COMPAQ

Smart Array 3200 Controller

Reference Guide

First Edition (July 1998)
Part Number 340862-001
Compaq Computer Corporation

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About This Guide

This guide is designed to be used as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

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

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

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings

WARNING: Indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Presents clarifying information or specific instructions.

NOTE: Presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These icons may be located on equipment in areas where hazardous conditions may exist.

Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.
WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.
WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

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

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

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

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

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 Website

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

Telephone Numbers

For the name of your nearest Compaq Authorized Reseller:

In the United States, call 1-800-345-1518
In Canada, call 1-800-263-5868

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

Chapter 1
Features

The Smart Array 3200 is a dual-channel, 32-bit array controller that offers advanced features (see below). The Smart Array 3200 supports Wide-Ultra2 SCSI technology for improved data transfer rates and is backward-compatible with other SCSI devices. It also includes optional daughter boards for customizing combinations of internal and external connections (two external, two internal, or one internal and one external). The controller supports all Compaq SCSI hard drives: Wide-Ultra SCSI-3, Fast-Wide SCSI-2, and Fast SCSI-2. Included with the Smart Array 3200 is Compaq Array Configuration Utility software, which simplifies drive array setup and configuration changes.

Overview of Features

The Smart Array 3200:

- Supports Wide-Ultra2 SCSI, a 16-bit, 40-MHz bus with a data transfer rate of 80 MB/s
- Has two channels with support for up to 30 drives (15 per channel)
- Supports two external Wide-Ultra2 SCSI connections or can be custom-configured for internal or external connections using daughter boards
- Has a removable Array Accelerator—battery-backed 64-MB read/write cache board with ECC (Error Checking and Correcting) memory*
- Has read-ahead caching
- Supports hot-plug PCI
- Allows multiple logical drives per drive array
- Supports RAID 0, 0+1 (also called RAID 10), 1, 4, and 5 fault tolerance options

*56-MB is available for read/write cache; 8-MB is reserved for transfer buffer and scripts.

- Supports advanced RAID Features:
  - Online capacity expansion
  - User-selectable stripe size
  - Adjustable read/write cache ratio
  - Automatic performance tuning
  - Global online spare
- Supports Wide-Ultra2 SCSI, Wide-Ultra SCSI-3, Fast-Wide SCSI-2, and Fast SCSI-2 hard drives
- Allows performance monitoring through Compaq Insight Manager
- Has pre-failure notification
- Has tagged command queuing
- Is available in 32-bit PCI Bus Master interface

About the Smart Array 3200

The Smart Array 3200 interface to the server is a Peripheral Component Interface (PCI) bus. The PCI bus is a high-performance, 32-bit bus with multiplexed address and data lines, and includes a parity signal. It provides a high-speed (up to 132 MB/s) path between the system board and the controller. The Smart Array 3200 is a PCI Bus Master device and conforms to Rev. 2.1 of the PCI Local Bus Specification.

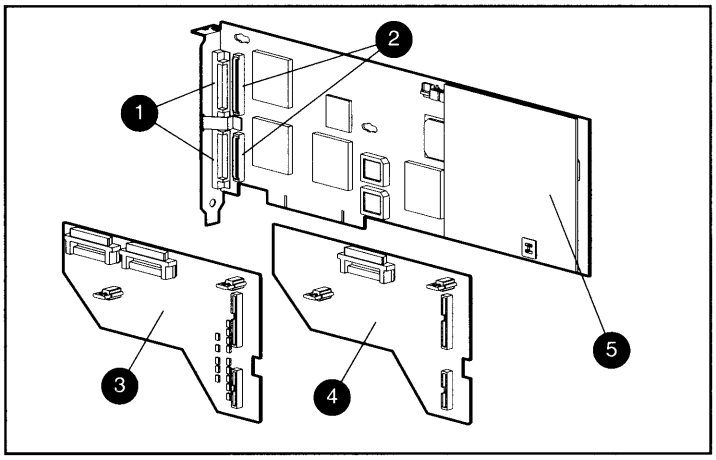

Figure 1-1. Smart Array 3200 and daughter boards

❶ Two external Wide-Ultra SCSI Port 1 connectors

❷ Connectors to attach daughter boards

❸ Daughter board equipped with two Wide-Ultra SCSI-3 internal connectors

❹ Daughter board equipped with one Wide-Ultra SCSI-3 internal connector

❺ Array Accelerator board

Using the Array Accelerator

The Smart Array 3200 64-MB Array Accelerator provides 56-MB read/write cache, which improves data access performance to the drive array with the accelerator acting as a posted-write cache and as a read-ahead cache. The write cache can accept data from the server at a rate of 80 MB/s. At the same time, read and write caches can be accommodated by the drivers. The read-ahead cache uses a multi-threaded algorithm to predict the next likely read operation for the array. This data is then read into the Array Accelerator from the drives. When the Smart Array 3200 receives a read request for the cached data, the data can be brought into the system at memory speeds and avoid the latency of a disk access. The Array Accelerator feature can be disabled manually via software or by the Automatic Performance Tuning Feature.

NOTE: The Smart Array 3200 is not operable without the Array Accelerator board attached.

The Array Accelerator's ECC memory provides a high level of data integrity. ECC memory detects and corrects hard and soft memory errors without affecting performance.

The Array Accelerator is backed up with onboard rechargeable batteries so that the data temporarily held (cached) there is safe during equipment failure or power outage. This is particularly important for data that has been cached by a posted-write, but has not yet been written to the hard drives. The batteries preserve data in the Array Accelerator for up to four days.

IMPORTANT: The rechargeable batteries on a new Smart Array 3200 controller may be discharged when the board is first installed. During server power up with discharged Array Accelerator batteries, Power-On Self-Test (POST) displays the code "1794," indicating that the Array Accelerator is disabled. This does not require action on your part. The Array Accelerator is enabled automatically when the batteries are charged to 90 percent of their capacity.

It can take up to 36 hours for the internal circuitry to charge the batteries fully. During this time, the Array Accelerator will be disabled, but the Smart Array 3200 controller will function properly, but without the performance advantage of the Array Accelerator.

The Array Accelerator, with backup batteries, is located on a removable daughter board (see Figure 1-1). For information on daughter boards, see the *Smart 3200 Array Controller Installation Guide.* Although controller failure is not anticipated, the Array Accelerator can be detached from a Smart Array 3200 and attached to a replacement Smart Array 3200. If the configuration information stored in the Array Accelerator matches that stored on the drives, any valid posted-write data being held in the cache will be written automatically to the drives attached to the replacement Array controller. Thus, data being held in the Array Accelerator memory can be recovered despite failure of the main Smart Array 3200 Controller board. See Appendix E, "Replacing the Array Accelerator," for specific information.

Wide-Ultra2 SCSI Technology

The Smart Array 3200 uses Wide-Ultra2 SCSI technology for improved performance. Wide-Ultra2 SCSI uses Low Voltage Differential (LVD) signaling to allow maximum burst rates on the Ultra2 SCSI bus of 80 MB/s, which doubles the maximum burst rate of the Wide-Ultra SCSI.

Wide-Ultra2 SCSI Benefits

The Wide-Ultra2 SCSI LVD technology provides these additional benefits:

- 80 MB/s maximum burst
- Higher data integrity through Differential Sensing (Diff Sens)
- Longer SCSI bus cable lengths
- System configuration for up to 15 peripherals

Wide-Ultra2 SCSI Compatibility

Wide-Ultra2 SCSI is compatible with your existing installed SCSI base. The Diff Sens circuit in the Wide-Ultra2 SCSI configures the drive operation and the appropriate bus capability. Wide-Ultra2 SCSI will work with the oldest SCSI designs. It is important to remember, however, that when using different SCSI devices on the same SCSI bus, all peripherals on that bus will respond to the earliest version SCSI specification. If an Ultra design is installed on an Ultra2 SCSI (LVD) bus, all devices will respond at Ultra speeds.

The Array Configuration Utility

The Array Configuration Utility is an easy-to-use, graphic-interface software program for setting up arrays and fault tolerance, and for expanding or changing drive array configurations. The utility:

- Provides a graphical representation of drive array configurations
- Uses Wizards to help optimize your array configuration
- Allows express or custom initial configuration
- Allows online spare (hot spare) configuration
- Supports RAID 0, 0+1, 1, 4, and 5 fault-tolerant configurations
- Allows separate fault tolerance configuration on a logical drive basis
- Allows user-selectable stripe size
- Enables easy capacity expansion
- Sets drive rebuild and capacity expansion priorities

Working with Drive Arrays

Drive array technology distributes data across a series of hard drives to unite these physical drives into one or more higher-performance logical drives. Distributing the data makes it possible to access data concurrently from multiple drives in the array, yielding I/O rates faster than those of non-arrayed drives. Each logical drive in the array can be set to a different fault-tolerant configuration. The Smart Array 3200 manages the drive array, independent of the host processor.

There may be several ways to configure each set of hardware. The Array Configuration Utility software helps configure the hardware to your needs.

CAUTION: Back up all data whenever you move drive arrays or change configurations.

See Appendix D for more information on drive arrays. See Chapter 5, "Running the Array Configuration Utility," for information on configuring your drive arrays.

Using Fault Tolerance

Fault tolerance refers to the protection of data if a hardware failure occurs in the storage system. There are several methods for setting a system's fault tolerance. Understanding each of these methods is important in determining the best method for the particular needs of your storage system. The fault tolerance methods supported by the Smart Array 3200 and the Array Configuration Utility include:

- Distributed data guarding: RAID 5
- Data guarding: RAID 4
- Drive mirroring: RAID 1 or RAID 0+1 (also called RAID 10)
- No fault tolerance: RAID 0

Further data protection can be achieved by assigning an online spare to any RAID 1, RAID 0+1, RAID 4, or RAID 5 configuration. See Appendix D for more information on fault tolerance methods. See Chapter 5 for information on using the Array Configuration Utility to configure your system for fault tolerance.

Expanding Capacity

Changing your storage configuration is easy using the Array Configuration Utility and does not require a data backup and restore cycle, even in fault-tolerant configurations. If you are using Microsoft Windows NT or Novell NetWare operating systems with hot-pluggable drives, storage expansion can be performed online, without shutting down the server's operating system. For more information on storage expansion, see "Running the Array Configuration Utility," in Chapter 5, and the section, "Expanding Storage Capacity" in Appendix D.

Drive Movement

As long as the relative order of the drives is maintained, an array of drives can be moved from one system to another. For more information, see Chapter 2.

SCSI Device Support

The Smart Array 3200 complies with ANSI SCSI-2 standards and supports 16-bit Wide-Ultra2 SCSI, 16-bit Wide-Ultra SCSI-3, 16-bit Fast-Wide SCSI-2, and 8-bit Fast SCSI-2 (standard SCSI) devices.

Wide-Ultra2 SCSI

Wide-Ultra2 technology provides data transfer rates of up to 80 MB/s at a 40-MHz bus rate. This combination allows higher throughput in many network application environments, than Wide-Ultra SCSI-3.

Wide-Ultra SCSI-3

Wide-Ultra SCSI-3 technology provides SCSI data transfer rates of up to 40 MB/s at a 20-MHz bus rate. This combination allows high throughput in many network application environments, including resource sharing and database servicing.

Fast-Wide SCSI-2 and Fast SCSI-2

Fast-Wide SCSI-2 provides two bytes of data at each bus transfer, providing a maximum data rate of 20 MB/s between SCSI devices while maintaining a 10-MHz bus rate.

Compaq Fast-Wide SCSI-2 controllers and devices communicate using Fast SCSI-2 protocol when required. Fast SCSI-2 drives are supported by the Smart Array 3200 using the appropriate cable adapter.

Operating System Drivers

The latest drivers for Compaq products can be obtained from:

World Wide Web
http://www.compaq.com.

CompuServe
Enter *GO COMPAQ* or go directly to the Compaq Forum.

America Online
Use the navigation keyword *COMPAQ*.

Prodigy
Use the *JUMP* navigation command followed by the keyword *COMPAQ*.

Internet
Go to *FTP.COMPAQ.COM* to access the Compaq anonymous FTP site. Enter "anonymous" for user name at the login prompt. Enter your full Internet E-mail address for the password.

Download Facility
Dial 281-518-1418. Compaq offers direct modem access for downloading drivers and other software. A SoftPaq manager is available to provide information on the latest files.

Chapter 2
Guidelines for Making Changes to Current Installation

Multiple Smart Array 3200 Controller Installations

If you will be installing or replacing drives in your Compaq server, keep in mind that:

- Each Smart Array 3200 has two independent SCSI channels, each of which supports up to 15 drives.
- Drives may be Wide-Ultra2 SCSI, Wide-Ultra SCSI-3, Fast-Wide SCSI-2, Fast SCSI-2, or a combination of the four in servers and storage systems that support hot-pluggable drives.
- Drives should *not* contain termination. Compaq servers and internal cabling provide the required termination of the SCSI bus.
- Compaq hard drives supported by the Smart Array 3200 include:

  2.1-GB Fast SCSI-2
  2.1-GB Fast-Wide SCSI-2
  2.1-GB Wide-Ultra SCSI-3
  4.3-GB Fast SCSI-2
  4.3-GB Fast-Wide SCSI-2
  4.3-GB Wide-Ultra SCSI-3
  9.1-GB Wide-Ultra SCSI-3
  9.1-GB Fast SCSI-2
  18.2-GB Wide-Ultra SCSI-3

- Drives should be of the same capacity to provide the greatest storage space efficiency when grouped in the same drive array.
- Except on hot-plug drives in ProLiant servers and storage systems, you must set the SCSI ID on each drive manually to a unique value in the range 0 to 6 for each SCSI bus (ID7 is reserved for the controller). Consult the documentation that came with the drive for instructions on setting the SCSI ID.

Determining the Maximum Storage

Maximum storage capacity factors of a server include:

- the number of option slots used for other purposes
- the number of available internal drive bays
- the number of logical drives or drive controllers allowed by the operating system

The maximum number of controllers and drives supported depends on several factors. To determine the number of drives supported by your server, refer to your server documentation. Server specifications are also available at the Compaq website, http://www.compaq.com.

Expanding the Capacity of an Array

General steps for expanding the capacity of an array include:

1. **Review**. See "Expanding Storage Capacity" in Appendix D for information on expanding the storage capacity of an existing Smart Array 3200 array.
2. **Back up data**. Although data loss is not anticipated during a normal capacity expansion, it is a good idea to back up all data in the array you will be expanding. This backup may also be used to return to the original configuration, if necessary.
3. **Add drives**. If you are using a server or storage system that *does not* support hot-pluggable drives, you will need to power down the server or storage system to add new drives. If you are using a server or storage system that *does* support hot-pluggable drives, do not power down the system or take it off line. Simply plug the new drives into vacant bays.
4. **Configure drive array**. See "Capacity Expansion" in Chapter 5 for instructions on using the Compaq Array Configuration Utility to reconfigure your drive array and make use of the added capacity.

Changing the Fault Tolerance of an Array

General steps for changing the fault tolerance of an array include:

1. **Decide on a fault tolerance method**. Review Appendix D, "Understanding Drive Arrays," and choose the fault tolerance method that best suits your needs.
2. **Back up data**. Changing the fault tolerance destroys the data on that logical drive. You **must** back up all data in the logical drive that you will be changing.
3. **Configure drive array**. Proceed to Chapter 5, "Running the Array Configuration Utility," for information on reconfiguring your drive array with the new fault tolerance method.
4. **Restore data**. Copy the backed-up data into the same logical drive. Your system automatically redistributes the data according to the new fault tolerance.

Changing the Stripe Size of an Array

General steps for changing the stripe size of an array:

1. **Review.** See "User-Selectable Stripe Sizes" in Appendix D for information on setting stripe size and the default values for given RAID levels.
2. **Back up Data.** Changing the stripe size may require destroying the data on those logical drives. You **must** back up all data in the logical drives where you will be changing the stripe size.
3. **Change Stripe-size.** Proceed to Chapter 5, " Running the Array Configuration Utility," for information on reconfiguring your logical drive with the new stripe size. If an error message, stating the number of sectors needed to be increased, is displayed, you must delete the old volume and reconfigure it as a new volume with the different stripe-size you had selected.
4. **Restart the System or Restore Data.** Copy the backed-up data into the same logical drives, if necessary. Your system automatically redistributes the data according to the new striping factor.

Moving Drives

Drives can be moved to alternate ID positions on the same array controller as long as their relative positions remain unchanged. (For information on moving arrays from one controller to another, see the "Moving Arrays" section in this chapter.) Although data loss is not anticipated during drive movement, Compaq recommends that you back up data before moving drives. To move drives, the following conditions must be met:

- System power is OFF (includes all system components).
- The move will not result in more than 15 physical drives and/or 32 logical drives (volumes) connected to a single controller.
- No failed drives are identified. The array should be in its original configuration with no active spare drives.
- Capacity expansion is not running.
- Drives in each array must maintain the same relative positions before and after drive movement as shown in Figure 2-1.
- Controller firmware is the latest revision (recommended).

The original configuration in Figure 2-1 shows drive positions 0, 3, and 6 filled. The drives are moved to positions 0, 1, and 2. In both configurations, the relative order of the drives stays the same: a, then b, then c. This example would not work if the new configuration changed the relative orders of the drives; that is, b, then a, then c. The new positions can also span multiple buses as long as the relative order remains the same; in this case, think of drive IDs 0 and 1 on SCSI port 2 as IDs (positions) 8 and 9. SCSI cables cannot be interchanged if an array spans the two ports.

Original Configuration		→	New Configuration	
ID6	c		ID6	
ID5			ID5	
ID4			ID4	
ID3	b		ID3	
ID2			ID2	c
ID1			ID1	b
ID0	a		ID0	a

Figure 2-1. Maintaining relative drive order while moving drives within or between arrays

When the above conditions are met, follow these steps to move drives:

1. Power system OFF.
2. Move drives.
3. Power system ON. A 1724 POST message should indicate that drive positions were changed and the configuration was updated. If a 1785 (Not Configured) POST message is displayed, turn the system off immediately to avoid data loss and return the drives to their original locations.
4. Run the Array Configuration Utility to view the new drive configuration (optional).

Moving Arrays

Moving arrays can be just moving an array from one controller to another controller in another server. Moving arrays also refers to consolidating arrays that exist on more than one controller onto a single controller. To move an array to another controller, the conditions listed previously for moving drives and the following additional restrictions must be met:

- All of the drives in the array must be moved at the same time.
- Drives on the destination controller must maintain the same relative positions before and after drive movement.

If any drives are missing or have failed, all data on the moved arrays could be lost. To protect against data loss, data should be backed up before moving an array. If you moved an array previously and plan to restore it to its original controller, see the following section, "Restoring an Array to Its Original Controller."

Figure 2-2 shows an original distributed configuration with two controllers, each having one array: drive IDs 0, 1, 2, and 3 constitute Array A on Controller 1 and drive IDs 0, 1, and 2 constitute Array A on Controller 2. Figure 2-3 shows that after removing the array from Controller 2 and adding it to Controller 1, Controller 1 now has two arrays: drive IDs 0, 1, 2, and 3 constitute Array A and drive IDs 4, 5, and 6 constitute Array B. Controller 2 has no arrays.

NOTE: A spare can be added as part of an array during this process. However, it will not be restored as a spare until you run the Array Configuration Utility on the newly configured array.

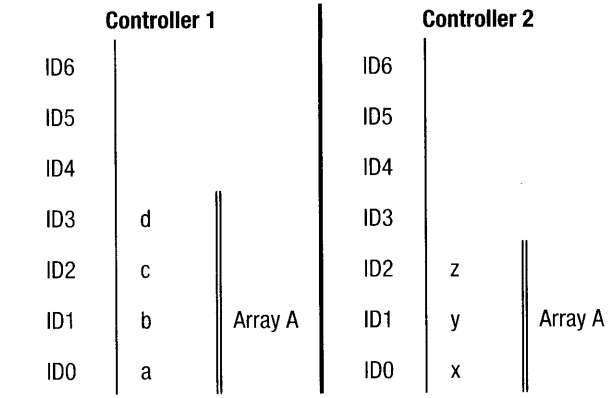

Figure 2-2. Configuration with two arrays, two controllers

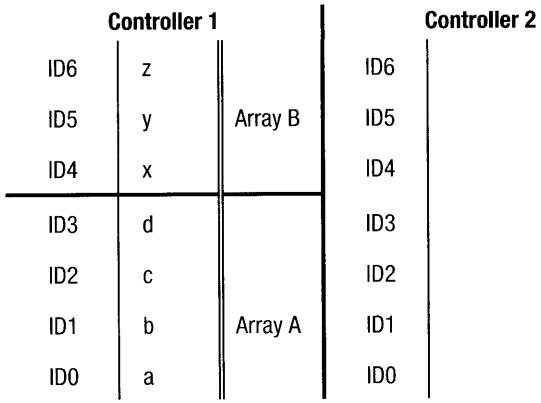

Figure 2-3. Arrays consolidated to one controller

To move an array, make sure all required conditions are satisfied, then:

1. Power system OFF.
2. Move array (include all drives in the array).
3. Power system ON. A 1727 POST message should indicate that logical drives were added to the configuration. If a 1785 (Not Configured) POST message is displayed, turn the system off immediately to avoid data loss and return the drives to their original locations.

NOTE: If you move arrays from a dual-channel controller to a single-channel controller, you may get an error message indicating a configuration error. If you get this error message:

- Return to the previous dual-channel controller configuration.
- Back up data on the array.
- Move the drives to the single-channel controller.
- Run the Array Configuration Utility on the single-channel controller to configure the array.
- Restore data to the array.

4. Run the Array Configuration Utility to view the new drive configuration or to assign spare drives (optional).

Restoring an Array to Its Original Controller

If you moved an array from one controller to another, you can restore it to its original controller. Figures 2-4 through 2-6 show the consecutive configurations required to restore an array to its original controller (or to a replaced controller in the event of controller failure). Figure 2-4 shows the consolidated configuration that includes Array A with drive IDs 0 through 3 and Array B with drive IDs 4, 5, and 6. Moving Array B back to Controller 2 creates an interim four-array state, with Array B on Controller 1 and Array A on Controller 2 appearing as failed. Running the Array Configuration Utility removes the failed arrays and restores the original two-array configuration.

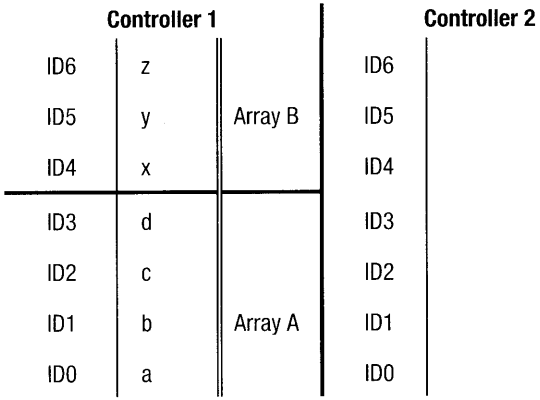

Figure 2-4. Arrays A and B both attached to Controller 1

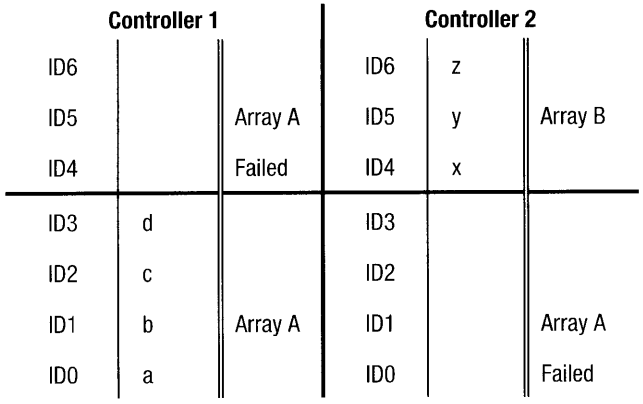

Figure 2-5. Interim four-array state

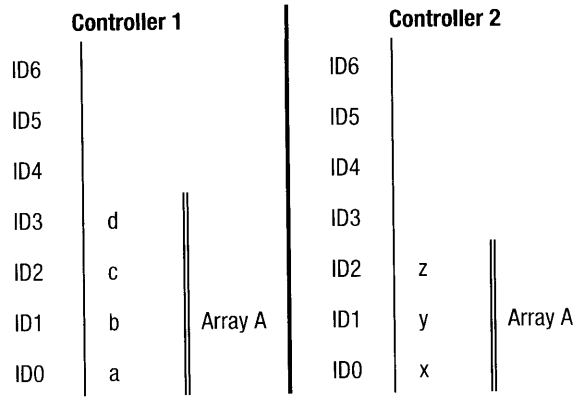

Figure 2-6. Failed arrays removed; arrays on separate controllers

To restore an array to its original controller, make sure the conditions for moving drives are met, then:

IMPORTANT: These steps must be followed AS DESCRIBED. Any deviation or mistake could result in the loss of all data across all moved arrays.

1. Power system OFF.
2. Move the array back to its original controller but retain its drive position from the consolidated configuration.
3. Power system ON.
4. Each controller will indicate a 1789 POST message, "drives are missing." Press **F2** to fail the missing drives.
5. Run the Array Configuration Utility and remove the appropriate failed arrays.
6. Reboot the system.

Chapter 3
Updating the Firmware

The ROMs on all Compaq servers and most Compaq options can be updated easily. By *flashing* the ROM using a special Compaq utility called ROMPaq, the existing contents of the ROM are replaced with another version stored in a disk file. This conveniently distributes new firmware to keep Compaq products updated with the latest capabilities.

There are two ROMPaq utilities:

System ROMPaq Updates the system ROM in all Compaq servers supporting Flash ROM. Use System ROMPaq when installing a new Smart Array 3200 in a Compaq server to be sure that the server can use all the capabilities of the Smart Array 3200.

Option ROMPaq Updates the onboard ROM on all Compaq options that support flashing. Use Option ROMPaq when new versions of the Smart Array 3200 firmware or SCSI drive firmware become available to take advantage of expanded capabilities.

IMPORTANT: Before you install the new Smart Array 3200 in your server, you must run System ROMPaq to update the system firmware. Use the instructions below to create diskettes with the latest version of System ROMPaq from the Compaq SmartStart and Support Software CD supplied with the Smart Array 3200.

ROMPaq Diskettes

The ROMPaq utility must be run from diskette(s). The latest version of ROMPaq diskettes can be created from the Compaq SmartStart and Support Software CD supplied in the Smart Array 3200 option kit. Compaq recommends that you use this version of ROMPaq initially; it is the latest one that supports your new Smart Array 3200 Controller.

Materials Needed

To create the ROMPaq utility diskette(s), you will need:

- Compaq SmartStart and Support Software CD (supplied in the Smart Array 3200 option kit)
- One blank diskette (for System ROMPaq) or three or four blank diskettes (for Option ROMPaq), depending upon your server
- Access to a server or workstation with a bootable CD-ROM drive. This can be the system in which you are installing the Smart Array 3200.

Creating Diskettes

To create ROMPaq diskettes:

1. Boot the server from the Compaq SmartStart and Support Software CD.
2. From the Compaq System Utilities screen, select Create Support Software.
3. From the Diskette Builder screen, scroll down the list and select one of the following three ROMPaq selections: System ROMPaq Firmware Upgrade Diskette for Compaq ProLiant Servers, System ROMPaq Firmware Upgrade Diskette for Compaq Systempro/XL and Compaq ProSignia Servers, or Option ROMPaq.
4. Follow the instructions on the screen to create the ROMPaq diskette(s).

Running System ROMPaq

System ROMPaq updates the firmware in Compaq servers. The Smart Array 3200 has enhanced drive array capabilities; many servers may need updated firmware to take advantage of these capabilities. Since it is difficult to determine when the firmware needs to be updated, Compaq recommends that you run the latest System ROMPaq on all servers when installing a new Smart Array 3200. If you purchased your server with Smart Array 3200 already installed, you do not need to run System ROMPaq at the time of server installation.

CAUTION: If you are replacing an existing array controller, such as the Compaq SMART Array Controller, with a Smart Array 3200, the system may not boot after hardware installation. This occurs if the old array controller was the primary controller containing the boot disk.

To avoid this problem when replacing an existing array controller with a Smart Array 3200, run System ROMPaq before you install the hardware. This ensures that the server recognizes the Smart Array 3200 and does not hang up on boot.

To run System ROMPaq:

1. Place the System ROMPaq diskette in the server diskette drive.
2. Boot the server by turning on the power.
3. Press **Enter** at the Welcome screen.
4. At the Select A Device screen, select the server from the list of the programmable devices. This may be the only item in the list. Press **Enter**.
5. At the Select An Image screen you will see:

Device to reprogram:	*your server*
Current ROM revision:	*date of existing ROM version*
Select Firmware Images:	*date of latest ROM version*

Press **Enter**.

6. Review the information on the Caution screen:

Device to reprogram:	*your server*
Current ROM revision:	*date of existing ROM version*
Selected ROM revision:	*date of ROM version to be installed*

   Press **Enter** to reprogram the system ROM or **Esc** to discontinue reprogramming and return to the Select An Image screen.

7. "Reprogramming Firmware" indicates that the system ROM is being reprogrammed. DO NOT INTERRUPT.

IMPORTANT: Do not interrupt this cycle. Interrupting the ROM reprogramming will leave the firmware in an unknown state. You may not be able to boot the server if this happens. You will be notified when reprogramming is complete.

8. When ROMPaq finishes reprogramming the system ROM, press **Esc** to exit the System ROMPaq Utility.

9. Remove the System ROMPaq diskette and reboot the server by cycling the power (cold boot).

If you have not installed your new Smart Array 3200 Controller, install it now.

Running Option ROMPaq

Option ROMPaq updates the firmware on Compaq options. Since it is difficult to determine when to update the firmware, Compaq recommends that you run the latest Option ROMPaq on all Smart Array 3200 Controllers whenever new versions are released.

The Smart Array 3200 firmware version on the Compaq SmartStart and Support Software CD has already been installed; you do not need to update immediately. However, if you have older Smart Array 3200 Controllers or other Compaq options (such as drives), create the Option ROMPaq diskettes and make sure the firmware on these options is the latest version.

To run Option ROMPaq:

1. Place the Option ROMPaq diskette 1 in the server diskette drive.
2. Boot the server by turning on the power.
3. Press **Enter** at the Welcome screen.
4. At the Select A Device screen, select:
   ALL COMPAQ Smart Array 3200 Controller(s)
   from the list of programmable devices. Press **Enter**.
5. If the ROM firmware for the Smart Array 3200 is the same or newer than that on the Option ROMPaq diskette, you will get the message:

   ```
   The ROM image files found for the device selected
   are not newer than the current ROM image
   ```

   Press **Enter** to go to step 9.

   OR

   If the ROM firmware for the Smart Array 3200 is older than that on the Option ROMPaq diskette, you will get the Select An Image screen:

   ```
   Device to reprogram:     ALL COMPAQ Smart Array 3200 Controller(s)
   Current ROM revision:    COMPAQ Smart Array 3200 Controller x.xx
   Select Firmware Images:  COMPAQ Smart Array 3200 Controller y.yy
   ```

   Press **Enter**.
6. Review the information on the Caution screen:

   ```
   Device to reprogram:     Smart Array 3200 Controller(s)
   Current ROM revision:    Smart Array 3200 Controller x.xx
   Selected ROM revision:   Smart Array 3200 Controller y.yy
   ```

   Press **Enter** to reprogram the Smart Array 3200 ROM or **Esc** to discontinue the reprogramming and return to the Select An Image screen.
7.

   ```
   Reprogramming Firmware
   ```

   Indicates that the Smart Array 3200 ROM is being reprogrammed. DO NOT INTERRUPT.

CAUTION: Do not interrupt this cycle. Interrupting the ROM reprogramming will leave the firmware in an unknown state. If this happens you may not be able to reprogram the ROM and the Smart Array 3200 ROM may have to be replaced. You will be notified when reprogramming is complete.

8. When Option ROMPaq finishes reprogramming Smart Array 3200 ROM, press **Enter** if you want to reprogram another Compaq option. Repeat steps 4–7.
9. If you are finished with reprogramming options, press **Esc** to exit the ROMPaq Utility.
10. Remove the Option ROMPaq diskette and reboot the server by cycling the power (cold boot). To upgrade additional options in the server, repeat steps 2–9 by booting from each Option ROMPaq diskette in succession.

    The Smart Array 3200 ROM has been updated. If there are any new or increased capabilities, they have been enabled with the new firmware.

Chapter 4
Running the System Configuration Utility

The Compaq System Configuration Utility provides easy configuration of hardware installed in or connected to the server. This utility detects each hardware device and configures the server to work with it.

The System Configuration Utility performs a wide range of configuration activities, including:

- Configures PCI boards automatically
- Provides switch and jumper settings
- Resolves resource conflicts in areas such as memory, port addresses, and interrupts (IRQs)
- Manages the installation of memory, processor upgrades, and mass storage devices such as hard drives, tape drives, and diskette drives
- Sets and stores power-on features like date and time
- Stores configuration information in nonvolatile memory
- Assists in the installation of the operating system
- Assists in running diagnostic tools such as TEST and INSPECT

System Configuration Utility

The Compaq System Configuration Utility can be run directly from the Compaq SmartStart and Support Software CD supplied with the Smart Array 3200 option kit. You may already have a version of this utility in the system partition of the boot disk; however, you will need Compaq SmartStart and Support Software CD version 4.20 or later. Compaq recommends that you use the version of the utility supplied on the CD; it is the latest one that supports the Smart Array 3200.

If your server does not have a bootable CD-ROM drive, you can create diskettes of the latest version of the System Configuration Utility from the Compaq SmartStart and Support Software CD. See the following section, "System Configuration Diskettes," for instructions on creating the diskettes.

If your server has a bootable CD-ROM drive, proceed to "Running the System Configuration Utility."

System Configuration Diskettes

Materials Needed

To create Compaq System Configuration Utility diskettes, you will need:

- Compaq SmartStart and Support Software CD (supplied in the Smart Array 3200 option kit)
- At least four blank diskettes
- Access to a server or workstation with a bootable CD-ROM drive. This may be the system in which you are installing Smart Array 3200 Controller.

Creating Diskettes

To create System Configuration Utility diskettes:

1. Boot the computer from the Compaq SmartStart and Support Software CD.
2. From the Main Menu screen, select Create Support Software.
3. Scroll down the list and select Compaq System Configuration Utility.
4. Follow the instructions on the screen to create the utility diskette(s).

Running the System Configuration Utility

To run the System Configuration Utility:

1. Place the Compaq SmartStart and Support Software CD in the server CD-ROM drive.
   or
   Place the System Configuration Utility Diskette 1 in the server floppy drive.
2. Reboot the server.
3. During the boot process, several messages appear. Among these are a notice that one or more Smart Array 3200 Controllers were detected in option slots and a recommendation to run the System Configuration Utility.
4. Press **F1** to resume booting, if prompted.
5. If you are using the Compaq SmartStart and Support Software CD, select Run the System Configuration Utility from the Main Menu screen.
6. If you are given a choice of Auto Configuration, choose Yes. The system loads configuration files for all detected devices.
7. In the Configuration Complete screen, choose Review or Modify Hardware Settings.
8. At the next screen, Steps In Configuring Your Computer, select Step 3: View or Edit Details.
9. Set the Smart Array 3200 Controller(s) configuration parameters at the View Or Edit Details screen. Scroll down to the option slot for the first Smart Array 3200 Controller and edit each parameter according to the following configuration information.

Configuring the Controller

The steps in this section include editing Controller Order and Online Recovery Server Status parameters. To make the correct selections, the parameters are discussed below.

Controller Order

Select the order in which you want this Smart Array 3200 to be recognized. All hard disk controllers, including the integrated controller on the system board, must be assigned a unique order number.

First	The primary disk controller that contains the boot disk. The first disk drive on this controller is the one the server will boot from.
Second	The second disk controller.
	.
	.
Fifteenth	The fifteenth disk controller.

When installing a Smart Array 3200, you must determine if the boot disk is to be handled by a Smart Array 3200 or the integrated SCSI controller. If this Smart Array 3200 Controller will be the primary controller, choose First; a Configuration Changes screen appears, indicating that if you accept this change the integrated SCSI controller will be changed automatically to *Second*. Press **Enter** to accept these changes.

If you want the order of the integrated SCSI controller to be something other than *Second*, scroll (usually down) to the Embedded Compaq Integrated Controller and set the Controller Order manually.

When installing a Smart Array 3200 in a system with an existing array controller, you can either place the new controller at the end of the controller order or reorder the controllers. Reordering changes the current drive letter assignments for all drives on the system. To avoid changing drive letter assignments, place the new controller at the end of the controller order.

IMPORTANT: Do not create a primary partition on any of the added disks.

Online Recovery Server Status

This function indicates whether the Smart Array 3200 is able to participate in Online Recovery; it is available only in Advanced Features (**Ctrl+A** at the main menu).

Select:

Disabled	Disable online recovery.
Primary	Smart Array 3200 Controller manages the local storage device.
Recovery	Smart Array 3200 Controller is able to adopt a storage device from another system that has had an online recovery event.

Configuration Steps

1. Edit these parameters for Smart Array 3200:

   Controller Order

   Under Advanced Features:

   Online Recovery Server Status

   Press **Enter** to select the parameter to edit.

2. Review and edit the Controller Characteristics of all Smart Array 3200 Controllers shown in the View or Edit Details screen.
3. Press **F10** when finished editing.
4. Select Step 5: Save and Exit at the Steps in Configuring Your Computer.
5. Choose Save the Configuration and restart the computer at the Save and Exit screen.
6. Press **Enter** at the Reboot screen.
7. Remove the CD or System Configuration diskette and verify that the server boots normally without POST errors.

System hardware configuration is complete.