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*Storage***Works** 

Getting Started

RAID Array 310 V3.2 for
DIGITAL Unix

Installation Guide

Order Number: EK-SMRA9-IG. C01

Digital Equipment Corporation
Maynard, Massachusetts

Third Edition January 1998

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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 manual.

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 for Digital UNIX – Alpha systems.

Revision Level	Date	Summary of Changes
EK–SMRA9–IG. A01	March 1996	Original Release
EK–SMRA9–IG. B01	March 1997	Updated to add support for HSOF V3.1 and StorageWorks Command Console V1.1
EK–SMRA9–IG. C01	January 1998	Updated to add support for HSOF V3.2

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:

- Description of how to unpack and assemble the RAID Array 310 Subsystem
- How to install the KZPSA and KZPBA Host Adapter board into your system
- Configuring the RAID Array

Audience

This guide is intended for administrators and system integrators of StorageWorks RAID Array 310 Subsystems. Installing the StorageWorks RAID Array 310 Subsystem requires a general understanding of RAID concepts, Digital UNIX, 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 write-back cache battery and making the CLI interface connection between the subsystem and the host system or maintenance terminal.

Chapter 2: 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).

Chapter 3: Working with RAID Array 310 in Digital UNIX

This chapter describes how to access the storage units on your RAID Array 310 storage subsystem from your Digital UNIX host system. It also includes descriptions of concepts and terms necessary to understand your RAID system.

Chapter 4: Installing and Configuring the Command Console Agent

This chapter describes how to install and configure the command console agent for your system.

Chapter 5: Installing the Command Console Client

This chapter provides information on installing the command console client on your DIGITAL Unix system.

Appendix A: *Setld* Script Example

This appendix provides an example of the script of the *setld* install utility.

Appendix B: Configuration Guidelines

Appendix C: Upgrading Controller Software v3.1 to v3.2

This appendix provides information on upgrading your RAID Array 310 software.

Associated Documents

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

Table 1 Associated Documents

Document Title	Order Number
<i>StorageWorks RAID Array 310 Configuration and Maintenance Guide</i>	EK-SMCS2-UG
<i>RAID Array 310 Deskside Subsystem User's Guide</i>	EK-SMCPL-UG
<i>Release Notes</i>	

Conventions

This guide uses the following documentation conventions:

Table 2 Style Conventions

Style	Meaning
boldface monospace type	To be input by the user
plain monospace type	Screen text
<i>italic type</i>	For emphasis, manual titles, utilities, menus, screens, and filenames

Support and Services

Who to contact in the Americas

Information and Product Questions:	Local Sales Office / StorageWorks Hotline 1-800-786-7967
Installation Support:	Contact the DIGITAL Distributor where the Storage Solution was Purchased / Local Digital Sales Office.
DIGITAL Multivendor Customer Service (MCS):	
Installation	Contact the DIGITAL Customer Support Center (CSC).
Warranty	Contact the DIGITAL Customer Support Center (CSC) for warranty service after solution is installed and operating.
Remedial	Contact the DIGITAL Customer Support Center (CSC) Note: A Service Contract is recommended when the equipment is out of warranty. Contact the local DIGITAL Sales Office.
Customer Support Center (CSC)	1 800-354-9000

Who to contact in Europe

Information and Product Questions:Contact the DIGITAL Distributor or reseller

Installation Support and Installation:Contact the DIGITAL Distributor or reseller from whom the Storage Solution was purchased.

For Warranty Service See the Warranty Card packaged with the product.

For Remedial Service Contact the DIGITAL Distributor or reseller from whom the Storage Solution was purchased.

Note: A Service Contract is recommended when the equipment is out of warranty.

Who to contact in Asia Pacific

For all services, contact the DIGITAL Distributor or reseller from whom the equipment was purchased.

Getting Started

This section provides an overview for preparing and installing the RAID Array 310 for DIGITAL UNIX in Alpha-based system. Detailed information is contained in Chapters 1 through 5.

Visit our Web Site for the Latest Information

Check out the web for the latest drives, technical tips, and documentation. We can be found in the technical area of our web page, <http://www.storage.DIGITAL.com/>

Thank you for purchasing a StorageWorks RAID Array 310 Subsystem. You should have received the following:

- StorageWorks RAID Array 310 Subsystem
- StorageWorks RAID Array 310 DIGITAL UNIX platform kit

NOTE

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

- DIGITAL Alpha-based Computer Systems
- RAID array concepts
- DIGITAL UNIX
- Basic hardware installation procedures
- Or, contact your supplier or service representative for installation assistance.

The major steps for installing and setting up the StorageWorks RAID Array 310 Subsystem include the following:

1. Performing the pre-installation steps listed below.
 2. Unpacking and locating the RAID Array 310 Subsystem, and charging the write-back cache module batteries (Chapter 1)
 3. Connecting the maintenance terminal and establishing communications (Chapter 2)
 4. Using the Command Line Interpreter (Chapter 2)
 5. Creating an Initial Configuration (Chapter 2)
 6. Install StorageWorks RAID Array for DIGITAL UNIX (Chapter 3)
 7. Installing and Configuring the Command Console Agent (Chapter 4)
 8. Installing the Command Console Client (Chapter 5)

Pre-installation Steps:

Before starting your installation, follow these pre-installation steps:

- Back up your system files using your normal procedure.
- 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.

Verify User-Supplied Hardware and Software (System Requirements)

The StorageWorks RAID Array 310 Subsystem requires the following user-supplied hardware and software:

- DIGITAL Alpha-server, with an available PCI slot, that supports KZPSA or KZPBA
- The associated system hardware manual(s)
- Appropriate tools to service your computer
- The DIGITAL UNIX V3.2D, V3.2E, V3.2F, V3.2G, V4.0 or V4.0B operating system

Inventory the StorageWorks RAID Array 310 Subsystem and Platform Kit Components

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

- A Host Adapter – Model KZPSA-BB or Model KZPBA-BB for Alpha-based systems
- SCSI cable, with a right-angle high-density 68-pin connector on one end and a straight high-density 68-pin connector on the other (BN21K)
- Media containing software to connect KZPSA or KZPBA
- This *Getting Started – RAID Array 310 for DIGITAL UNIX Installation Guide*
- Release Notes containing version-specific instructions for system installation

The StorageWorks RAID Array 310 Subsystem provides the following components:

- The StorageWorks Storage Expansion Enclosure
- The RAID Array 310 Deskside Subsystem Enclosure User's Guide
- The RAID Array 310 Configuration and Maintenance Guide
- Serial cable (two 9-pin adapters and two 25-pin adapters) for connecting the maintenance port of the RAID controller to the serial port of your system, PC, or maintenance terminal
- Two power cords
- Enclosure keys

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

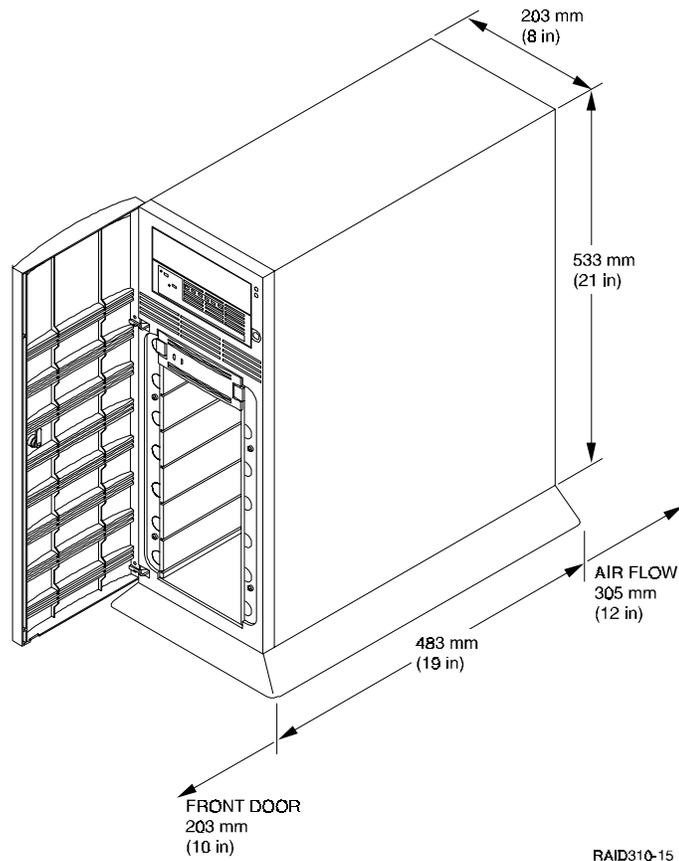
The installation of your RAID Array 310 subsystem is accomplished by performing seven major steps as follows:

- 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 controller configuration (*Chapter 2*)
- Installing the RAID Array Utility for DIGITAL Unix (*Chapter 3*)
- Installing and configuring the Command Console Agent (*Chapter 4*)
- Installing the Command Console Client (*Chapter 5*)

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.

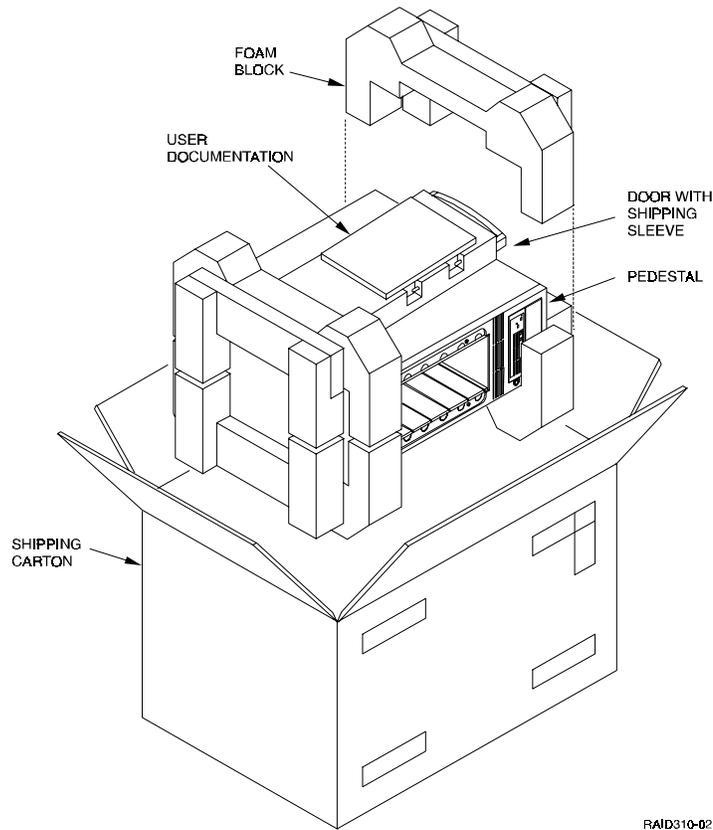
NOTE

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 and 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 SBB's.
4. Connecting the power cable, SCSI bus cable, and CLI serial cable.
5. Configuring the RAID Array 310.
6. Charging the controller cache battery.
7. Checking the subsystem for proper operation.

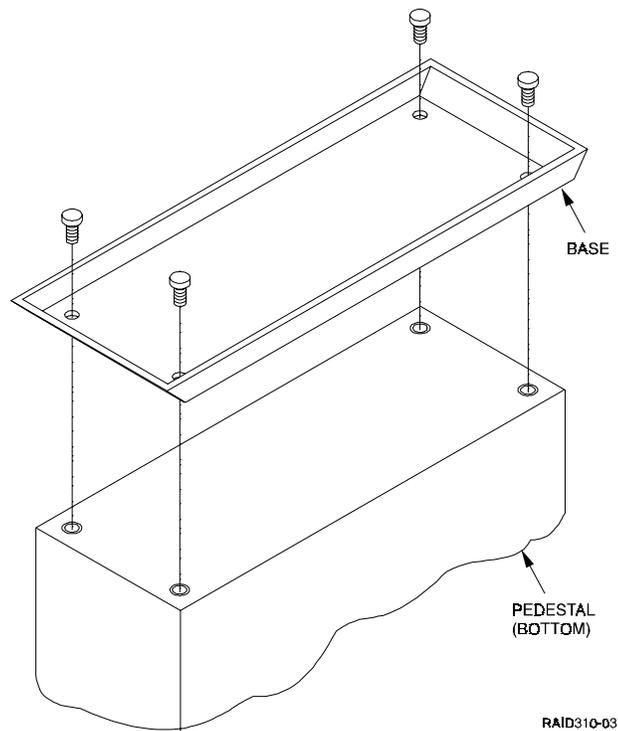
1.5 Mounting the Base

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).

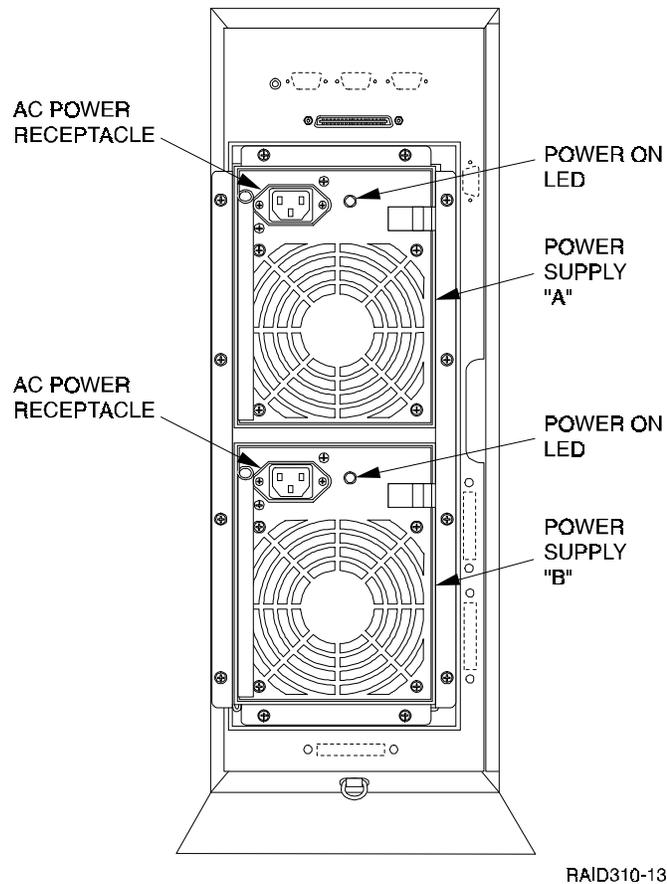
NOTE

There are two power supply units in the cabinet. Both must be connected using their respective power cables. Connect each supply to independent ac sources to provide maximum fault tolerant operation.

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

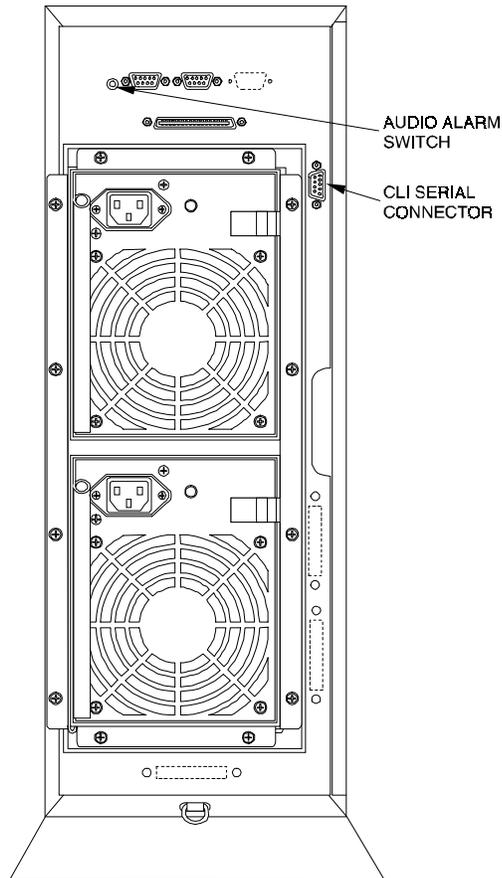
Figure 1–4 Subsystem AC Power Receptacles



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 is set to 9600 baud, with 8 data bits, 1 stop bit, and no parity.

Figure 1–5 Subsystem CLI Serial Connector



SMRA9-02

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	Straight through	Cable to 25-pin Male Connector
1	H8575-E	Crossed	Cable to 25-pin Male Connector

1.7.2 Serial Connection

From the components listed in Table 1–2, construct and attach a cable that connects the DB-9 CLI serial connector on the subsystem to your terminal or the host serial port.

1.7.3 Maintenance Terminal Connection

Refer to your terminal or terminal emulator documentation for setup instructions.

1.7.4 UNIX Host Terminal Emulation – “*tip*” Connection

Make a connection to the DIGITAL UNIX system. The *tip* utility may be used for terminal emulation to the RAID Array 310. See “man pages” for a detailed description of the *tip* utility. The serial interface on your host varies among systems. In general, the *tip* utility uses “/etc/remote” as a setup file. You may have to add an entry to the file for your serial port. At a minimum, you need to find the *line identifier* for your serial port (i.e., “hardwire”).

As an example, establish a *tip* connection to the RAID Array 310 from /dev/tty01. Examine the file /etc/remote. There should be an entry of the form:

```
hardwire:\
/dev/tty01pa=none:br#9600:el=^C^S^Q^U^D:ie=%$:oe=^D:
```

If necessary, edit the file to select /dev/tty00 as appropriate, and ensure that the “*br*” parameter (baud rate) is set to 9600.

Once the “/etc/remote” file has been modified, the *tip* session is started by typing:

```
#tip hardwire
```

tip will print “connected.”

Press return a few times to display the controller CLI prompt, HSZ20>. If the prompt is displayed, the *tip* session has been successfully started. If no prompt is seen, the serial port might be misconfigured or used by another application.

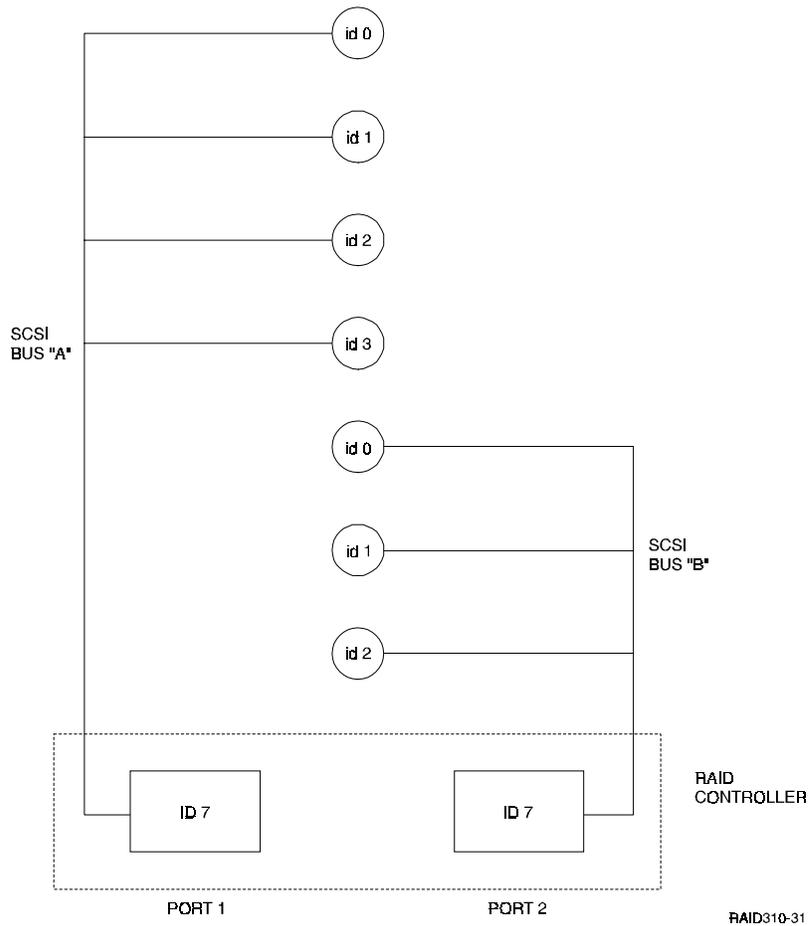
1.7.5 CLI Serial Interface Verification

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.

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. The battery will be fully re-charged in the time specified.

NOTES

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

If only one power supply is powered, the audible alarm will sound. This can be turned off from the switch shown on Figure 1-5.

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, stripesets, mirrorsets, and striped mirrorsets, declaring the storagesets as units to the host, and verifying and recording your final configuration.

2.1 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 Deskside Subsystems User's Guide for detailed descriptions of all CLI commands.

NOTE

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

2.2 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.

2.2.1 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

2.2.2 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>
```

2.3 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 V32Z-0, HARDWARE A02
SCSI ADDRESS 7
TIME: NOT SET
```

HOST PORT:

```
a SCSI TARGET(S) (0, 1, 2) NO PREFERRED TARGETS
```

CACHE:

```
16 MEGABYTE WRITE CACHE, VERSION 2
```

```
b CACHE IS GOOD
```

```
c BATTERY IS GOOD
```

```
NO UNFLUSHED DATA IN CACHE
```

```
CACHE_FLUSH_TIMER = DEFAULT (10 SECONDS)
```

```
d CACHE_POLICY=A
```

```
e HOST FUNCTIONALITY MODE=A
```

EXTENDED INFORMATION:

```
TERMINAL SPEED 9600 BAUD,EIGHT BIT,NO PARITY,1 STOP BIT
```

```
OPERATION CONTROL:0000004 SECURITY STATE CODE:85780
```

f CONFIGURATION BACKUP DISABLED

Examine the display to verify the following information:

a **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).

b **Cache condition should be GOOD**

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

c **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.

d **CACHE_POLICY should be A**

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

e **Host function mode must be set to A for DIGITAL UNIX.**

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

f **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.

NOTE

After the RESTART command is initiated, it can take up to 90 seconds for the "cli" prompt to re-appear.

2.4 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.

```
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.

Depending on the type of RAIDsets you want to create, follow the guidelines in the next four sections listed below to create your configuration. Throughout this document, the following references apply:

- Stripeset refers to RAID 0
- Mirrorset refers to RAID 1
- Striped Mirrorset refers to RAID 0+1
- RAIDset refers to RAID 5

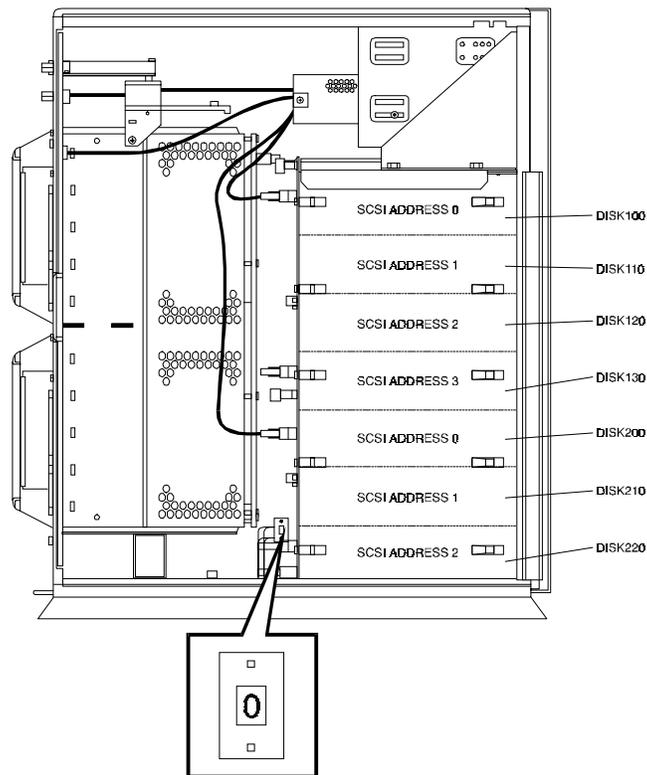
2.5 Create a RAIDset

The next sections contain examples of different sets of configurations. 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 RAIDset using the ADD RAIDSET command.

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

In this example, “RAIDS1” is the name of the RAIDset, and is 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 the figure below.

Figure 2–1 Distribution Example



RAID310-09

2.5.1 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.

```
HSZ20> INITIALIZE RAIDS1
```

With the SAVE_CONFIGURATION parameter:

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

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*.

2.5.2 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.

Identify the RAIDsets as host logical units by using the ADD UNIT command:

```
HSZ20> ADD UNIT D0 RAIDS1
```

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

2.5.3 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.

2.5.4 Verify and Record Your Configuration

NOTE

Your configuration will be saved on disk using the SAVE CONFIGURATION parameter when initializing a storage container. 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.

Working with RAID Array 310 in DIGITAL UNIX

This Chapter describes how to access the storage units on your RAID Array 310 storage subsystem from your DIGITAL UNIX host computer. It includes a description of concepts and terms that you need to know, a discussion on device naming, instructions for loading the StorageWorks RAID utilities and instructions for creating device special files in DIGITAL UNIX plus tips on some helpful utilities.

NOTE

DIGITAL UNIX was formerly called DEC OSF/1. The term "DIGITAL UNIX" is used throughout this chapter.

You must perform all configuration set up and parameter definitions, and run all utilities from a maintenance terminal or a terminal emulator connected to your controller's terminal port. As an alternative, you can use the HSZterm utility, although it is not covered in this Chapter. See the *StorageWorks HSZ40 Array Controller Utility for DIGITAL UNIX, System Manager's Guide for HSZterm*. The utility and documentation are on DIGITAL UNIX' Consolidated software distribution CD-ROM.

3.1 Basic Configuration Steps

Once you have completed the initial setup and configuration of your RAID Array 310 subsystem, you will be able to use RAIDsets and other storage containers much like single disks, including using them as boot devices.

The configuration steps vary depending upon whether you are running DIGITAL UNIX V3.2D or greater or V4.0.

3.1.1 Configuring for DIGITAL UNIX V3.2D or greater

For DIGITAL UNIX V3.2D or greater, the initial configuration steps that you must follow are:

1. Complete the steps in Chapter 1 to setup the RAID Array and make a serial connection to the RAID Array Controller.
2. Complete the procedures in Chapter 2 to create a Communications Logical Unit.
3. Run the *setld* utility from the CD-ROM to install the StorageWorks RAID Array installation utilities. (See section 3.2.1)

Device special files are explained in Section 3.2.2. Before proceeding, make sure that you are familiar with the terminology in the next section so that you can fully understand the discussions that follow.

4. Create device special files if necessary. (See section 3.2.4)
5. Create disklabels and partitions on the containers. (See section 3.5.1)

6. Create filesystems on the previously created partitions. (See section 3.5.2)

3.1.2 Configuring for DIGITAL UNIX V4.0

For DIGITAL UNIX V4.0, the initial configuration steps that you must follow are:

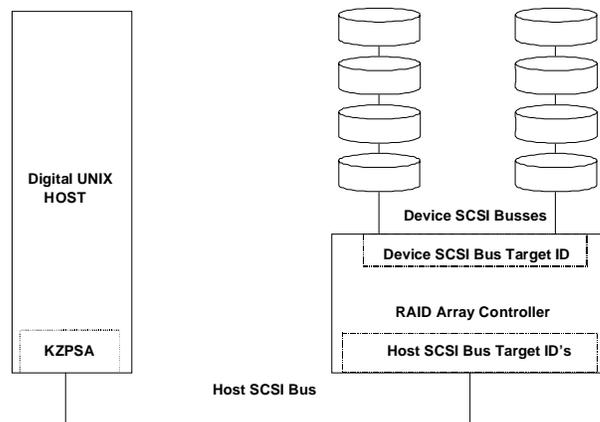
1. Complete the steps in Chapter 1 to setup the RAID Array and make a serial connection to the RAID Array Controller.
2. Complete the procedures in Chapter 2 to create a communications Logical Unit.
3. Understand device special file naming conventions. (See section 3.2.2)
4. Rebuild the Kernel.
5. Create disklabels and partitions on the containers. (See section 3.5.1)
6. Create filesystems on the previously created partitions. (See section 3.5.2)

3.1.3 Words and Concepts That You Need to Know

You will be better able to work with your RAID Array 310 subsystem if you keep one concept in mind:

The RAID Array 310 controllers in the subsystem are active on several SCSI buses. The controllers communicate with the DIGITAL UNIX host computer on the Host SCSI bus and communicate with the devices in the RAID Array 310 on two device SCSI buses. In other words, the controllers are targets on the host SCSI bus and initiators on the device SCSI bus and initiators on the device SCSI buses.

Figure 3–1 Block diagram of storage connections in a RAID Array 310 subsystem



The following terms appear in the block diagram and throughout this chapter:

- **Host SCSI Bus** – The SCSI bus that connects the host adapter to the RAID Array 310 controller. This is sometimes called the “front end” SCSI bus or the “host-side” bus.
- **Device SCSI Bus** – The two SCSI buses that connect the RAID Array 310 controller to the SCSI-2 devices. These are sometimes called the “back end” SCSI buses or the “device-side” buses. These buses are also referred to as device ports and are numbered 1 to 2. The device buses are built into the backplane in your RAID Array 310 cabinet as there are no device bus cables.

- **Controller SCSI IDs** – Each controller is assigned SCSI IDs on both the host bus and all device buses.

Host SCSI Bus – On the host SCSI bus, a RAID Array 310 controller can be assigned from one to four target IDs. The controller can present up to eight units through each target ID. The ability to respond to four target IDs instead of just one allows the controller to present more units to the host computer. A controller with four host-side target IDs can present up to 32 units.

Target IDs must be in the range of 0–7, but they must not conflict with any other devices on the host SCSI bus, such as the host's KZPBA or KZPSA SCSI adapter itself. (The host's adapter is usually set to ID 7.)

The controller's host-side target IDs are set using the controller's Command Line Interpreter (CLI). The CLI is accessed using a maintenance terminal connected to the port on the rear bezel of the controller.

Device SCSI Buses – The RAID Array 310 controller occupies one SCSI ID on the device bus (port). The device-side ID is always SCSI ID 7 on all device buses, this is not user configurable.

- **Controller Storage Container** – A single- or multiple-device storageset. A single disk can be a container, all stripesets, mirrorsets, and RAIDsets are containers.
- **Controller Unit** – "Unit" is the controller term for a storage container that is available for use by the DIGITAL UNIX host. Until a storage container is made into a unit with the ADD UNIT command, it is not available to the host.
- **DIGITAL UNIX Disk Device** – (As used in reference to a RAID Array 310 controller subsystem.) "Disk device" is the DIGITAL UNIX term for a controller unit. You must create device special files to associate the controller units with DIGITAL UNIX disk device names.
- **LUN and Logical LUN** – The term LUN refers to two different entities in a RAID Array 310 controller environment, the host-side LUN and the device-side LUN.

Host-side LUN – The host-side Logical Unit Number is used by the host operating system to uniquely identify a container.

Device-side LUN – In current HSOF firmware, this LUN is always 0. The device-side target ID and the port number are the only entities that are currently used by the RAID Array 310 controller to uniquely identify a device on the device-side SCSI Bus.

3.2 Installing the StorageWorks RAID Array Utility for DIGITAL UNIX

The installation of the StorageWorks RAID Array Utility for DIGITAL UNIX takes less than one hour to complete. The installation procedures included in this chapter will get the utility loaded onto your system and prepare DIGITAL UNIX to run the utility and interact with the StorageWorks RAID Array 310 subsystem.

You must perform each of the procedures specified in the following to complete the installation and configuration:

- Run the *setld* install utility to install the RAID utility (A sample of the installation script appears in Appendix A of this guide.).
- Prepare LUNs for access by the DIGITAL UNIX filesystem.

3.2.1 Running the *Setld* Install Utility

Before running the *setld* install utility, do the following:

- Have your system booted with the *'/genvmunix'* kernel
- Load the distribution diskette into your floppy drive
- The distribution diskette has been created as a *tar* image diskette.

Extract the subsets from the *tar* diskette using *tar*:

```
# cd /tmp  
  
# tar xpf /dev/rfd0c
```

To install the subset package from the Bourne shell (*sh*) root account, type:

```
# setld -l /tmp SWRAID100
```

where: */tmp* is the name of the directory where you extracted the *tar* diskette to.

Installing the package performs the following task that do not need your intervention.

- Checks for the necessary file system space (1MB)
- Displays copyright information
- Checks the current revision of your DIGITAL UNIX operating system and will according to this install/update specific files or utilities.
- Checks if you have the */genvmunix* kernel booted. (which is required to detect all connected hardware).
- Installs your StorageWorks RAID Array Utility for DIGITAL UNIX
- Creates symbolic links, for new installed utilities and boot device support
- Creates device special files, using the *MAKEDEV.hsz* script
- Updates the system config files
- Prompts you just before the kernel rebuild starts

3.2.2 Device Special Files

DIGITAL UNIX does not strictly enforce one format for device special files naming, however the format below is recommended.¹

- *rxnny* for block mode device special files, example:

Block device: `/dev/rzb18c`

where the components of `rzb18c`, an example of a device name, are as follows:

`/dev/rzb18c`

- **c** is the partition designator
- **18** is the device logical number, equal to $(8 * \text{Host SCSI Bus \#}) + (\text{Controller Target ID})$;
- **b** is the LUN indicator, a letter from a-h representing LUNs 0-7 (therefore in this example, `b` = LUN 1);
- **rz** indicates the SCSI disk device.
- *rrxnny* for character device special files, example:

Character device: `/dev/rrzb18c`

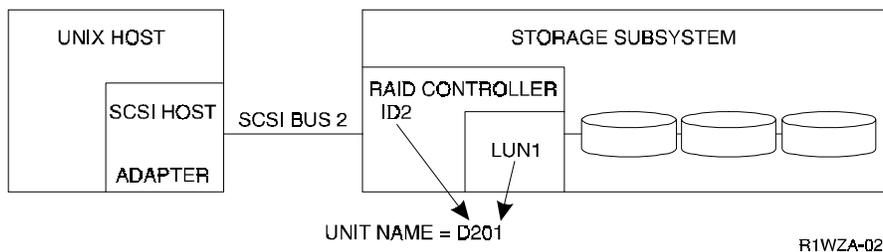
where the components of `rrzb18c`, an example of a device name, are as follows:

`/dev/rrzb18c`

- **c** is the partition designator
- **18** is the device logical number, equal to $(8 * \text{Host SCSI Bus \#}) + (\text{Controller Target ID})$;
- **b** is the LUN indicator, a letter from a-h representing LUNs 0-7 (therefore in this example, `b` = LUN 1)
- **rz** indicates the SCSI disk device; **r** indicates raw device.

Figure 3–2 is a sample configuration of a single unit in a storage subsystem.

Figure 3–2 Device Naming Example



The sample configuration has the following characteristics:

- Host SCSI Bus = 2
- Controller Target ID = 2
- Storage Container = LUN 1
- Unit number = D201

¹ Some DIGITAL UNIX utilities, such as `iostat`, and certain startup procedures, will not recognize this device naming format, and will recognize only `lun-0` devices e.g. `rzb18c`.

- host partition letter c (not shown)

Using these values to derive the device name looks like this:

“rz” + LUN letter + ((8 * Host SCSI Bus #) + (Controller Target ID)) + partition letter

or

“rz” + b + ((8 * 2) + (2)) + c

or

rz**b18c**

The equivalent character mode device name would be:

rr**zb18c**

This naming scheme is used throughout this chapter. However, be aware that DIGITAL UNIX device naming schemes do not have to follow this format. This particular naming scheme was chosen to avoid conflicts with the DIGITAL UNIX default SCSI device naming conventions.

3.2.3 Creating Character

Before a storage container (unit) can be accessed by the host, you must create character device special files and block mode device special files to associate a DIGITAL UNIX device name with the controller storage unit. All eight possible partitions of a DIGITAL UNIX disk device must have special files.

The Device Special files must be located in the */dev* directory on the DIGITAL UNIX host operating system. The following information must be known to create the device special files for a RAID Array 310 unit:

- Host SCSI bus number
- Target ID of the controller
- LUN of the controller unit

3.2.4 Creating Device Special Files

DIGITAL UNIX contains a utility that can make all of the device special files for any single unit in a storage subsystem. It creates block and character files for all eight partitions of the unit. Each device special file references the major and minor number of a specific partition. You can use one of the following methods:

- The StorageWorks RAID utilities subset contains a simple utility which scans the available SCSI-busses and will create RAID Array 310 special device file entries. To perform this task type:

```
# cd /dev
# ./MAKEDEV.hsz
```

This will scan the buses and create device special files as needed.

- Determine the device name as described earlier in this chapter. You do not need to add the partition letter at the end of the device name.

As an example, we will create special device file entries for *rzbl8* (explained earlier):

```
# cd /dev
# ./MAKEDEV rzb18
```

In this example the utility creates block mode files *rzbl8a* through *rzbl8h* and character files *rrzbl8a* through *rrzbl8h*. You have to repeat this step for each RAID Array 310 unit you have created.

3.3 Kernel Information Files Updates

For full support of the RAID Array 310 with DIGITAL UNIX operating system, the following kernel information files are updated by the SWRAID100, RAID Array utility:

- Device parameter file
The file which makes device names and set their functionality to the operating system has to be updated for the RAID Array 310 controller.
- Kernel configuration file
This file needs to be updated to make the KZPBA or KZPSA known to the kernel and add the device entries to the kernel so it will recognize the devices at boot time.

NOTE

In this chapter we reference the RAID Array 310's subsystem's controller as HSZ20.

3.3.1 Updating the Device Parameter File

For making use of the full functionality of the RAID Array 310, you have to add an entry into the device data files. The DIGITAL UNIX will then recognize the RAID Array 310 SCSI inquiry string (HSZ20) and will present the RAID Array 310 to the applications as a HSZ20 device.

3.3.2 Kernel Configuration File Entries for RAID Array 310 Units

NOTE

The configuration file name format is not the same as the format for device special files. You must use the *rznn* format in your configuration file, and it is recommended that you use the *rxnny* format for device special files. The different names do not conflict since they are used by different pieces of the operating system.

You can access RAID Array 310 storage units using the standard SCSI-CAM driver without making entries in the configuration file. However, to see the units from the startup procedure, and to make the output of the *iostat* utility easier to read, you must create entries for the units. (See the manual pages on DIGITAL UNIX for reference, *man SCSI*, *man rz* and *man raid*)

Entries for RAID Array 310 units in the configuration file have the following format:

device disk *name* at scsiz drive *number*

Where:

- *z* in the entry "at scsiz" is the host SCSI bus number

- *name* is in the format *rznn*. The *nn* is calculated as:
 $(8 * z) + (\text{HSZ20 Target ID})$
- *number* is unique drive number for each controller unit and is calculated as:
 $(64 * z) + (8 * \text{HSZ20 Target ID}) + \text{controller unit LUN}$
You only need to calculate the drive number of the first device using the formula.
You can then add 1 for each subsequent LUN.

As an example, the configuration file for the controller unit numbers D000 to D007 on host-side SCSI bus # 2 are constructed as follows:

- $\text{name} = (8 * 2) + 0 = 16$
- $\text{first unit number} = (64 * 2) + (8 * 0) + 0 = 128$

The entries in the DIGITAL UNIX configuration file could be, assuming *scsi2* is at *pza0*:

```
bus           pza0         at pci0      slot 11     vector pzaintr
controller    scsi2        at pza0      slot 0
device disk   rz16         at scsi2     drive       128
device disk   rz16         at scsi2     drive       129
device disk   rz16         at scsi2     drive       130
device disk   rz16         at scsi2     drive       131
device disk   rz16         at scsi2     drive       132
device disk   rz16         at scsi2     drive       133
device disk   rz16         at scsi2     drive       134
device disk   rz16         at scsi2     drive       135
```

To continue the configuration for DIGITAL UNIX 3.2, go to Section 3.5.

3.4 Rebuilding the Kernel for DIGITAL UNIX V4.0

DIGITAL UNIX V4.0 provides Dynamic Device Recognition (DDR). DDR simplifies the process of adding new devices to your AlphaServer by allowing you to add new devices by rebuilding the Kernel. The Kernel rebuild will automatically configure your StorageWorks RAID Array into the Kernel and create device driver files for the communications logical unit you added in Chapter 2.

To configure your StorageWorks RAID Array for a system running DIGITAL UNIX V4.0, rebuild your kernel and then reboot the system now. For more information on rebuilding the kernel, see the *doconfig* man page or your System Administration documentation.

After rebooting your system, go to the next section.

3.5 Preparing LUNs for Access by DIGITAL UNIX Filesystem

DIGITAL UNIX treats a RAID Array 310 LUN much like a SCSI disk. To prepare your configured LUN for access by the DIGITAL UNIX filesystem, you will need to do the following:

- Create the partitions on the LUN using *disklabel*
- Create a filesystem on the LUN
- Mount the filesystem to be able to access it

3.5.1 Creating the Partitions on a LUN Using Disklabel

You create the partitions on a LUN by issuing a *disklabel* command. The *disklabel* command partitions the LUN for access by the DIGITAL UNIX operating system. DIGITAL UNIX defines only partitions a, b, c, and g for the RAID Array 310 controller. Refer to the *rz* and *disktab man* pages for more information about the *disklabel* utility.

To create the read/write partitions on a LUN using the default partition sizes, enter the following:

```
# disklabel -rw device HSZ20
```

HSZ20 defines this LUN as attached to the RAID Array 310 array controller. Always use the device label HSZ20, regardless of what drive types make up the LUN.

"Device" is the character device name as defined in Section 3.2.2. For example, to create partitions on device, *rza16*, enter:

```
# disklabel -rw /dev/rrza16a HSZ20
```

To view a LUN partition, enter:

```
# disklabel -r /dev/rrza16a
```

3.5.2 Creating a Filesystem on a LUN

Use the *newfs* command to create a filesystem on a LUN the same way that you would create a filesystem on a disk device by entering the following:

NOTE

The *newfs* command is given here as an example. This is similar to using the Advanced File System (ADVFS) and making devices available for Logical Storage Manager (LSM).

```
# newfs devicepartition
```

"Partition" is the letter representing the partition, a, b, c, or g on which you want to create a filesystem (usually "c" for the whole drive).

"Device" is the character device name as defined in Section 3.2.2.

For example, to create a filesystem on partition "c" of device *rza16*, enter the following:

```
# newfs /dev/rza16c
```

This creates a UFS-filesystem on LUN 0 of this subsystem at SCSI-bus address 2, target ID 0 on the C partition (whole disk-device).

3.5.3 Mounting the Filesystem

To access the LUN, mount it as a device filesystem to a mount point. For example:

```
# mount /dev/rza16c /mnt
```

To view the mounted filesystem, enter: **df**

The LUN is now accessible to the filesystem just as a disk device would be. The filesystem can not see the RAID functionality and number of physical devices attached to the RAID Array 310 controller. This device appears as a single LUN or "disk" to the user as viewed by the filesystem.

3.6 Controller-Attached Disks as DIGITAL UNIX Initialization (Boot) Devices

The RAID Array 310 units that are visible to the host as LUN 0 can be used as system boot devices. After the unit has been created from the controller CLI, install the DIGITAL UNIX operating system on the unit.

Units at LUN 0 have a 0 (zero) as the last digit in the unit number. Examples of LUN 0 units are: D000 or D0 , D100 , D200, and so forth. So, D102 cannot be used as a boot device.

3.7 Using *genvmunix*

If you use *genvmunix* to initialize the system and *doconfig* to build a new configuration file, the new configuration file will only list the RAID Array 310 LUN 0 units. Nonzero LUNs will not appear in the new configuration file.

Before rebuilding a configuration file using *genvmunix*, save any existing customized configuration file that has entries for RAID Array 310 units. After rebuilding the configuration file, add the entries from the saved configuration file to the new configuration file.

3.8 RAID Array 310 Units and DIGITAL UNIX Utilities

This section contains notes on the interactions of some DIGITAL UNIX utilities with storage units in your RAID Array 310 subsystem.

3.8.1 *file*

You can use the DIGITAL UNIX *file* utility to determine if a controller unit can be accessed from the host.

The unit that you want to test must already have a character mode device special file and the correct disk label.

This example uses the RAID Array 310 unit D101.

Run the *file* command and specify the character mode device special file, such as:

```
# /usr/bin/file /dev/rrzb17a
```

The device activity indicator (green light) will illuminate, if the information is not in cache, on the device. If the unit is a multi-device container, only one of the devices from that container will illuminate. The DIGITAL UNIX operating system should display something like the following output after the command is entered:

```
/dev/rrzb17a character special (8/33856) SCSI #2 HSZ disk #146 (SCSI ID #1)
```

- 8 is the major number
- 33856 represents the minor number
- 2 is the SCSI host-side bus number
- 146 is the drive number as listed in the Configuration File
- 1 is the controller target ID

If the only output that is returned from the file command is the major and minor number, then either the device is not answering or the device special file does not have the correct minor number. Check the minor number to be sure that it matches the host SCSI bus number, the controller target ID, and the LUN of controller unit.

If an error occurs regarding the disk label, there is a good probability that the device can be accessed. This error can usually be fixed by creating the disk label with the DIGITAL UNIX *disklabel* utility.

NOTE

For major and minor number calculations, see the reference pages on DIGITAL UNIX, *man SCSI*.

3.8.2 Reading from the device, *dd*

Check the created device using *dd* on the 'raw' device to see if there is a full communication path between devices and DIGITAL UNIX, like the following:

```
# dd if=/dev/rrzb17a of=/dev/null
```

This will read the full disk-device until you hit [^]c or until the device has been read. If the test is successful, the device activity (green) LED lights up. If the device consists of multiple disks, all of these will then be lit.

3.8.3 *SCU*

You can use the SCSI CAM Utility (SCU) program to see which RAID Array 310 units are available to the DIGITAL UNIX operating system. It is located in the /sbin directory and documented in the reference (*man*) Pages.

The SCU command, *scan edt*, polls all devices on the host-side SCSI buses. This allows you to show what devices are available from all host-side SCSI buses. The device special files do not have to exist for SCU to see the devices.

```
# /sbin/scu scan edt bus 2
```

```
# /sbin/scu show edt bus 2
```

CAM Equipment Device Table (EDT) Information:

Bus: 2, Target: 1, Lun: 0, Device Type: Direct Access

Bus: 2, Target: 1, Lun: 1, Device Type: Direct Access

Bus: 2, Target: 1, Lun: 2, Device Type: Direct Access

Bus: 2, Target: 1, Lun: 3, Device Type: Direct Access

For detailed information on one of the unit's you can use:

```
# /sbin/scu show device bus 2 target 1 lun 0
```

RAID Array 310 units appear like any other SCSI device. All four entries for Bus 2 Target 1 in the example display are RAID Array 310 units. The last entry would be for unit D103 on host SCSI bus 2.

3.8.4 *Iostat*

You can use the *iostat* utility to view performance statistics on RAID Array 310 storage units. (Set your terminal screen to 132 columns before running *iostat*.)

The output from *iostat* shows the number of devices (LUNs) that have been defined in the configuration file. It is much easier to interpret the output if the configuration file contains entries for all eight devices. If the configuration file does not contain entries for all devices, the *iostat* output has fewer columns and it is difficult to correlate each column with a specific device.

The *iostat* utility only recognizes device names in the format *rznn* where *nn* is calculated as:

$$(8 * \text{Host SCSI Bus \#}) + (\text{HSZ20 Target ID})$$

(This is the same formula and format that is used for the configuration file.)

Invoke the *iostat* utility using the following format:

```
iostat rznn s t
```

Where:

- *rznn* is the device name
- The *s* is optional and denotes the amount of time, in seconds, between screen updates
- The *t* is optional and denotes the total number of screen updates

The output from *iostat* shows all devices that have device name *rznn*. The information for LUN 0 is in the first column. The information for LUN 1 is in the second column, and so forth.

iostat rz16 5 4

```
rz16 rz16 rz16 rz16 rz16 rz16 rz16 rz16
bps tps bps tps
0 0 0 0 0 0 0 0 0 0 0 0 0 0 126 3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 1618 34
0 0 0 0 0 0 0 0 0 0 0 0 0 0 1639 34
0 0 0 0 0 0 0 0 0 0 0 0 0 0 1610 34
```

The above display shows activity on all eight LUN's attached to one SCSI-bus (2) and one Target 0. The above list represents information on *rza16*, *rzb16* ... *zh16*. The active device is device *zh16*.

Installing and Configuring the Command Console Agent

This chapter contains instructions for installing Command Console, a Graphical User Interface (GUI), and creating your first volume.

4.1 Introduction

This chapter describes how to install and use Command Console software to create your first volume, a 5/3 RaidSet. Do the sections in order. At the end of this chapter you will have created your first logical volume.

Procedure summary:

- Install Command Console software.
- Launch Command Console.
- Establish communications with the controller over the serial port.

Connection methods:

There are three ways to connect to your RAID 310 Array:

- **Serial Port** – This method is covered in this chapter and is the recommended method for local, direct connection to your array. This method must be used to create your first volume.
- **SCSI Bus** – A local connection method, SCSI bus connection is covered in the Command Console User's Guide.
- **Network Connection** – You can communicate with your RAID 310 Array over a TCP/IP network. Communication is by means of the agent process. Paragraph 4.5 of this chapter describes this method.

NOTE

If you are planning to configure and monitor your RAID Array 310 over a network, one volume must be created for network communications. This volume, the "communications" volume, is created using the serial port. DIGITAL recommends creating and designating a RAID 5/3 volume as the "communications" volume. RAID 5/3 is highly reliable and provides the most stable communication link. Once the communications logical unit is created, the SXCC Agent can be installed.

4.2 Installing Command Console Software in the Management Station

Command Console installs from the *RAID Array 310 Upgrade* CD-ROM disk using a standard Windows installation routine. Command Console installs on an Intel-based Windows 95 or an Intel- based Windows NT platform. (The platform is referred to as the Management Station.) The program is self-extracting and stores Command Console into the directory `C:\Command_Console` by default. You have the option to change the disk or directory location. To install Command Console:

1. Place the disk 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.

NOTE

The Management Station must be either an Intel-based Windows NT platform or an Intel-based Windows 95 platform.

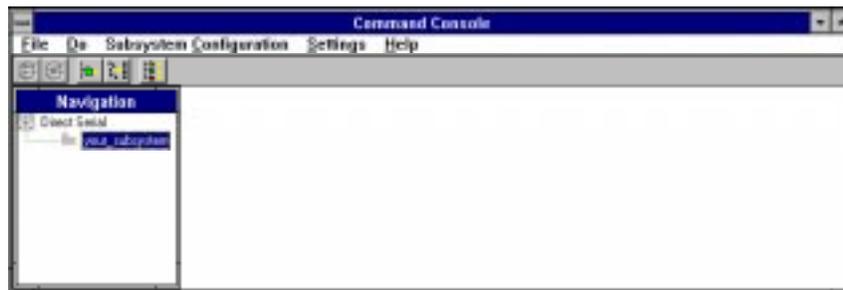
4.3 Launching Command Console

Launch the Local Version (serial port communications) of Command Console by typing:

`swcc.exe direct`

in the *RUN* dialog command-line box and pressing Enter. Command Console displays the Control Panel (Figure 4–1).

Figure 4–1 Command Console’s Control Panel



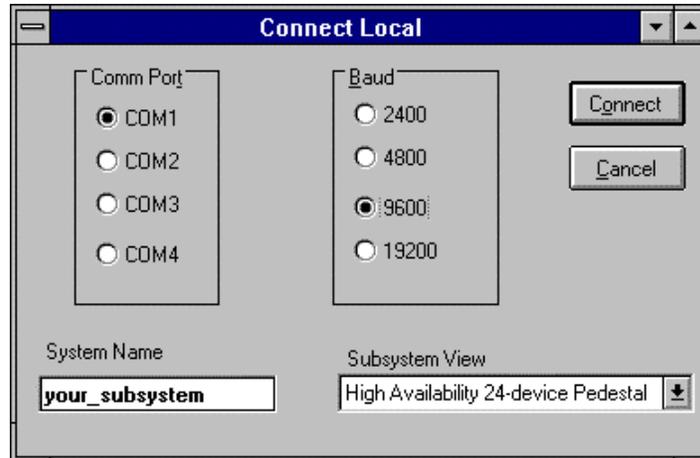
A Divider Bar splits the Control Panel into two smaller windows: the Navigation Window (on the left) and the Subsystem Window (on the right). The Subsystem Window lets you view, configure and monitor the storage subsystem shown in the Navigation Window. The Control Panel also has a Menu Bar and below it a Toolbar. For more information on Command Console’s windows, menus, and tools, refer to the *Command Console User’s Guide*.

4.4 Establishing Communications with the 310 Array

The simplest connection to your storage subsystem is a direct, cable connection from the Management Station (the host system running Command Console) to one of the storage subsystem's serial maintenance ports. To establish a serial connection proceed as follows:

1. Launch the Local Version of Command Console.
2. Select the **Settings | Controller Communications | Serial** command to display the dialog box shown in Figure 4–2.

Figure 4–2 Connect Local Dialog Box (for Serial Connection)



3. Select the appropriate communications port and select the 9600 baud rate for your subsystem.

NOTE

Default communication parameters for the RAID 310 controller are 9600 baud, 8 bits, no parity, one stop bit.

4. Enter a name for your storage subsystem or leave the default name.
5. Click on *Connect*.

NOTE

Command Console connects to the subsystem's controller by means of its serial maintenance port. Its subsystem icon turns green. A red icon indicates a communication problem between Command Console and your subsystem. If communication problems occur, recheck the connection and the settings.

4.5 Communicating over a Network

To communicate with your RAID Array 310 over a network, two software applications are required: an agent and a client. The client is a Graphical User Interface (GUI) which installs and runs on a system designated as a Management Station. From the Management Station you can configure and monitor your RAID Array. The agent installs and runs unseen in the background on the storage subsystem's host computer. First you install the

agent and then the client. Together the two provide the software link required for communication over a network.

The Agent:

The agent runs on the host system as a server application and connects to Command Console via the TCP/IP network protocol. To establish communication over a network, you must install the agent in the storage subsystem’s host system.

The agent provides the software interface between the host storage subsystem and any number of Command Console (client) sessions running on either the host or remote system, allowing you to configure and monitor your storage subsystem from many locations.

The agent provides access protection and asynchronous fault notification. You can configure the agent to use TCP notification to Command Console or SNMP notification to an SNMP-compatible monitoring application.

The Client:

In this document the client is called Command Console. Command Console is the control interface for your RAID Array. Before you can communicate with your storage subsystem over a network, the subsystem and host system must be added to Command Console’s database.

NOTE

The Management Station must be either an Intel-based Windows NT platform or an Intel-based Windows 95 platform.

4.6 Agent Connection Licensing

The basic network version of Command Console comes with a built-in license to connect to one agent program. To run more than one agent, you must purchase a multi-agent license.

The license number determines the number of agents you can connect Command Console (the client) to. The Command Console **Settings | License Upgrade** command accesses the license number dialog box.

4.7 Before You Start

- Your system resources must meet the minimum requirements listed in Table 4–1.

Table 4–1 Minimum Management Station System Requirements

Host Feature	Requirement
PC Requirements	Intel 486, 66 MHz, 16 MB memory, 1 MB free disk space, and CD-ROM drive
Operating System	Microsoft Windows 95, Windows NT 3.51 or NT 4.0
Network Connection	TCP/IP-compatible network card
Controller Compatibility	StorageWorks RAID 310 controller running operating firmware Version 3.1 or higher.

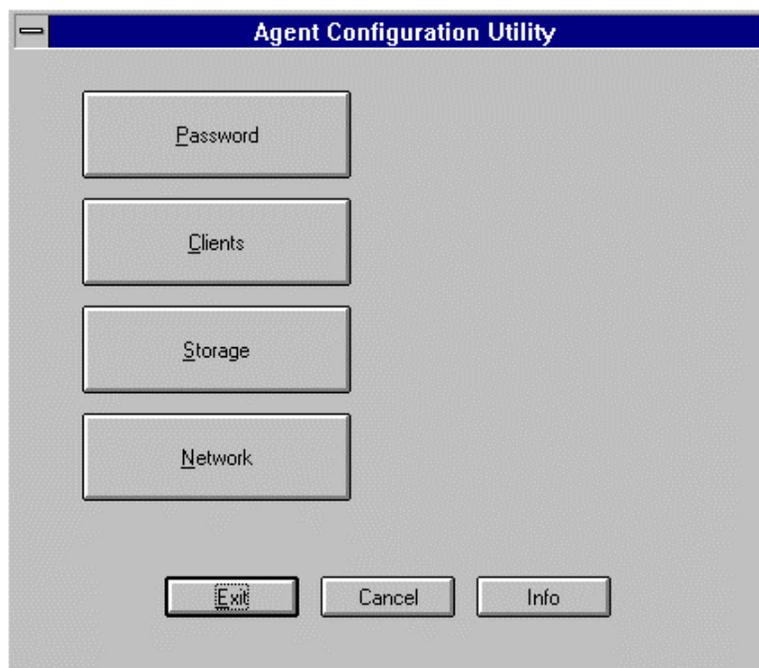
- Decide if you need password protection for the agent’s host system. You may specify a password during the agent’s installing routine.

- You will also need the IP name of Command Console’s host system and you need to name the storage subsystem(s) connected to the agent’s host system.
- You need to have installed TCP/IP services on your NT server.
- You need to have created a “communications” volume on your RAID 310 Array using Command Console and a serial port connection and assigned a Windows NT drive letter to the “communications” volume using the Disk Administrator.

4.8 Installing the Agent

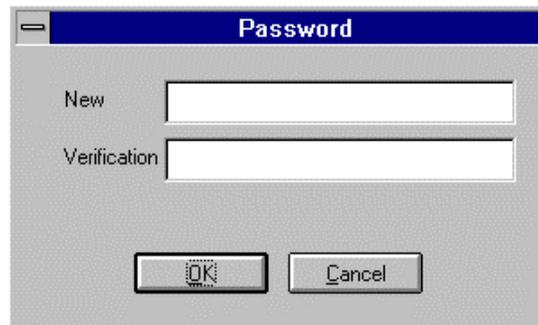
1. Place the RAID Array 310 Software V3.2 CD-ROM in your storage subsystem’s host system CD-ROM drive.
2. Open the \AGENTS subdirectory in File Manager.
3. Double click the INSTALL.BAT file. The installation program begins and displays the *Agent Configuration Utility* menu. The menu, shown in Figure 4-3, provides four choices: *Password*, *Clients*, *Storage* and *Network*. If you need more information on configuring the agent, click the *Info* button.

Figure 4-3 Agent Configuration Utility Menu



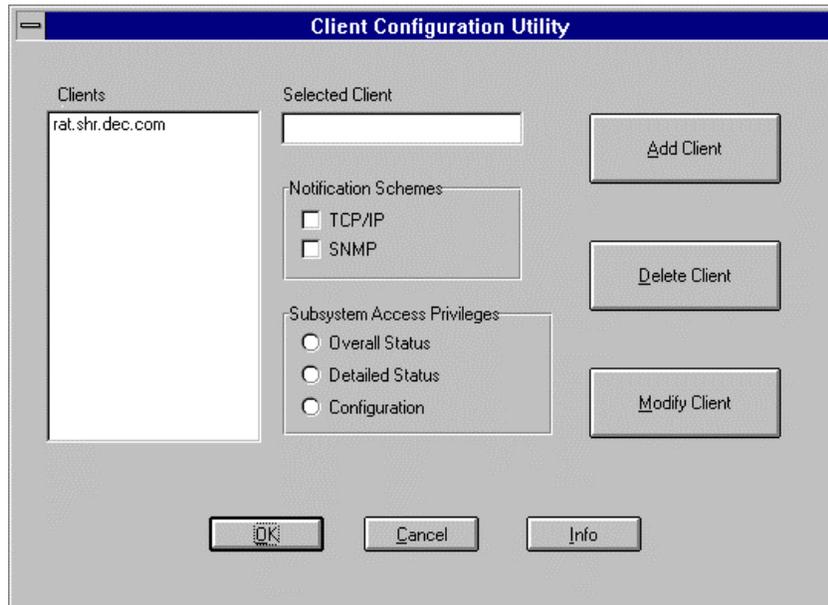
4. Click *Password*, enter a password in the *New* and *Verification* text boxes (Figure 4-4), and click *OK*.

Figure 4–4 Agent Password Dialog Box



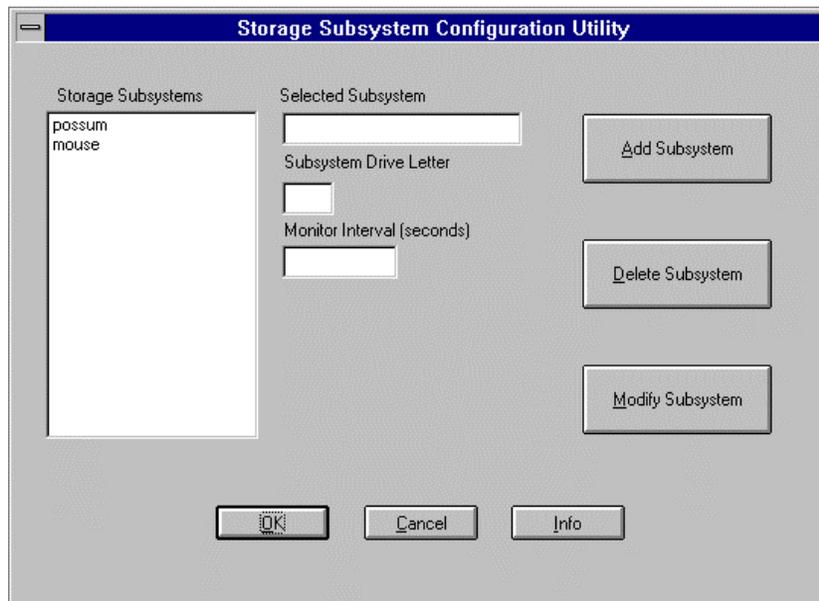
5. Click *Clients* to access the *Client Configuration Utility* (Figure 4–5). Enter the name of Command Console's host system and configure the client. Choose TCP/IP (for Command Console) or SNMP notification. When you are finished, click *OK*.

Figure 4–5 Client Configuration Utility Screen



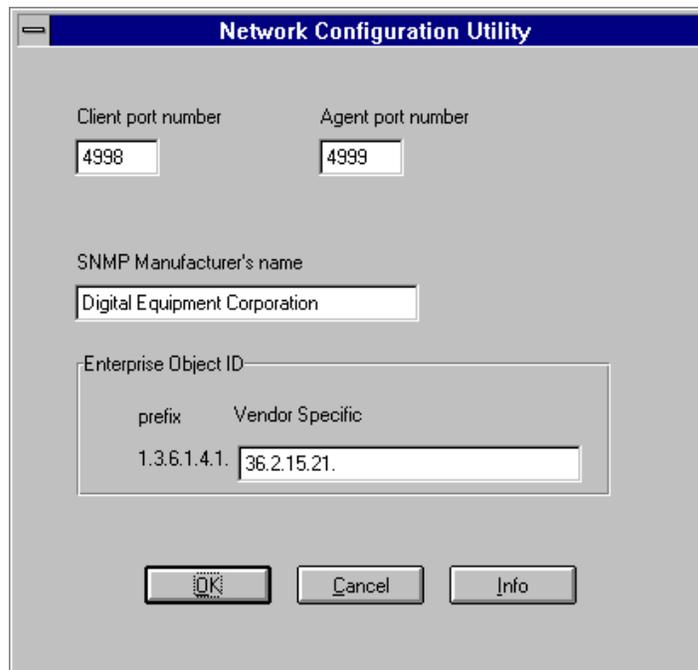
6. Click *Storage* to access the *Storage Subsystem Configuration Utility* (Figure 4–6). Assign and enter the name of your storage subsystem, its Window NT drive letter and the monitoring interval in seconds. When you are finished, click *OK*.

Figure 4–6 Storage Subsystem Configuration Utility Screen



7. Default network configuration settings usually are not changed unless the default port numbers are being used by another application. If a conflict exists, click the *Network* button and change the default settings. For more information on port numbers (windows socket numbers), click on the *Info* button.

Figure 4–7 Network Configuration Utility Screen



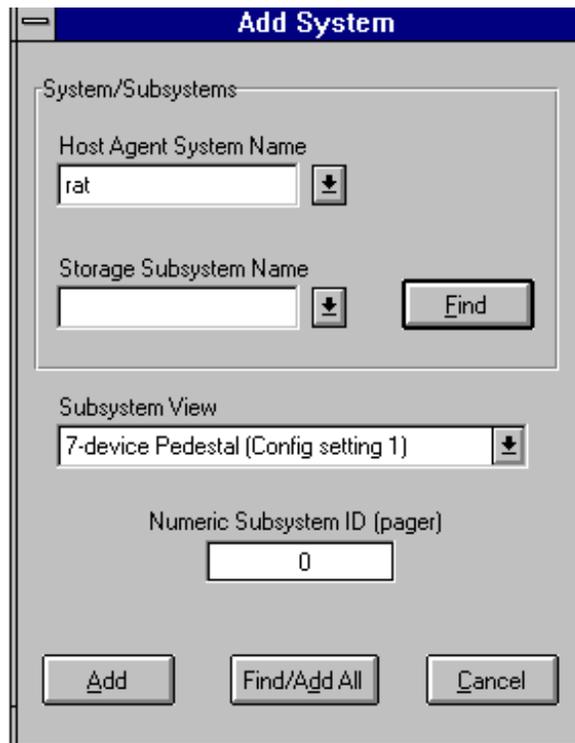
8. Return to the *Agent Configuration Utility* menu and click *OK* to install the agent.

4.9 Adding A System to the Network

Systems are added to the network using Command Console, i.e, the client. Command Console can be installed locally in the storage subsystem's host system or in a remotely located PC running Windows 95 or Windows NT, which is referred to as the Management Station. To complete the network link, proceed as follows:

1. Install Command Console in the Management Station. This is the system you will use to configure and monitor your RAID 310 Array.
2. Make sure that you have properly installed and configured an agent on the host system you want to connect.
3. Launch the icon representing the Network Version of Command Console to display the Control Panel.
4. From the Menu Bar choose **Configuration | Add System** to access the *Add System* dialog box (Figure 4-8).

Figure 4–8 Add System Dialog Box



5. Enter the host platform agent and storage subsystem names as defined in the agent. After you enter the host system name, you can use the *Find* button to find and list the storage subsystems connected to a host system. Command Console finds all the subsystems connected to the host system and creates a pull-down list of their names. You can then select a name from the list.

6. Select *7-device Pedestal* for the *Subsystem View* and click on either the *Add* button (which adds the subsystem shown in the *Storage Subsystem Name* box to the network) or the *Find/Add All* button (which adds all the storage subsystems connected to the host system). Command Console displays the icons for the added system and subsystem(s) in the Navigation Window.

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 Alpha-based Windows 95 or Windows NT system. 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 will 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	VGA or better.
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 upgrade 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 now 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.

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.



Setld Script Example

This Appendix provides an example of the script of the setld install utility.

Example script of the *setld* install utility:

```
# cd /tmp
# ls
.X11-unix
# tar xpf /dev/rfd0c
# ls
.X11-unix SWRAID100 instctrl
# setld -l /tmp SWRAID100
```

Checking file system space required to install specified subsets:

File system space checked OK.

```
StorageWorks RAID Utilities
  Copying from /tmp (disk)
  Verifying
```

Configuring "StorageWorks RAID Utilities" (SWRAID100)

Configuring the system to run the StorageWorks RAID Array support V1.0.

This procedure will modify several system files and optionally rebuild the kernel.

Modifying /sys/conf/OSF1KF

```
Creating special device files
Modifying sys/data/cam_data.c
```

This installation procedure can rebuild and move a kernel to /vmunix. You may choose to skip this phase of the installation if you are installing more than one subset which will require a kernel build.

If you choose to rebuild the kernel at this time, you will be asked whether you want to edit the configuration file during the rebuild procedure. The default is no; select the default.

Remember you must build a kernel and reboot at some point to activate the StorageWorks RAID Array support V1.0 software.

Build a kernel as part of this install? (y/n): y

The rest of the procedure will take approximately 15 minutes to rebuild your kernel, depending on your processor type.

Starting kernel rebuild...

*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

Saving /sys/conf/OSF1KF as /sys/conf/OSF1KF.bck

Do you want to edit the configuration file? (y/n) [n]:

*** PERFORMING KERNEL BUILD ***

Working....Fri Jan 26 12:51:55 WET 1996

Working....Fri Jan 26 12:53:55 WET 1996

The new kernel is /sys/OSF1KF/vmunix

Saving /vmunix as /vmunix.preSWRAID100

Moving /sys/OSF1KF/vmunix to /vmunix

Configuration Recommendations

This appendix suggest a list of items to optimize the performance of your RAID Array 310 subsystem.

B.1 Recommendations

Use the following guidelines to configure the RAID Array 310 subsystem to achieve optimal performance:

- Configure your RAID Array 310 to contain multiple devices or storagesets rather than one.
- Make use of the controller's two ports (channels). When you add devices to the controller, add some of the devices and storagesets to each of the controller ports. Distributing your devices and storagesets over both controller ports allows parallel activities to occur through the controller.
- Distribute your device or storageset units across the four possible target SCSI IDs for the controller. Specify a unique target SCSI ID for the first four device or storageset units that you configure. Any additional device or storageset units will need to share one of the target SCSI IDs; however, the load will already be fairly balanced.
- Avoid configuring multiple mirrorsets with the first member on the same port. For example:

add mirrorset m1 disk100 disk200

add mirrorset m1 disk210 disk110

- For write performance dependent applications, turn **on** the writeback cache. (The writeback cache is turned off by default.)
- Set the size of the `maximum_cache_transfer` of each unit to the largest size allowable, 1024, so that all transfers get cached. Otherwise, transfers that exceed the `maximum_cache_transfer` size would not get cached.



Upgrading Controller Software (V3.1 to V3.2)

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 V3.1 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 command:

```
HSZ20> show this_controller full
```

Complete the following information 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 (5 seconds)
CACHE_POLICY = _____

Host Functionality Mode =A

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


Next, list the storagesets you have configured:

```
SWXRC> SHOW STORAGESETS FULL
```

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

```
Name           Storageset      Uses           Used by
S28            stripeset       DISK130 D100
                DISK220
```

Switches:

```
CHUNKSIZE = 256 blocks
State:
NORMAL
DISK130 (member 0) is NORMAL
DISK220 (member 1) is NORMAL
Size: 50268168 blocks
```

```
M1            mirrorset      DISK100 D200
                DISK110
```

Switches:

```
POLICY (for replacement) = BEST_PERFORMANCE
COPY (priority) = NORMAL
READ_SOURCE = LEAST_BUSY
MEMBERSHIP = 2, 2 members present
```

Record the storageset information in the Storageset Table (Table C-2). The first row shows how to record for S28 of the sample:

NOTE

Not all column headings apply to all storagesets.

Table C-2 Storageset Table

NAME	STORAGE SET	USES	USED BY	POLICY	COPY	READ SOURCE	RECONS TRUCT	CHUNK SIZE
S28	Stripeset	DISK130 DISK220	D100					256
FAILED SET	AUTOSPARE	NOAUTOSPARE						

C.3 Upgrading Controller Software Using Windows NT

To upgrade software on these subsystems to Version V32Z, copy a new version of the software image from the CD-ROM to the controller. To do this, you need the following:

- The software distribution CD-ROM which came in the StorageWorks RAID Array for the RAID 310 upgrade kit.
- Windows 3.1 and 3.11, Windows for Work Groups, 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 in the following example.

NOTE

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

C.4 Windows 3.1/3.11, Windows for Work Groups, or 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 the Terminal icon 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 to highlight **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)

Click OK when you complete the settings.

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 have completed the settings. Press the Enter key. The default prompt should now appear.

8. Set the controller prompt by typing:

```
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.

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

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

10. Change the Terminal program baud rate to match the controller's. Select the *Communications* option from the *Settings* menu. When the *Communications* window appears, set the baud rate to *19200* and click OK.

NOTE

Remember to change the RAID Manager and/or 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.
12. 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\v3.2 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 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

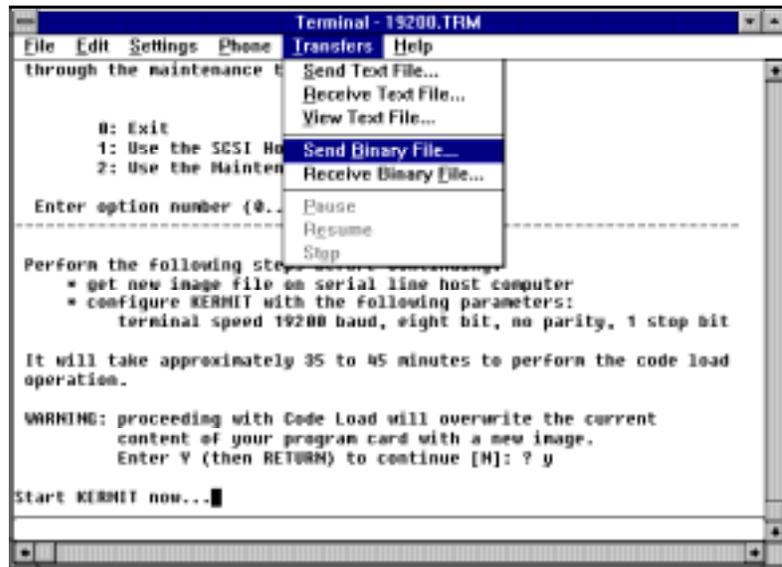
Start KERMIT now...

8. 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 C-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

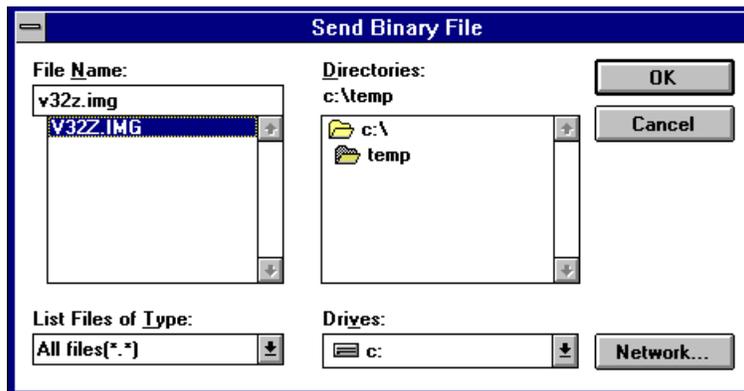


11. Select the V32Z.IMG file and Click OK as shown in Figure C-2.

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 V32Z.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:V32Z
Informational Report
Instance Code: 0102030A
Last Failure Code:86000020 (No Last Failure Parameters)

Controller:
HSZ20 CX54300265 Software V32Z, Hardware A02
Not configured for dual-redundancy
SCSI address 7
Time: NOT SET

Host Port:
SCSI target(s) (0, 1, 2, 3), No Preferred target(s)
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 = 5 (seconds)
CACHE_POLICY = A
Host Functionality Mode = A
```

C.5 Windows 95 and Windows NT 4.0 Upgrade Procedures

To begin upgrading the controller software, start and set up the terminal emulation program as specified in the following example:

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 setting. Press the Tab key once and select the OK icon.
4. Click the *Settings* menu and select VT100 emulation.
5. At the "Connect To" menu, change the connection settings for your particular system setup by pressing the Enter key. Choose the appropriate comp port for your system.

NOTE

COM1 is the default connection setting.

6. Change the Port Settings baud rate from 2400 to 9600 bits per second.
7. Select Xon/Xoff or None as the Flow Control setting. Press the Enter key. This will return you to your newly-created Terminal session.
8. 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 ?.

9. Click *File* at the menu bar. Choose "Save", to save the configuration you have just created.
10. Set the controller prompt by typing at the prompt: (This step is optional):

```
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.

11. Change the controller's baud rate to 19200 by typing:

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

CAUTION

Remember to change the RAID Manager and/or Command Console software baud rate from 9600 to 19200.

12. Press the Enter key and the HSZ20> prompt appears. Now you are ready to begin downloading the software.
13. 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\v3.2* 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.

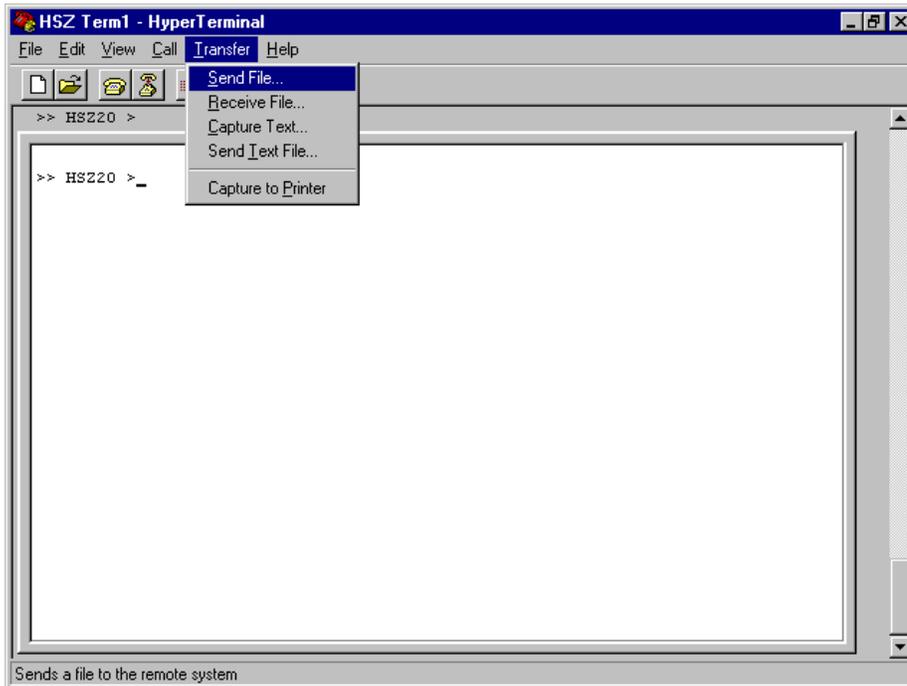
WARNING: proceeding with Code Load will overwrite the current content of your program code with a new image. Enter Y (then RETURN) to continue [N] ? y Start KERMIT now...

8. 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 C-3.

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–3 Select Send File from the Transfer Menu

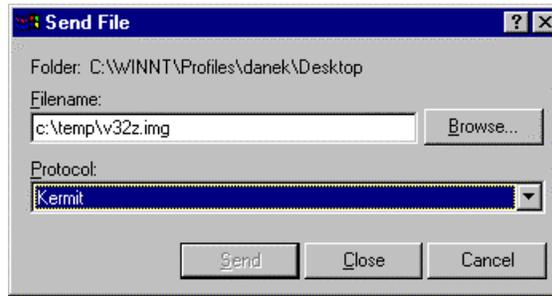


11. Select the V32Z.IMG file and click OK.

NOTE

The following figure shows 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–4 Select the V32Z.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
```

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.
14. 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:V32Z
Informational Report
Instance Code: 0102030A
Last Failure Code:86000020 (No Last Failure Parameters)
HSZ20>show this_controller
Controller:
HSZ20 CX54300265 Software V32Z, Hardware A02
Not configured for dual-redundancy
SCSI address 7
Time: NOT SET
```

```
Host Port:
          SCSI target(s) (0, 1, 2, 3), No Preferred target(s)
          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 = 5 (seconds)
CACHE_POLICY = A
Host Functionality Mode = A.
```

C.6 Reverting to Software Image Version 3.1

For reversions to release V3.1, substitute V31Z.IMG for V32Z.IMG in the previous section (step 2) as the correct software image filename. V31Z.IMG is stored in directory\firmware\V31.

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.

Reader's Comments

Manual Order Number:

EK-SMRA9-IG. C01

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