Quick Reference:
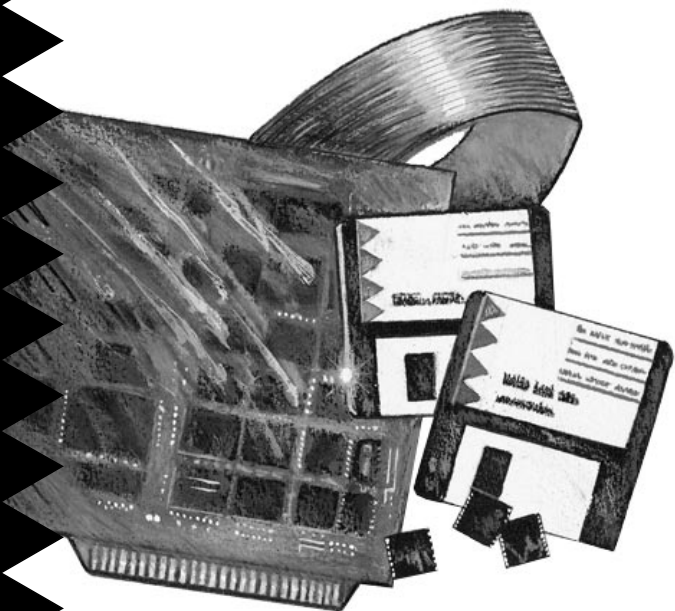## Array Software

AHA-3980/3980W
AHA-3985/3985W

MultiChannel PCI-to-SCSI RAID Adapters with SCSI*Select*

Gladaptec®

1 Understanding the Array Software

Adaptec AHA-398x adapters use the following programs to create and manage arrays:

- The **Adaptec Initial Array Configuration Utility**, which runs under DOS. Use this utility to create an initial bootable array to use as a boot device. (After arrays are created, they run under NetWare.)

- The **Adaptec Array Driver Copy Utility**, which runs under DOS. Use this utility to copy DOS and NetWare drivers to your computer's hard disk.

- The **Administrator Utility**, which runs under NetWare. Use this utility to create, modify, and manage arrays.

You can find these programs on the *Adaptec Initial Array Configuration Utility* and *AHA-3980/3985 Drivers and RAID Utilities* disks included with each AHA-398x adapter.

We recommend that you use the Adaptec Initial Array Configuration Utility to create the first array on a new server *only* if you want to boot from that array. Then install NetWare and the required drivers, as described in the *AHA-3980/3980W/3985/3985W User's Guide,* and use the Administrator Utility to create and manage other arrays. If you do *not* need to boot the server from an array, install NetWare and use *only* the Administrator Utility to create and manage arrays.

2 Selecting Menu Options

There are two ways to select menu options in the AHA-398x utility programs:

- If the option name includes a *hot key*—a light blue character in color monitors, and a gray character in monochrome monitors—type the hot key. In this guide, hot keys are underlined in the option name. In the Display Array Status option, for example, the hot key is D.

- Press the ↑ and ↓ keys to highlight the option, and then press **Enter**.

3 Initial Array Configuration Utility

Follow these steps to create the first array with the Adaptec Initial Array Configuration Utility. For more detailed information on all Adaptec Initial Array Configuration Utility options, see the *AHA-3980/3980W/3985/3985W User's Guide*.

1 Make a bootable copy of the Adaptec Initial Array Configuration Utility diskette.

2 Insert the diskette copy in the *A* drive and boot the computer.

3 When the computer has finished booting, type a:arconfig and press **Enter**.

4 From the Main menu, select **Add New Array**. The Selection List menu appears.

5 Press **Enter** to define Array #1.

6 Select the array type (e.g., **Mirrored**).

   If you select **RAID5** or **RAID0**, a prompt asks if you want to make the array convertible between RAID 5 and RAID 0.

7 Type the number of drives (excluding spares) you want in the array, and press **Enter**.

8 Press **Tab** to select an adapter channel and display its drives.

9 Select each disk for the array by pressing the ↑ and ↓ keys to highlight the disk name, and then pressing **Enter** or **Ins**.

> ⚠ **Caution:** If you choose disks that contain data, all the data will be lost when you format the array. A warning message appears if you select a disk that contains partition information.

   To select disks on a different adapter channel, repeat steps 7 and 8. To deselect the most recently selected disk, press **Del**. (All disks in the array must be connected to the same AHA-398x adapter.)

When you have selected the number of disks you specified in step 7, the next screen appears.

10 If the array is mirrored or RAID 5 *and* at least one disk is unassigned, a prompt asks whether you want to choose a spare disk:

If you do not want a spare: Type n.

To select a spare: Type y. If prompted for the number of spares, type the number (1 or 2), and press **Enter**. Then follow steps 8 and 9 to select the spares.

> **Note:** A spare must have at least the capacity of the smallest disk in the array.

11 When you are prompted, select a formatting method to initialize the new array.

- **Low-level format** is a lengthy process that writes a consistent pattern to the disks and checks the disk surface for defects.

- **Initialize the array with zeroes** (recommended method) is faster than low-level formatting, but it does not verify the integrity of the disks.

> **Caution:** Back up the disks first if they contain data you want to keep! Low-level formatting or initializing an array erases all data on the array disks.

12 When you are prompted, select a block size for the array. The recommended size is 16 KBytes.

13 When the prompt appears, confirm that you want to format the array.

14 When you see the message Initialization of Array #1 is complete, press any key to return to the Main Menu.

15 Press **Esc**, and reboot the computer when you see the prompt.

4 Array Driver Copy Utility

The Adaptec Array Driver Copy Utility is on the AHA-3980/3985 Drivers and Raid Utilities diskette included with the AHA-398x adapter. You use this utility to copy DOS and NetWare drivers to your hard disk drive. These drivers are required to operate arrays under NetWare. You need the DOS drivers if you want to install NetWare or other software from a SCSI CD-ROM drive connected to your AHA-398x adapter.

See the *AHA-3980/3980W/3985/3985W User's Guide* for instructions on how to use the Adaptec Array Driver Copy Utility to install these drivers.

5 Administrator Utility

This section describes the most frequently used options in the Administrator Utility. For complete information on all options, see the *AHA-3980/3980W/3985/3985W User's Guide*.

Starting and Exiting the Utility
To start the Administrator Utility:

1 If the server is not running, start it.

2 At the server prompt, enter load aruadmin (load c:aruadmin if loading for the first time).

To exit the Administrator Utility:

1 Press **Esc** until the prompt Do you want to exit the Administrator? (y|n) appears.

2 Type y. You return to the server prompt.

The Main and System Menus
The Main menu is the primary Administrator Utility menu. If the system has only one array, the Main menu appears when you start the Administrator utility. If the system has multiple arrays, the System menu appears first. In this case, follow these steps to display the Main menu:

1 From the System menu, select **Select Target Array**.

2 Select the array for which you want to display the Main menu. The Main menu for that array appears.

On systems with multiple arrays, the array status is indicated by the color of the array name that appears in the box to the left of the menus. **Red** means the array is off-line; **yellow** means the array has a down drive; **green** means the array is operating normally.

Adding an Array
Follow these steps to add a new array in the Administrator Utility:

1 From the System menu or the Main menu, select **Change Array Configuration**.

2 Select **Add an Array**. The Selection List menu appears.

3 Follow steps 5 through 14 in *Initial Array Configuration Utility* on page 2.

4 When you have finished defining arrays and you are back at the Selection List menu, press **Esc**.

Displaying Array Information
To view logical and physical array characteristics and any utilities running on an array:

1 From the System menu or the Main menu, select **Display Array Status**.

2 Select **Display Array Overview** (to view logical characteristics) or **Display Array Drive Status** (to view physical characteristics and utilities running on the array).

3 If in step 1 you started from the System menu, press any key to view information on the next array.

To display performance statistics for an array:

1 From the Main menu for the array, select **Display Array Status**.

2 Select **Display Statistics**.

3 Select **Temporary Array Statistics** (array read/ write information), **Temporary Drive Statistics** (drive read/write information), **Permanent Drive Statistics** (errors, successful retries, and

reassigned blocks), or **Display <u>V</u>olume(s) on Array** (list of partitions and volumes on the array.

4 When finished viewing the statistics, press **Esc** to display a pop-up menu, then select **<u>Q</u>uit**.

Verifying Arrays
If a mirrored or RAID 5 array becomes inconsistent, data will be lost if an array drive fails. Follow these steps to verify the consistency of data on an array:

1 From the Main menu for the array, select **<u>V</u>erify Functions**.

2 Select **Start <u>V</u>erify**.

3 Indicate the priority of the operation by typing a number from 0 through 9 (0 = lowest priority; 9 = highest priority).

To schedule routine verifications, see *Scheduling Tasks* on page 8.

Reconstructing Data
Follow these steps to reconstruct data on a replacement disk if a disk fails in a mirrored or RAID 5 array and no spare disk is available. (If a spare is available, the spare replaces the failed disk and the data is reconstructed automatically.):

1 Physically replace the failed disk, if necessary.

> **Note:** If your drive enclosure requires all host adapter activity to stop while you replace a drive, select **Hot Swap <u>P</u>ause** before you replace the drive. When you have finished, press any key to resume SCSI bus activity.

2 From the Main menu for the array, select **<u>R</u>econstruct Functions**.

3 Select the reconstruction option you want. If the array is mirrored, for example, select **Re-mirror Single Drive** or **Re-mirror all DOWN Drives**.

4 Indicate the priority of the operation by typing a number from 0 through 9 (0 = lowest priority; 9 = highest priority).

5 When prompted, type y to continue, or n to cancel the operation.

To schedule a reconstruction, see *Scheduling Tasks* on page 8.

> **Note:** If you used Hot Swap Pause to stop SCSI bus activity, resume activity by pressing any key at the Administrator Utility screen.

Reactivating an Off-line Array

An array goes off-line if the power fails or if someone removes a second disk when one has already been removed. To reactivate an off-line array:

1 Physically correct the problem that caused the array to go off-line.

2 From the Main menu for the array, select **Reactivate Off-line Array**.

3 When prompted, type y to reactivate the array, or n to cancel the operation.

Reactivating a Spare Disk

If a disk fails in an array that has spares, a spare is automatically activated and the failed disk is marked *Down*. When you replace the failed disk with a new disk drive at the same channel and SCSI ID, the replacement disk becomes the new spare. To reactivate the new spare:

1 From the Main menu for the array, select **Reactivate Spare Disk**.

2 Select the spare you want to reactivate.

3 When prompted, type y to reactivate the spare, or n to cancel the operation.

Testing a Spare Disk

To test a spare disk, use the Scheduler. Instructions are in the next section.

Scheduling Tasks

You can schedule the following tasks:

- Verifying mirrored and RAID 5 arrays
- Testing spare disks
- Reconstructing data on a replacement disk

Follow these steps to schedule a task:

1 From the Main menu for the array, select **Scheduler Functions**.

2 Select **Schedule Verify**, **Schedule Reconstruct**, or **Schedule Spare Testing**.

> **Note:** If you schedule a verification, all arrays are verified. To verify only one array, follow the procedure given in *Verifying Arrays* on page 6.

3 Select one of these options:

Schedule Task to Run Once: To schedule the task for a single time.

Schedule Cyclic Task: To schedule the task to run at regular intervals. If you select this option, the Task Schedule Intervals menu appears. Select **Schedule Daily**, **Schedule Weekly**, or **Other**.

Test Now (appears only if you selected Schedule Spare Testing): To test the spare immediately. If you select this option, you are finished—ignore steps 4 and 5.

4 Follow the prompts and the examples to enter the date and time for the task.

5 If you are scheduling a verification, a new menu appears. Select **In Parallel** to have the arrays verified simultaneously, or **Serially** to have the arrays verified in sequence.

> **Note:** Verifying arrays in parallel usually slows your system more than verifying them serially.

Adding a Spare Disk
If you create a mirrored or RAID 5 array without spare disks (RAID 0 arrays cannot have spares), follow these steps to add up to two spare disks later:

1 From the Main menu for the array, select **Change Array Configuration**.

2 Select **Add Spare Drives**.

3 If prompted to enter the number of spares, type 1 or 2 and press **Enter**.

4 Press **Tab** to select the channel with the spare disk(s). A list of disks on that channel appears to the right. Select each spare disk by pressing the ↑ and ↓ keys until the disk name is highlighted, and then pressing **Ins** or **Enter**.

5 When you have finished selecting spares, press **Esc**.

6 When prompted, type y to accept the new spare disks, or n to reselect the disks.

You need not reformat the array.

Deleting a Spare Disk
To delete a spare disk from an array, select the **Delete Spare** command from the Configuration menu. If the array has two spares, first select the spare you want to delete. Type y when the prompt asks you to confirm the deletion.

Initializing Arrays
When you create a new array or redefine disks (other than spares) in an existing array, you are automatically prompted to initialize the array. You can choose to low-level format the array or initialize it with zeros. (For a brief description of both formatting methods, see page 3.)

If necessary, you can reinitialize an existing array if the data on the array has become corrupted. To do this, follow the directions in the *AHA-3980/3980W/3985/3985W User's Guide*.

Converting between RAID 0 CVT and RAID 5 CVT Formats

You can convert a RAID 5 CVT array to a RAID 0 CVT array and back again without loss of data and without reformatting. If you convert a RAID 5 CVT array with spares to a RAID 0 CVT array, the RAID 0 CVT array retains the spares, but they are not usable. When you convert the array back to a RAID 5 CVT array, the spares can again be used.

To convert between formats, follow these steps:

1   From the Main menu for the array, select **Convert RAID Level**.

2   Select **Convert to RAID0 CVT** or **Convert to RAID5 CVT**.

3   Indicate the priority by typing a number from 0 through 9 (0 assigns the lowest priority; 9, the highest).

4   When prompted, type y to continue; otherwise, type n.

To cancel a conversion while it is under way, follow step 1 to display the Convert menu and then select **Abort Convert**.

Deleting Arrays

Caution: Before you delete an array, back up any data you want to keep. When you delete an array, all array data will be lost!

Follow these steps to delete an array:

1   From the System menu, select **Change Array Configuration**.

2   Select **Delete an Array**.

3   Select the array you want to delete.

4   When prompted, type y to delete the array, or n to cancel the operation.

6 Menu Trees

The following diagrams show the arrangement of menu options for the Adaptec Initial Array Configuration Utility, the Adaptec Array Driver Copy Utility, and the Administrator Utility.

Adaptec Initial Array Configuration Utility
MAIN MENU

Display Arrays	Add New Array	Delete Array	Replace Array Drive	Initialize Array
Adaptec Array #1	Adaptec Array #1	Adaptec Array #1	Adaptec Array #1	Adaptec Array #1
Adaptec Array #2	Adaptec Array #2	Adaptec Array #2	Adaptec Array #2	Adaptec Array #2
Adaptec Array #3	Adaptec Array #3	Adaptec Array #3	Adaptec Array #3	Adaptec Array #3
Adaptec Array #4	Adaptec Array #4	Adaptec Array #4	Adaptec Array #4	Adaptec Array #4

Adaptec Array Driver Copy Utility
INSTALL SOFTWARE DRIVERS MENU

CD-ROM Drivers	NetWare 3.xx Drivers	NetWare 4.xx Drivers

Administrator Utility
SYSTEM MENU*

Select Target Array	Display Array Status	Change Array Configuration	Install Utility Suite
Adaptec Array #1	Display Array Overview	Add an Array	
Adaptec Array #2	Display Array Drive Status	Add Spare Drive(s)	
Adaptec Array #3		Redefine an Array	
Adaptec Array #4		Delete an Array	
		Change Message Repeat Cycle	
		Change Broad-cast Mode	
		De-install Array NLMs	

* If you are in Setup mode, a Format/Initialize Array option also appears on the System menu.

Administrator Utility
MAIN MENU FOR ARRAY #_

Display Array Status
- Display Array Overview
- Display Array Drive Status
- Display Statistics
  - Temporary Array Statistics
  - Temporary Drive Statistics
  - Permanent Drive Statistics
  - Reset Temporary Statistics
  - Set Sampling Rate
  - Log Current Data Values
- Display Volume(s) on Array

Verify Functions
- Start Verify
- Change Priority
- Abort Verify

Reconstruct Functions
- RAID5 Reconstruct
- Re-mirror Single Drive
- Re-mirror All DOWN Drives
- Change Priority
- Abort Reconstruct

Format/Initialize Array
- RAID0
- RAID5
- Mirror

Convert RAID Level
- Convert to RAID 0 CVT
- Convert to RAID 5 CVT
- Change Priority
- Abort Convert

Change Array Configuration
- Add an Array
- Add Spare Drive(s)
- Delete Spare
- Redefine an Array
- Change Message Repeat Cycle
- Change Broadcast Mode
- De-install Array NLMs

Scheduler Functions
- Schedule Verify
- Unschedule Verify
- Schedule Reconstruct
- Unschedule Reconstruct
- Schedule Spare Testing
- UnSchedule Spare Testing

Reactivate Off-line Array

Reactivate Spare

Hardware Functions
- Display Host Adapter Drives
- Blink Drive Lights
- Hot Swap Pause

Install Utility Suite

7 Adaptec Customer Support

If you have questions about installing or using the host adapter, check this installation guide first—you will find answers to most of your questions here. If you need further assistance, please contact us. We offer the following support and information services:

■ For technical support (answers to technical questions, information about the Adaptec BBS, FTP and WWW Servers, and access to the Interactive Fax system), call 800-959-SCSI (7274) or 408-945-2550, 24 hours a day, 7 days a week. To speak with a product support representative, call 408-934-SCSI (7274), M–F: 6:00 a.m. to 5:00 p.m., Pacific Time. After these hours, on weekends, and on holidays, product support is also available for a fee at 800-416-8066

■ For sales information, call 800-959-SCSI (7274) or 408-945-2550, M–F: 6:00 a.m. to 5:00 p.m., Pacific Time.

■ The Adaptec Electronic Bulletin Board Service (BBS) provides information on software upgrades, answers to common questions, and other topics. The BBS is available 24 hours a day, 7 days a week, at 408-945-7727; 1200/2400/9600/14,400/28,800 baud, 8 data bits, 1 stop bit, no parity.

■ The Adaptec FTP and WWW Servers provide information on software upgrades, product literature, answers to common questions, and other topics. The FTP and WWW Servers are available from the Internet 24 hours a day, 7 days a week, at ftp.adaptec.com and http://www.adaptec.com.

■ The Adaptec Interactive Fax system provides answers to common questions, product literature, and current information about Adaptec products and services. The Adaptec Interactive Fax system is available 23 hours a day, 7 days a week. The Fax system is out of service 1 hour each day. You can call this service directly at 408-957-7150.

■ To order Adaptec software and SCSI cables, call 800-442-SCSI (7274) or 408-957-SCSI (7274), M–F: 6:00 a.m. to 5:00 p.m., Pacific Time.

■ To request additional documentation for Adaptec products, call 800-934-2766 or 510-732-3829, M–F: 6:00 a.m. to 5:00 p.m., Pacific Time.

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