

# ***Compaq StorageWorks***<sup>TM</sup>

## **RAID Array 3000 Subsystem Second Controller Option**

Installation Guide

Fifth Edition (January 2001)  
Part Number EK-SM3KC-IG. E01  
**Compaq Computer Corporation**

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# Contents

## About This Guide

|                                 |      |
|---------------------------------|------|
| Purpose and Scope.....          | v    |
| Intended Audience.....          | v    |
| Document Structure.....         | v    |
| Related Documents.....          | vi   |
| Text Conventions.....           | vii  |
| Symbols in Text.....            | vii  |
| Symbols on Equipment.....       | viii |
| Rack Stability.....             | ix   |
| Getting Help.....               | ix   |
| Compaq Technical Support.....   | x    |
| Compaq Website.....             | x    |
| Compaq Authorized Reseller..... | x    |

## Chapter 1

### Second Controller Option

|  |      |
|--|------|
| Introduction.....  | 1-1  |
| Installing the Upgrade.....  | 1-3  |
| Saving the Existing Configuration.....                                   | 1-3  |
| Updating Firmware.....   | 1-4  |
| Updating Firmware Using the SWCC.....                                    | 1-4  |
| Updating Firmware Using a Serial Interface.....                          | 1-5  |
| Shutting down the RA3000.....  | 1-6  |
| Installing Two SIMMs into a Second Controller.....                       | 1-7  |
| Replace Existing Controller.....   | 1-8  |
| Restoring the Configuration.....   | 1-9  |
| Updating the Firmware on a Second Controller.....                        | 1-10 |
| Installing the Original Controller.....                                  | 1-10 |
| Configuring a Dual Controller Installation for a Single Serial Port..... | 1-11 |
| Configuring the RA3000 for the Active Mode of Operation.....             | 1-11 |
| Configuring the Dual Controllers.....                                    | 1-12 |

|  |      |
|--|------|
| Connecting to Your Dual Controller Storage System..... | 1-14 |
| Verifying the Controller Operating Parameters.....     | 1-14 |

### *List of Figures*

|  |      |
|--|------|
| Figure 1-1. Second controller pedestal slot location.....  | 1-2  |
| Figure 1-2. Saving the existing configuration .....        | 1-3  |
| Figure 1-3. Saved configuration .....                      | 1-4  |
| Figure 1-4. Update Firmware command .....                  | 1-4  |
| Figure 1-5. Firmware Update dialog box .....               | 1-5  |
| Figure 1-6. Insert SIMM into connector .....               | 1-7  |
| Figure 1-7. Pivot SIMM down to seat .....                  | 1-7  |
| Figure 1-8. Remove controller from top slot.....           | 1-8  |
| Figure 1-9. Restoring configuration to new controller..... | 1-9  |
| Figure 1-10. Restored configuration example .....          | 1-10 |

# About This Guide

## Purpose and Scope

This guide provides instructions for installing a Compaq *StorageWorks™ RAID Array 3000 Subsystem Second Controller Option*.

## Intended Audience

This document is written for installers and operators.

## Document Structure

### Chapter 1: Second Controller Option

- Introduction
- Installing the Upgrade
- Saving the Existing Configuration
- Updating Firmware
- Shutting down the RA3000
- Installing Two SIMMs into a Second Controller
- Replacing Existing Controller
- Restoring the Configuration
- Updating the Firmware on a Second Controller
- Installing the Original Controller

- Configuring a Dual Controller Installation for a Single Serial Port
- Configuring the RA3000 for the Active Mode of Operation
- Configuring the Dual Controllers
- Connecting to Your Dual Controller Storage System
- Verifying the Controller Operating Parameters

## Related Documents

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

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**Table 1**  
**Related Documents**

---

| Document Title   | Part Number     |
|--|-----------------|
| Command Console V2.2 for the RAID Array 3000 (Pedestal and Rack Mount Models) User's Guide | AA-RBF2C-TE     |
| RAID Array 3000 Controller Shelf Hardware User's Guide                                     | EK-SMCPQ-UG.D01 |
| RAID Array 3000 Pedestal Storage Subsystem Hardware User's Guide                           | EK-SMCPO-UG.C01 |

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## Text Conventions

This document uses the following conventions to distinguish elements of text:

|   |  |
|---|--|
| <b>Keys</b>   | Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.        |
| USER INPUT  | User input appears in a different typeface and in uppercase.   |
| <i>FILENAMES</i>                                    | File names appear in uppercase italics.  |
| Menu Options,<br>Command Names,<br>Dialog Box Names | These elements appear in initial capital letters.  |
| COMMANDS,<br>DIRECTORY NAMES,<br>and DRIVE NAMES    | These elements appear in uppercase, unless case sensitive.   |
| Type  | When you are instructed to <i>type</i> information, type the information <b>without</b> pressing the <b>Enter</b> key. |
| Enter   | When you are instructed to <i>enter</i> information, type the information and then press the <b>Enter</b> key.         |

## Symbols in Text

The following symbols are found in the text of this guide to indicate different types of information.



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

---



**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

---

**IMPORTANT:** Text set off in this manner presents clarifying information or specific instructions.

---

**NOTE:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

## Symbols on Equipment

The following symbols are placed on equipment to indicate the presence of potentially hazardous conditions:



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

---



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

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

---



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

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

---



This symbol on an RJ-45 receptacle indicates a Network Interface Connection.

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

---



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

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

---





These symbols on power supplies or systems indicate the equipment is supplied by multiple sources of power.

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

---



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

Weight in kg **WARNING:** To reduce the risk of personal injury or damage to the  
Weight in lb equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

---

## Rack Stability



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

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

## Getting Help

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

## Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website. Access the Compaq website:

<http://www.compaq.com>

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

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

## Compaq Website

The Compaq website has information on this product. Access the Compaq website:

<http://www.compaq.com/storage>

## Compaq Authorized Reseller

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

## Second Controller Option

### Introduction

This chapter describes how to install a second RAID controller in the RAID Array 3000 pedestal or controller shelf. The second controller option adds a fail/safe feature to your storage subsystem. The guide also contains a procedure describing how to configure the subsystem for dual-controller operation when only one serial port is available on the host.

**NOTE:** The second controller option installation and configuration procedures shown in this guide apply to both the pedestal and the rackmount controller shelf. For clarity, only the pedestal is shown in this guide.

The controller option adds a second (redundant) controller unit to your subsystem to preserve the integrity of data should the first controller malfunction. The second controller is installed directly below the existing controller in the bottom controller slot of the RAID Array 3000 pedestal or the rack-mount controller shelf version of the subsystem (see Figure 1-1).

The installation procedure consists of adding two Single Inline Memory Modules (SIMM) to the redundant controller and, depending on the option kit you are installing, one or two SIMM modules to the existing controller. Following the memory upgrade, you must:

- Upgrade the firmware in both controllers
- Seat the devices in their respective controller slots
- Configure the subsystem to accommodate a redundant controller

## 1-2 RAID Array 3000 Subsystem Second Controller Option Installation Guide

Perform an inventory of the items contained in the second controller kit option. The kit should contain:

- RAID Array 3000 Controller
- For option kit DS-HSZ22-AA, 3 SIMMs
- For option kits DS-HSZ22-AB, 4 SIMMs
- Model label
- Warranty card
- This guide

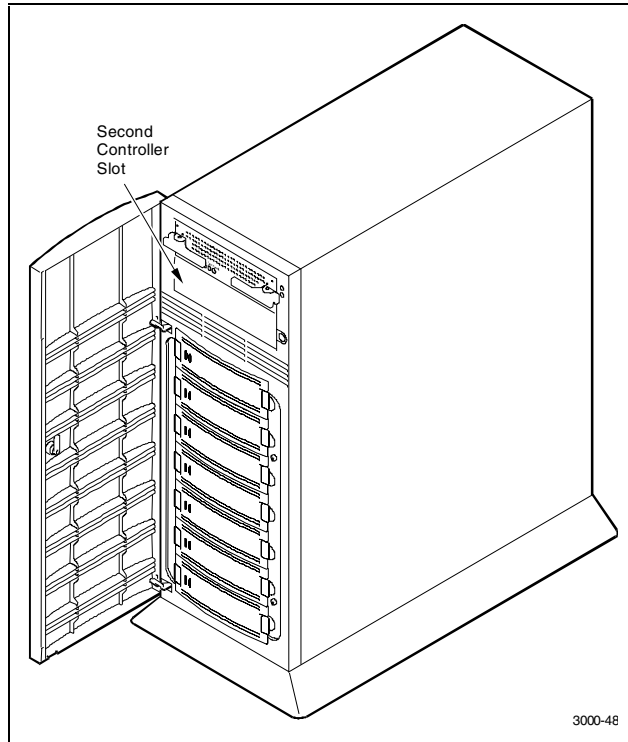


Figure 1-1. Second controller pedestal slot location

# Installing the Upgrade

**CAUTION:** To prevent an electrical discharge from damaging the SIMMs, always wear an ESD wrist or foot strap connected to a suitable ground when handling the memory modules.

You can upgrade your firmware using the SCSI or network connection method. Either method provides the fastest way to upgrade your firmware. To update your controller's firmware, proceed as follows.

# Saving the Existing Configuration

**NOTE:** You must save the subsystem configuration using the StorageWorks Command Console Client (SWCC) before performing the installation procedure. Otherwise, the RAID controller might lose your configuration.

To save your current configuration:

Select the **Storage** pull-down menu from the Toolbar, click **Controller**, select **Configuration**, and then **Save** (see Figure 1-2).

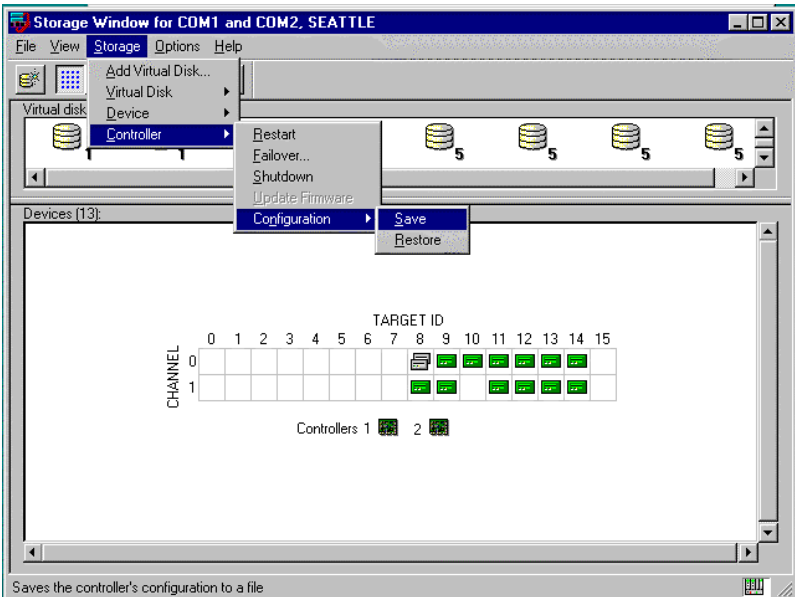


Figure 1-2. Saving the existing configuration

A **Save Configuration** screen with a Save to File field appears as shown in Figure 1-3. The example in Figure 1-3 shows the file name as `c:\config1`.

Enter your file name in the Save to File field and click **Save**.

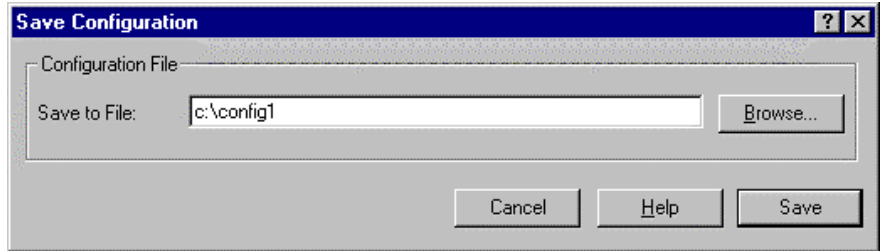


Figure 1-3. Saved configuration

## Updating Firmware



**CAUTION:** If the system disk is on the RA3000, firmware cannot be upgraded using the SWCC. Establish a temporary system disk on a disk drive outside the RA3000 and proceed with these instructions or follow the procedure in “Updating Firmware Using the Serial Interface”.

## Updating Firmware Using the SWCC

Start the SWCC and choose SCSI or Network Connection. From the Storage menu select **Controller**, and then select **Update Firmware** (see Figure 1-4).

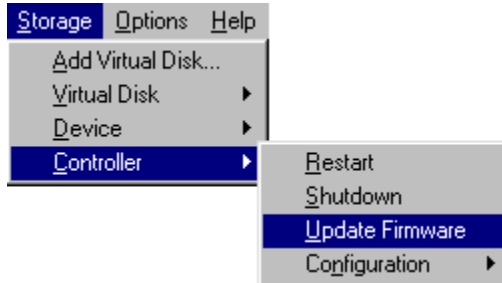


Figure 1-4. Update Firmware command

A window appears prompting you to specify the firmware file that you want to load. This file resides on the CD supplied with the controller kit option. You can easily identify firmware software by its *.FDI* extension. Enter the *.FDI* file name (for example, D:\FIRMWARE\XXX.FDI), then click **Start Update**. upon completion of the firmware update, the system will automatically reboot and update the controller's firmware (see Figure 1-5).

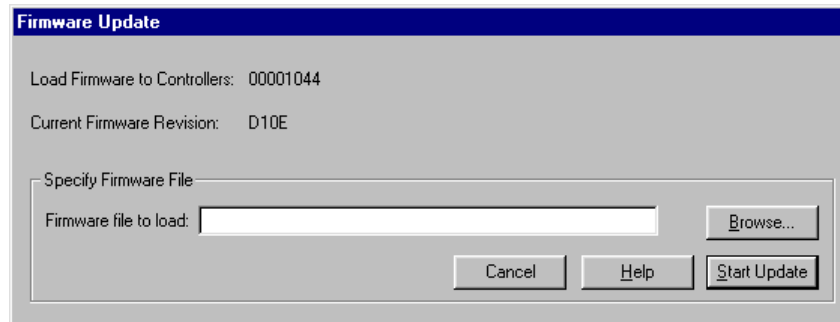


Figure 1-5. Firmware Update dialog box

## Updating Firmware Using a Serial Interface

**NOTE:** Follow this procedure only when the host operating system is installed on the RA3000.

1. Properly shutdown your host system.
2. Using either a laptop computer or a computer other than the one attached to the RA3000, connect a serial cable between the COM port on that computer and the corresponding serial port (CTR1 or CTR2) for the controller on the RA3000.
3. Start a terminal emulator session. For Windows NT or Windows 2000, Compaq suggests the HyperTerminal emulator. Use the settings 9600 baud, 8 bits, No Parity, 1 stop bit, XON/XOFF.
4. To access the controller, press the **Escape** key then press the **Shift+7** keys. The controller will respond with a banner stating DEC HSZ22 DEC Monitor Utility, followed by the firmware revision number.

**NOTE:** You will not actually be using this utility to upgrade the firmware, but having it operational makes the next step easier.

5. Reset the controller by power cycling the RA3000 subsystem. You will see a Flash Boot Utility banner, followed by instructions to press the **Ctrl+C** keys to abort. Press the **Ctrl+C** keys to abort the load sequence. A FLASH Boot Utility Options menu will appear.

6. Select item (2), “Change serial baud rate”. Select **38400**. When presented with the “Please change your baud rate and press Return” message, do so from within HyperTerminal via the File Properties menu, then choose **Configure**. If there is no response from the utility after changing the baud rate, proceed with step 7.
7. After changing the baud rate, you may have to close and re-enter HyperTerminal. Press the **Return** key after HyperTerminal restarts. You will see the FLASH Boot Utility Option menu again.
8. Select menu item (1) “Download new Firmware Image”. Using the Transfer menu in HyperTerminal, choose **Send Text File** and send the firmware. You will see a “Receiving code for System Version <ver>” message, followed by a series of \ | / - characters cycling at the end of the line. At 9600 baud, the download takes between 45-60 minutes. At 38400, it should take around 10-12 minutes. At completion, you will see the FLASH Programming complete message, followed by the FLASH Boot Utility Options menu again.
9. Select item (9), “Restart Controller”. You will be instructed to reset the baud rate back to 9600, which you'll again do from the HyperTerminal File\Properties\Configure menu. As in step 7, you will probably have to exit and restart HyperTerminal to get any response. Press the **Enter** key when Hyperterminal restarts.
10. Your firmware should now be upgraded.

## Shutting down the RA3000

1. Ensure that both host ports are in a quiescent state (no I/O activity).
2. Shut down the Host System.
3. Issue a shutdown command from the SWCC to the pedestal/ controller shelf controller.
4. Power off the pedestal/controller shelf as applicable.



## Installing Two SIMMs into a Second Controller

1. Install two of the SIMMs into the second controller (make sure all SIMMs are of the same type) by aligning the connector pins and inserting the modules into the connectors as shown in Figure 1-6.

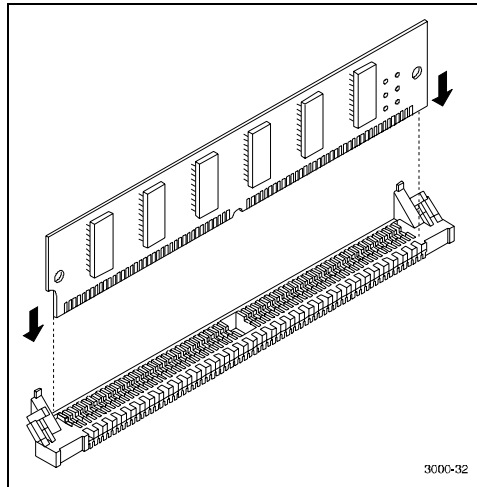


Figure 1-6. Insert SIMM into connector

2. Ensure the SIMM is firmly seated and then gently pivot it toward the controller board until it snaps into place as shown in Figure 1-7.

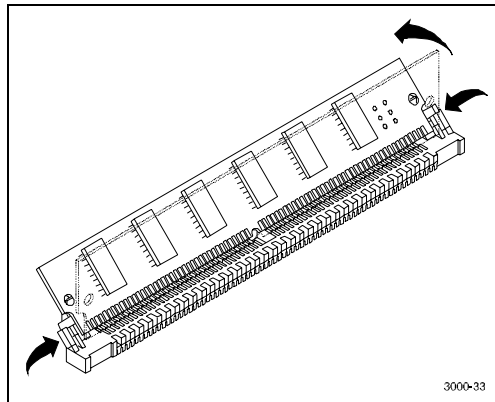


Figure 1-7. Pivot SIMM down to seat

## Replace Existing Controller

1. Replace the existing controller with the new controller (see Figure 1-8).

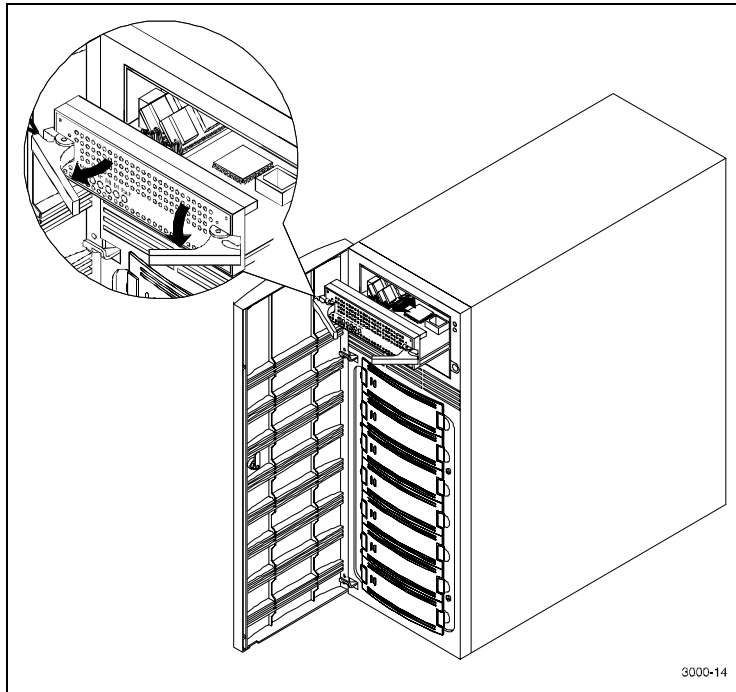


Figure 1-8. Remove controller from top slot

**NOTE:** Ensure you install the new controller in the same slot as the existing controller removed in step 1. Do not leave the existing controller in the pedestal (or controller shelf) while performing the following step 2.

2. Power up the system and then restore the configuration on the new controller as explained in the following section.

# Restoring the Configuration

To restore your configuration to the new controller:

- 1. Restart the SWCC in the Serial Mode (refer to the *Getting Started RAID Array 3000 Installation Guide* for instructions).
- 2. Select the **Storage** pull-down menu from the Toolbar, then choose **Controller**.
- 3. From the Controller pull-down menu, select **Configuration**, and then **Restore** (Figure 1-9).

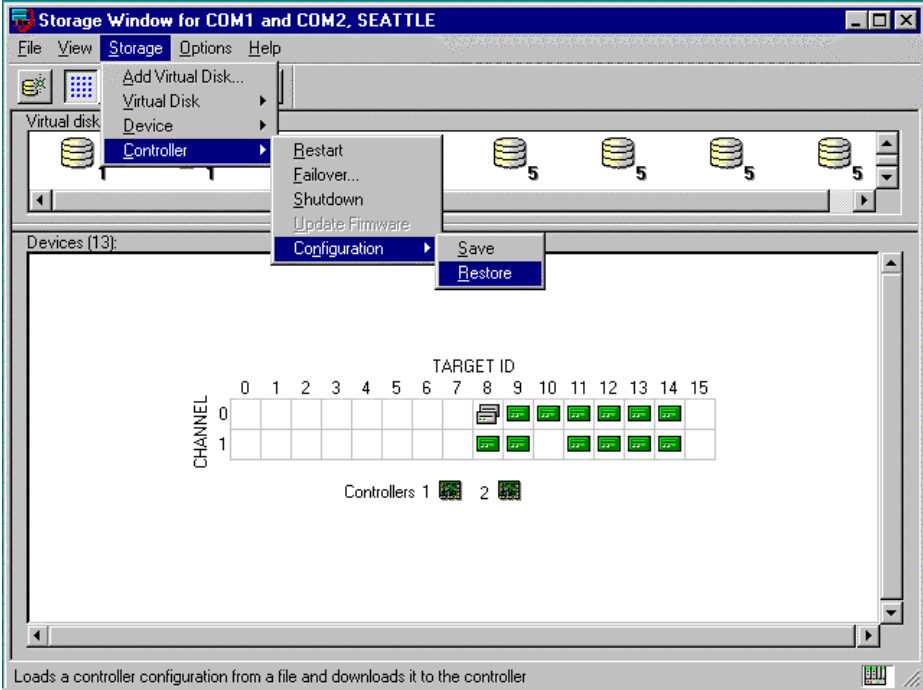


Figure 1-9. Restoring configuration to new controller

The saved configuration screen with a Restore from File field appears as shown in Figure 1-10.

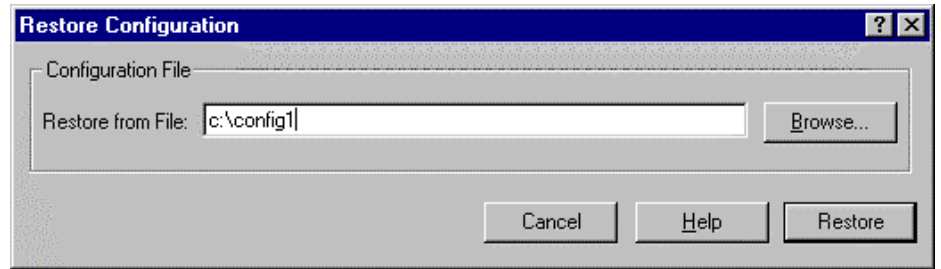


Figure 1-10. Restored configuration example

**NOTE:** Restoring the configuration in step 4 might take up to 5 minutes.

4. Enter the file name that you saved in “Saving the Existing Configuration” and click **Restore**.

## Updating the Firmware on a Second Controller

1. After configuration has been restored, update firmware on the second controller. Repeat the procedure in “Updating Firmware Using a SWCC” or “Updating Firmware Using a Serial Interface”.
2. After the configuration has been restored and firmware has been updated, power down the system.

## Installing the Original Controller

1. If installing option kit DS-HSZ22-AA, add the second SIMM to the original controller. If installing option kit DS-HSZ22-AB, replace the existing SIMM with the two remaining SIMMs supplied with the kit. (See “Install Two SIMMs into Second Controller” for instructions).
2. Install the second controller into the pedestal (or controller shelf) and power up the system. The system is now in the dual-redundant operating mode.
3. Locate the second serial cable that came in the second controller kit. Connect this cable to the second controller serial port on the RA3000 and to COM 2 port and restart the SWCC in serial mode. You now have two serial connections.

4. To check that the controller pair is in redundant mode, click the **Controller** icon. Properties for both controllers will be visible. Firmware revision of both controllers must be identical. If either controller is shown in gray, refer to the *Getting Started RAID Array 3000 Installation Guide* for more detailed instructions.

## Configuring a Dual Controller Installation for a Single Serial Port

This section describes how to configure your RA3000 storage system for dual controller operation when only one serial port is available on the host. If required, refer to the *Getting Started RAID Array 3000 Installation Guide* for SWCC installation instructions. The information in this section is divided as follows:

- Configuring the RA3000 Storage System for dual-controller operation
- Connecting to your dual controller storage system using a serial connection
- Verifying the controller operating parameters

## Configuring the RA3000 for the Active Mode of Operation

If you are upgrading from a single controller storage system, the installed controller will be in the active/passive mode of operation. To configure the storage system using a single serial connection, the dual controllers must be placed in active/active mode. Perform the procedure to change your storage system from active/passive to active/active mode of operation.

1. Shutdown the RA3000 storage system, install the second controller, and restart the system.
2. Connect the host serial port to the serial port connector on the top controller of the RA3000.
3. Open an HSZ22 monitor utility terminal session. The terminal settings should be 9600 BAUD, 8 bits, no parity, 1 stop bit, XON/XOFF. If prompted for a password, enter **RAID**.
4. When the terminal session is displayed, press the **Escape** key then press the **Shift+7** keys. The controller will respond with a banner listing the HSZ22 Monitor Utility followed by the firmware revision number.
5. Select **Setup Parameters** from the main menu.

6. Select **Rdnt Ctrlr Parameters** and change the value of Host I/O Channel 1 to Passive. Press the **Ctrl+Z** keys to exit.
7. Transfer the serial cable to the serial port on the bottom controller and press the **Ctrl+Z** keys. When the Monitor Utility screen appears, press any key to continue.
8. Select **Setup Parameters** and then select **Rdnt Ctrlr** Parameters from the main menu.
9. Both channels should appear as Passive. Select the host I/O channel that was not reconfigured in step 5 and change its value to Active. Press the **Ctrl+Z** keys to exit.
10. Restart the controllers by power cycling the RA3000 storage system.
11. Recheck the Rdnt Ctrlr Parameters. The controller values should display active/passive.
12. Transfer the serial cable to the serial port on the top controller on the RA3000 and press the **Ctrl+Z** keys.
13. Check the Rdnt Ctrlr Parameters. The controller values should display Passive/Active.

Your storage system is now properly configured for dual controller operation from a single serial host port. Proceed to the next section to configure the controllers.

## Configuring the Dual Controllers

In order to create a virtual disk, a serial connection must be made to the controller. The serial connection provides a local connection to the RA3000 (HSZ22) controller. To configure the controller:

1. Ensure the RA3000 Storage System is turned off.
2. Connect the serial cable between the host serial connector and the top controller's serial port connector.
3. Power on the RA3000 storage system.
4. Open SWCC utility.
5. Select the **Serial** button in the HSZ22 Management window.
6. Select the serial port available on the host's workstation and then click the **Connect** button.

7. When the second connection window appears, select **Cancel**. Once the connection is established, a storage window will appear with the connected port identified at the top of the window.
8. From the Storage menu, select **Add Virtual Disk**. Select **JBOD** from the menu (you can select any RAID level you wish) and then select **Next**.
9. Select Drive from the window Devices Available to Create a New Virtual Disk and then select **Next**.
10. Select **Add** and then select **Next**.
11. A window appears prompting you for a selection of the host port that the JBOD should be created on. There is a single connection to the controller so only one host port will be available. Select **Next**.
12. Choose a LUN number and enable the write-back cache.
13. Select **Next** and then **Finish**.
14. You have now created one Virtual Device (JBOD) on the top controller. Disconnect the serial cable from the top controller and reconnect the cable to serial port connector on the bottom (redundant) controller.
15. Close and reopen the StorageWorks window and repeat steps 4 through 13 above.  
  
**NOTE:** If the storage window connection is lost when the cable is moved, reopen the HSZ22 StorageWindow.
16. Once the second Virtual Disk has been created close the StorageWorks window.
17. To complete dual-controller configuration, perform the following:
  - a. Ensure all cables and connections to your server are in place
  - b. Leave the RA3000 Rack Mount Storage System powered on
  - c. Reboot the server

Refer to the *Getting Started RAID Array 3000 Installation Guide* to configure the virtual disks as communications LUNs.

## Connecting to Your Dual Controller Storage System

1. Open the SWCC utility.
2. Refer to the *Getting Started RAID Array 3000 Installation Guide* for instructions describing how to connect the RA3000 to your host system.

## Verifying the Controller Operating Parameters

For optimal dual-controller performance and load balancing, the host ports should be configured as listed. Verify these parameters from the Controller Properties page:

- Host I/O channel 0 for Controller 1 (top) to Active
- Host I/O channel 1 for Controller 1 to Passive
- Channel 0 Target ID for Controller 1 to 0
- Channel 1 Target ID for Controller 2 to 1

**NOTE:** It is allowable to configure the host I/O and target IDs as follows:

Controller 1 (top) may be set to “Passive” while host I/O channel 1 for Controller 1 is set to Active. As long as each host channel value and channel target ID value is unique, the system is correctly configured for Active/Active mode.

1. Select the **Environment** tab from the Controller Properties window.
2. Ensure the cabinet and UPS settings are set to normal.
3. Select the **Cache** tab from the Controller Properties window. The SIMMs parameters must be identical between controllers.
4. Select **OK**. The system is now ready for dual-controller operation. Configuration of additional RAID sets can now be performed as desired.