this step ***
```

```
Manufacturer code read from memory card= 8989
```

```
Device Code read from memory card= bdbd
```

10. If the main menu appears, press 0 to exit the utility.
11. Verify that this process successfully copied the new version of the software onto the controller.
12. At the CLI prompt, type :

```
HSZ20> show this_controller
```

The CLI displays information indicating the current software version of the controller similar to the following:

```
Controller Model: HSZ20
```

```
Serial Number: CX54300265 Hardware version: A01
```

```
Software Version:V31Z-0
```

```
Informational Report
```

```
Instance Code: 0102030A
```

```
Last Failure Code:86000020 (No Last Failure Parameters)
```

```
HSZ20>show this_controller
```

Controller:

HSZ20 CX54300265 Software V31Z, Hardware A02
Not configured for dual-redundancy
SCSI address 7
Time: NOT SET

Host Port:

SCSI target(s) (0, 1, 2, 3), Preferred target(s) (0, 1,
2, 3)
TRANSFER_RATE_REQUESTED = 10MB

Cache:

16 megabyte write cache, version 2
Cache is GOOD
Battery is GOOD
No unflushed data in cache
CACHE_FLUSHED_TIMER = DEFAULT (10 seconds)
CACHE_POLICY = A
Host Functionality Mode = A.

C.6 Reverting to Software Image Version 2.7

To request release V2.7, substitute V27Z.IMG for V31Z.IMG in the previous section as the correct software image filename. V27Z.IMG is stored in directory (firmware\V27).

C.7 Manual RAID Array 310 Configuration Restoration

The configuration of the storage sets on the RAID array 310 is usually unaffected by changing the software version. The configuration parameters, however, should be logged before performing any upgrade.

Configuring STRIPEsets, MIRRORsets, and Striped MIRRORsets

This appendix supplements Chapter 2 and contains instructions for configuring STRIPEsets, MIRRORsets, and Striped MIRRORsets.

D.1 Create a STRIPEset (Configuration Example 1)

If your site requires STRIPEsets for storage, you must assign disks to each STRIPEset. STRIPEsets must have at least two members, and can have as many as fourteen. This example creates a two-member STRIPEset using the ADD STRIPESET command.

```
HSZ20> ADD STRIPESET STRIPE1 DISK130 DISK220
```

In this example, “STRIPE1” 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-defined. Performance of your STRIPEsets will be optimized if each STRIPEset includes disks from different buses as shown in Figure 2–1 in Chapter 2. The example above contains disks from different buses.

D.1.1 Initialize the STRIPEset

You must initialize STRIPEsets before you can put them into service. When you initialize a STRIPEset, you can optionally specify a chunksize. The chunksize is the number of blocks of data that are transferred at one time or the width of the stripe. By using the default chunksize, the controller will select a chunksize that works well for most site requirements.

```
HSZ20> INITIALIZE STRIPE1 SAVE_CONFIGURATION
```

NOTE

Valid chunksizes are 16 – 32768 blocks. You should use a larger chunksize for applications that make a lot of I/O requests. Use a smaller chunksize for applications that make relatively few I/O requests, but need to move large amounts of data with each request.

D.1.2 Add the STRIPEset as a Logical Unit

To make a STRIPEset available to the host computer, you must add it as a host logical unit with a unique unit number. The unit number is a one or three digit number preceded by “D”, such as “D0” or “D102”. The unit number is made of the controller’s target ID and the Logical Unit (LUN) of the STRIPEset for the target. Each target ID can have up to eight LUNs, numbered 0–7.

- Units identified with controller target ID 0 have a single digit number which corresponds to the LUN number. For example, D5 would be target 0, LUN 5.
- Units identified with all other controller targets (1–7) use a 3 digit number. The first digit corresponds to the controller target number, the second digit is always 0 and the third digit is the LUN number. For example, D205 would be target 2, LUN 5.

Identify the STRIPEsets as host logical units by using the ADD UNIT command.

```
HSZ20> ADD UNIT D100 STRIPE1
```

This example creates LUN 0 for controller target ID 1 (specified earlier with the SET THIS_CONTROLLER command).

D.1.3 Set Writeback Cache

The final step in creating a STRIPEset is to enable the writeback cache. A single CLI command enables that feature for the entire STRIPEset:

```
HSZ20> SET D100 WRITEBACK_CACHE
```

Where D100 represents the host logical unit of the STRIPEset created above.

D.2 Create a MIRRORset (Configuration Example 1)

If your site requires MIRRORsets for storage, you must assign disks to each MIRRORset. 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.

```
HSZ20> ADD MIRRORSET MIRROR1 DISK120 DISK210
```

In this example, “MIRROR1” 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-defined. Performance of your MIRRORsets will be optimized if each MIRRORset includes disks from different buses as shown in Figure 2–1 in Chapter 2. The example above contains disks from two different buses.

D.2.1 Initialize the MIRRORset

You must initialize a MIRRORset before you can put it into service.

```
HSZ20> INITIALIZE MIRROR1
```

D.2.2 Add the MIRRORset as a Logical Unit

To make a MIRRORset available to the host computer, you must add it as a host logical unit with a unique unit number. The unit number is a one or three digit number preceded by “D”, such as “D0” or “D102”. The unit number is made of the controller’s target ID and the Logical Unit (LUN) of the MIRRORset for the target. Each target ID can have up to eight LUNs, numbered 0–7.

- Units identified with controller target ID 0 have a single digit number which corresponds to the LUN number. For example, D5 would be target 0, LUN 5.
- Units identified with all other controller targets (1–7) use a 3 digit number. The first digit corresponds to the controller target number, the second digit is always 0 and the third digit is the LUN number. For example, D205 would be target 2, LUN 5.

Identify the MIRRORsets as host logical units by using the ADD UNIT command.

```
HSZ20> ADD UNIT D200 MIRROR1
```

This example uses the controller target ID of 2 and LUN 0.

D.2.3 Set Writeback Cache

The final step in creating the MIRRORset is to enable the writeback cache. A single CLI command enables that feature for the entire MIRRORset:

```
HSZ20> SET D200 WRITEBACK_CACHE
```

Where D200 represents the host logical unit of the MIRRORset created above.

D.3 Create a Striped MIRRORset (Configuration Example 2)

If your site requires striped MIRRORsets for storage, you must assign disks to MIRRORsets and then assign the MIRRORsets to a STRIPEset.

D.3.1 Create the MIRRORsets

MIRRORsets must have at least two members, and can have as many as six. This example creates 2, two-member MIRRORsets using the ADD MIRRORSET command.

```
HSZ20> ADD MIRRORSET MIRROR3 DISK100 DISK200
```

```
HSZ20> ADD MIRRORSET MIRROR4 DISK110 DISK210
```

In this example, “MIRROR3” and “MIRROR4” are the names of the MIRRORsets, and they are followed by a list of the disks to be included in each MIRRORsets.

D.3.2 Create a STRIPEset from the MIRRORsets

Striped MIRRORsets must have at least two members, and can have as many as fourteen. This example creates a two-member STRIPEset using the ADD STRIPESET command.

```
HSZ20> ADD STRIPESET MIRSTR1 MIRROR3 MIRROR4
```

In the previous example, “MIRSTR1” is the name of the striped MIRRORset, and it is followed by a list of MIRRORsets to include in the STRIPEset. The name of the STRIPEset is user-defined. Performance of your striped MIRRORset will be optimized if each MIRRORset includes disks from different buses.

D.3.3 Initialize the Striped MIRRORset

You must initialize the striped MIRRORset before you can put it into service.

When you initialize a STRIPESet, you can optionally specify a chunksize. The chunksize is the number of blocks of data that are transferred at one time. By using the default chunksize, the controller will select a chunksize that works well for most site requirements.

```
HSZ20> INITIALIZE MIRSTR1 SAVE_CONFIGURATION
```

NOTE

Valid chunksizes are 16–32768 blocks. You should use a larger chunksize for applications that make a lot of I/O requests. Use a smaller chunksize for applications that make relatively few I/O requests, but need to move large amounts of data with each request.

D.3.4 Add the Striped MIRRORset as a Logical Unit

To make a striped MIRRORset available to the host computer, you must add it as a host logical unit with a unique unit number. The unit number is a one or three digit number preceded by “D”, such as “D0” or “D102”. The unit number is made of the controller’s target ID and the Logical Unit (LUN) of the striped MIRRORset for the target. Each target ID can have up to eight LUNs, numbered 0–7.

- Units identified with controller target ID 0 have a single digit number which corresponds to the LUN number. For example, D5 would be target 0, LUN 5.
- Units identified with all other controller targets (1–7) use a 3 digit number. The first digit corresponds to the controller target number, the second digit is always 0 and the third digit is the LUN number. For example, D205 would be target 2, LUN 5.

Identify the striped MIRRORset as a host logical unit by using the ADD UNIT command.

```
HSZ20> ADD UNIT D300 MIRSTR1
```

Where 300 represents the host logical unit of the striped MIRRORset created above.

D.3.5 Set Writeback Cache

The final step in creating the MIRRORset is to enable the writeback cache. A single CLI command enables that feature for the entire striped MIRRORset:

```
HSZ20> SET D300 WRITEBACK_CACHE
```

Where D300 represents the host logical unit of the striped MIRRORset described above.

D.4 Add Individual Disks as Logical Units (Configuration Example 2)

Before you can put an individual disk into service, it must be initialized:

```
HSZ20> INITIALIZE DISK120
```

```
HSZ20> INITIALIZE DISK220
```

If you require individual Disks to be available to the host as Logical Units, you must now identify the Disks as host logical units by using the ADD UNIT command.

```
HSZ20> ADD UNIT D1 DISK120
```

```
HSZ20> ADD UNIT D2 DISK220 SAVE_CONFIGURATION
```

In this example, disk DISK120 and DISK220 are identified to the host as units D1 (Target 0, LUN 1) and D2 (Target 0, LUN 2) respectively.

D.5 Add Drives to the Spareset

If a disk in a RAIDset or MIRRORset goes bad, the controller will replace it with a disk from the Spareset, if one exists. If the Spareset is empty, a RAIDset will run “reduced,” and you should replace the disabled disk as soon as possible. For maximum availability, you should keep at least one drive in the spareset.

The Spareset always exists in the controller configuration, even if there are no drives assigned to it. Assign drives to the Spareset with the ADD SPARESET command.

```
HSZ20> ADD SPARESET DISK130
```

In this example, DISK130 was assigned to the Spareset.

D.6 Failed Set

Failed drives are automatically added in the FAILEDSET. Failed drives that are replaced with new drives that **do not contain** metadata can be automatically placed in the SPARESET. To enable this feature, use the command:

```
HSZ20> SET FAILEDSET AUTOSPARE
```

You can remove or insert devices at any time, with the following restrictions:

- Do not remove or insert devices before the CLI prompt appears during a controller initialization.
- Do not insert devices while the controller is still recognizing a device removal (indicated by flashing LEDs).
- Do not remove or insert devices while the controller is running a local program such as DILX or VTDPY.
- Wait 50 seconds after inserting one disk drive before inserting a second disk drive.

The Auto New Spare feature only operates when the newly-inserted disk drive does not contain any metadata, such as a disk drive from the factory. You can use the transportable function to initialize a used device so that it no longer contains metadata by issuing the following CLI commands:

```
HSZ20> SET disk-name TRANSPORTABLE
```

```
HSZ20> INITIALIZE disk-name
```

To initialize additional disks, simply remove the first disk and replace it with another, then retype the INITIALIZE command. You do not need to reenter the ADD DISK or SET TRANSPORTABLE commands as long as you use the same SCSI-location.

When the drive is moved into the spareset, some metadata is written on it and it is no longer transportable. Additional metadata is written on it when it is moved from the spareset into a RAIDset or MIRRORset.

D.7 Verify and Record Your Configuration

NOTE

Your configuration may be saved on disk using the SAVE CONFIGURATION command. Refer to the *RAID Array 310 Configuration and Maintenance Guide* for a detailed description of this command.

You have now completed all the steps required to create an initial configuration on your controller. In the following steps, verify and record your configuration for future reference. Additional worksheets are provided in Appendix A for recording changes to the configuration.

First, verify the Logical Units you have configured:

```
HSZ20> SHOW UNITS
```

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

Configuration Example 1:

```
LUN  Uses
-----
D100 STRIPE1
D200 MIRROR1
```

Configuration Example 2:

```
LUN  Uses
-----
D1   DISK120
D2   DISK220
D300 MIRSTR1
```

Record the information in the following table:

Next, verify the storagesets you have configured:

```
HSZ20> SHOW STORAGESETS
```

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

Configuration Example 1:

Name	Storageset	Uses	Used by
STRIPE1	stripeset	DISK130 DISK220	D100
MIRROR1	mirrorset	DISK120 DISK210	D200
RAIDS1	raidset	DISK100 DISK200 DISK110	D0
FAILEDSET	failedset		

Configuration Example 2:

Name	Storageset	Uses	Used by
MIRSTR1	stripeset	MIRROR3 MIRROR4	D300
MIRROR3	mirrorset	DISK100 DISK200	MIRSTR1
MIRROR4	mirrorset	DISK110 DISK210	MIRSTR1
SPARESET	spareset	DISK130	

Record the information in the following table. In the event of a controller failure, the information that you recorded here will assist you in reconstruction of the storagesets on your RAID Array 310.

Record the information in the following table:

Single-device units and devices that have not been added to units are not shown in this report. To display these devices, enter the following:

HSZ20> **SHOW DEVICES**

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

Configuration Example 1:

Name	Type	Port	Targ	Lun	Used by
DISK100	disk	1	0	0	RAIDS1
DISK110	disk	1	1	0	RAIDS1
DISK120	disk	1	2	0	MIRROR1
DISK130	disk	1	3	0	STRIPE1
DISK200	disk	2	0	0	RAIDS1
DISK210	disk	2	1	0	MIRROR1
DISK220	disk	2	2	0	STRIPE1

Configuration Example 2:

Name	Type	Port	Targ	Lun	Used by
DISK100	disk	1	0	0	MIRROR3
DISK110	disk	1	1	0	MIRROR4
DISK120	disk	1	2	0	D1
DISK130	disk	1	3	0	SPARESET
DISK200	disk	2	0	0	MIRROR3
DISK210	disk	2	1	0	MIRROR4
DISK220	disk	2	2	0	D2

Record the information in the following table:

