INSTALLATION AND HARDWARE GUIDE

ARO-1130U2

RAID OPTION CARD FOR PC SYSTEMS

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Printed in Singapore
STOCK NO.: 512215-00, Rev. A RQ 12/98

▼▼▼▼ ARO-1130U2

RAID Option Card
for PC Systems
with RAID*port* III

Installation and Hardware Guide

adaptec®

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WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Adaptec, Inc. ARO-1130U2

FC Tested To Comply With FCC Standards

FOR HOME OR OFFICE USE

Canadian Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matérial brouilleur du Canada.

▼▼▼▼ Contents

1

Introduction

The Adaptec® ARO™-1130U2 RAID option card provides powerful disk array support in servers and workstations that have an available RAID*port*™ III expansion slot on the system motherboard.

Note: The ARO-1130U2 will not work with RAID*port*™ I motherboards. The ARO-1130U2 can be used in a RAID*port* II system; however, only motherboards with a RAID*port* III expansion slot support Ultra2 SCSI technology. See the Adaptec Web Site at *http://www.adaptec.com/raid* for a list of motherboards and systems that support the ARO-1130U2 RAID option card.

This *Installation and Hardware Guide* explains how to install the ARO-1130U2, run the Array1000 BIOS & Driver Selection Utility, run the Array*Config*U2™ Utility to create the first array for a bootable array configuration, and then install the software driver for your operating system.

Use the *Adaptec CI/O Management Software*™, which is included with the ARO-1130U2, to create additional arrays (CI/O is required for array management in order to provide the proper level of fault tolerance and event notification). Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

System Requirements

The minimum system requirements for the ARO-1130U2 are

- An Intel-based platform motherboard with an available RAID*port* III slot. See the Adaptec Web Site at *http://www.adaptec.com/raid* for a list of motherboards and systems that support the ARO-1130U2 RAID option card.
- A minimum of one SCSI hard disk drive.
- A standard 168-pin EDO 3.3v, 60ns or faster DIMM installed on the card. (A DIMM is typically pre-installed.) See the Adaptec Web Site at *http://www.adaptec.com/raid* for a list of approved DIMMs and vendors.
- Five MBytes of free hard disk space for the ARO-1130U2 software (five MBytes of free hard disk space on the Windows system disk are also required for the temporary files created during installation of the software).
- Windows NT™ 4.0 Server, Windows NT 4.0 Workstation, Novell NetWare 4.11 or 5.0, or UnixWare 7.0.
- A 3.5-inch 1.44-MByte primary (boot) floppy disk drive.
- 64 MBytes or more of system memory.

Caution: An Uninterruptable Power Supply (UPS) is a key feature for system fault tolerance. It is possible to lose data due to power failure or power brown outs. In order to prevent errors or data loss due to power failure, Adaptec strongly recommends that a UPS be installed to support your system.

Installation Overview

To install ARO-1130U2 hardware and software, follow these steps:

1. Locate the RAID*port* III expansion slot on the motherboard. (Chapter 2)
2. Install the ARO-1130U2 into the RAID*port* III expansion slot. (Chapter 2)
3. Connect any additional SCSI devices to the RAID ready SCSI connectors on the motherboard.
4. Run the Array1000 BIOS & Driver Selection Utility. (Chapter 3)

Note: If you plan to install ARO-1130U2 in a system containing another Adaptec product, and the Array1000 BIOS & Driver Selection Utility determines you require Disk B of the manager set driver diskettes, see Appendix B before continuing with installation.

5. Create the first bootable array using the Array*Config*U2 Utility. (Chapter 4)
6. Install the appropriate Array1000U2 software driver for your operating system. (Chapter 5, Chapter 6, and Chapter 7)
7. Install the Adaptec CI/O Management Software. (*Adaptec CI/O Management Software User's Guide*)

Note: Before proceeding with installation, review the *readme.txt* file found in the Adaptec CI/O Management Software CD-ROM and the *relnote.txt* file found in the root directory of the Array1000U2 driver diskette.

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2

Installing ARO-1130U2 Hardware

This chapter explains how to install the ARO-1130U2 in your system.

Note: If the Array1000 BIOS & Driver Selection Utility (Chapter 3) determines you require driver Disk B of the Array1000U2™ Family Manager Set driver diskettes, see Appendix B, *Using the ARO-1130U2 with Other Adaptec Products*.

ARO-1130U2 Layout

Figure 2-1 identifies the major ARO-1130U2 components. You may find it helpful to refer to this information while installing the ARO-1130U2.

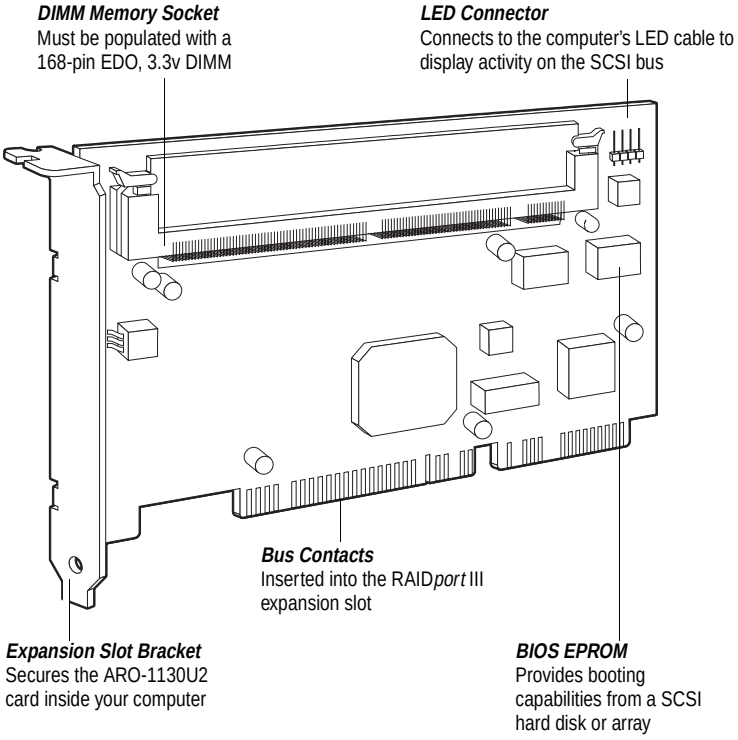

Figure 2-1. ARO-1130U2 Major Components

Verifying Presence of DIMM Memory

Before you can use the ARO-1130U2, the DIMM memory socket must be populated with a DIMM, as shown in Figure 2-2. In most cases, the ARO-1130U2 comes pre-installed with a DIMM. If a DIMM is not pre-installed, a 168-pin EDO 3.3v 60ns or faster DIMM can be used. (See the Adaptec Web Site at *http://www.adaptec.com/raid* for a list of approved DIMMs and vendors.)

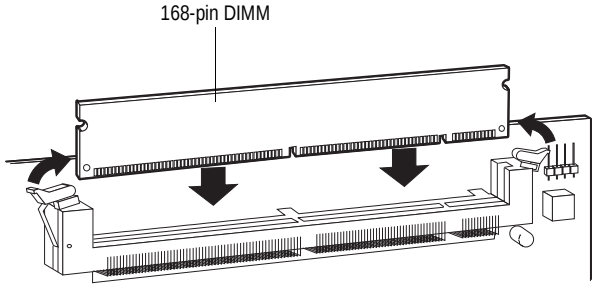

Figure 2-2. Installing a DIMM in the ARO-1130U2 DIMM Memory Socket

Installing the ARO-1130U2

Follow these steps to install the ARO-1130U2:

Note: Before installing the ARO-1130U2 in an existing system that already has data, back up all data before continuing.

1. Turn OFF power to the computer, and disconnect the power cord.
2. Remove the cover from the computer case. (If necessary, refer to the instructions in your computer documentation.)
3. Locate the RAID*port* III expansion slot; unscrew and remove the expansion slot bracket that covers the card-slot opening.
4. Insert the ARO-1130U2 in the slot; press down firmly so that the bus contacts are securely seated in the slot. Secure the adapter bracket with the screw you removed in Step 3, as shown in Figure 2-3.

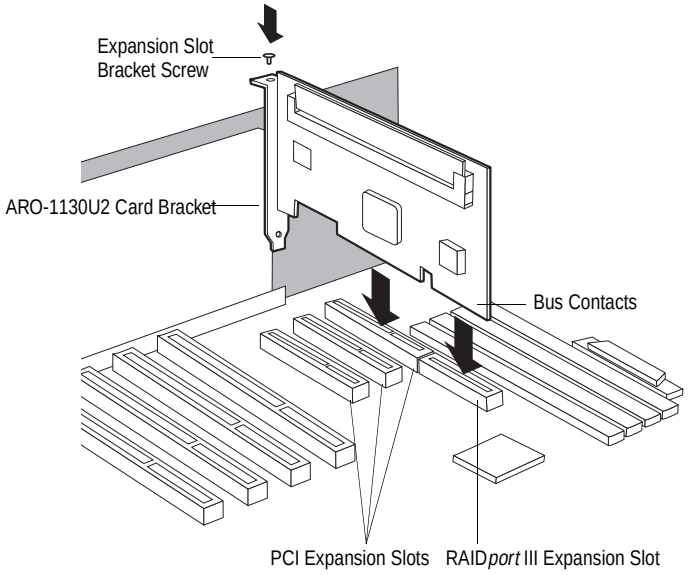

Figure 2-3. Installing the ARO-1130U2 in a Typical RAID*port* III Expansion Slot

Connecting the LED Cable to the ARO-1130U2

(*Optional feature*) An LED on the front panel of most computers lights to indicate non-SCSI hard disk activity. If you would like that LED to light whenever there is activity on SCSI Channel A (controlled by ARO-1130U2), disconnect the LED cable from the motherboard and connect it to the LED connector on the ARO-1130U2. If the LED has a two-position cable, connect the cable to pins 1 and 2 of the LED connector, as shown in Figure 2-4.

If the ARO-1130U2 supports multiple SCSI channels, and you want the LED to light whenever there is activity on any of those channels, refer to your motherboard documentation for instructions on setting the appropriate motherboard jumpers.

Note: If you are using non-SCSI disk drives (e.g., IDE), the LED may no longer indicate activity on these drives when you connect the LED cable to the ARO-1130U2.

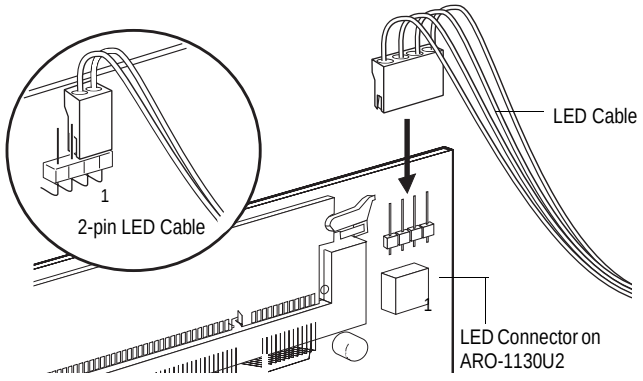

Figure 2-4. Connecting the LED Activity Indicator Cable

Completing the Installation

Once the ARO-1130U2 is installed in your system, refer to the documentation that came with your computer and SCSI devices for specific instructions on setting up your SCSI devices and connecting them to the SCSI connectors on the motherboard.

Note: If you refer to the computer's documentation for installation instructions, be sure to return to this document for instructions on running the Array1000 BIOS & Driver Selection Utility and installing the software included in the package.

In most cases, it is not necessary to run the SCSI*Select*® utility. Should you need to configure SCSI options (e.g., ID, Parity Checking, and Termination), see Appendix A, *Configuring ARO-1130U2 with the SCSISelect Utility*.

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3

Using the Array1000 BIOS & Driver Selection Utility

Whenever you install a new ARO-1130U2 in your system and before you run the Adaptec Array*Config*U2 program to create the first array in your system, always run the Array1000 BIOS & Driver Selection Utility.

Caution: We highly recommend that you back up the data on your system before you use the Array1000 BIOS & Driver Selection Utility. This ensures that your data is completely protected.

The Array1000 BIOS & Driver Selection Utility installs the ARO-1130U2 BIOS by automatically updating (flashing) the correct ARO-1130U2 BIOS. The utility also determines which Array1000U2 Family Manager Set driver diskette (Disk A or Disk B) is required when you install the operating system driver, as explained in Chapters 5, 6, and 7.

Running the Array1000 BIOS & Driver Selection Utility

The Array1000 BIOS & Driver Selection Utility is provided on a bootable floppy disk and runs under DOS as a stand-alone utility. A simple-to-use interface prompts you through the process. Follow these steps to run the Array1000 BIOS & Driver Selection Utility:

1 Insert the Array1000 BIOS & Driver Selection Utility diskette in drive *A* and reboot your system. The utility starts automatically and the initial Array1000 BIOS & Driver Selection Utility screen appears.

Note: The initial Array1000 BIOS & Driver Selection Utility screen identifies which Array1000U2 Family Manager Set driver diskettes (Disk A or Disk B) is required when you install the operating system driver, as explained in Chapter 5 and Chapter 6. Make a note of which diskette to use, and continue with Step 2.

2 Select either **Express** or **Advanced** setup.

Note: If you receive an "Unsupported Hardware Configuration," message during setup, contact the system manufacturer. The ARO-1130U2 is not supported by the system.

- **Express** setup automatically updates the ARO-1130U2 BIOS. Select **Express** setup and the utility will do the rest. When prompted, remove the floppy disk and press any key to reboot the system.
- **Advanced** setup also allows you to update the ARO-1130U2 BIOS. In addition, Advanced setup allows you to select other options such as:
  - **Display Current BIOS Checksum**. Determines current version of the ARO-1130U2 BIOS.
  - **Display New BIOS Checksum**. Determines version of the BIOS available on the floppy.

- **Save Current BIOS to a File**. Saves the current ARO-1130U2 BIOS to a file.
- **Erase Current BIOS**. Erases the current ARO-1130U2 BIOS.

To access these options, select **Advanced** setup and continue with Step 3.

3. From the Main Menu, select the array adapter card you want to upgrade (only available array adapters can be selected). The Utility Menu appears.
4. Make a selection from the Utility Menu.
5. Follow the instructions on the screen.
6. When prompted, remove the Array1000 BIOS & Driver Selection Utility diskette from drive *A* and reboot your system.

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4

Creating an Array With the Array*Config*U2 Utility

This chapter explains how to use the Array*Config*U2 Utility to create a bootable or non-bootable array on your system. If you want a bootable array on your system, you must use the Array*Config*U2 utility to create the bootable array.

Once the array is created, use Adaptec CI/O Management Software to create additional arrays and to manage the arrays over the network. Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

Note: Array*Config*U2 runs from a self-booting diskette. If you are changing the configuration of a system that is already in use on a network, log all users off the system and shut it down in an orderly manner before you start Array*Config*U2.

Caution: It is strongly recommended that you consistently and regularly backup your data to a backup media such as tape so you may recover your data due to failure events not protected by a fault tolerant array.

Creating an Array

Before creating the array, make sure the disks for the array are connected and installed in your system (or array enclosure), and that you have run the Array1000 BIOS & Driver Selection Utility, as described in Chapter 3. You can use Array*Config*U2 in two ways:

- Select **Express Setup** if you want to create an array quickly and easily. Array*Config*U2 asks you a few simple questions and uses your answers to create the kind of array that best meets your needs.
- Select **Custom Setup** if you want to perform advanced operations, such as creating an array with more than two disks or adding spare disks to an array.

Creating an Array with Express Setup

Follow these steps to create an array with Express Setup. (You can probably complete the Express Setup process simply by following the instructions that appear on the screen.)

Note: To select Array*Config*U2 menu options, type the *hot key*—the letter that appears in a different color. (The hot key letters are underlined in the following instructions). You can also press the ↑ and ↓ keys until the option is highlighted and then press **Enter**.

1. Insert the Array*Config*U2 diskette in drive *A* and reboot your system. Wait for Array*Config*U2 to start automatically.
2. Read the text that appears on the initial screens. Press any key to view the next screen, or press **Esc** to return to the previous screen.
3. When you see the Setup Type Selection Menu, select **Express Setup.**

4 When the next screen appears, select the type of array you want to create:

- Select **Optimized for Performance (RAID 0)** if you want the fastest possible data input and output from the new array. This kind of array does not have special data protection features, however. When prompted, type the number of disks you want in this array.
- Select **Optimized for Data Protection (RAID 1)** if your main concern is to protect the files on the array from disk failure. This kind of array safeguards files in the array even if one of the array disks fails. (This kind of array has two disks by definition, so you will *not* be prompted to enter the number of disks you want in the array.)
- Select **Performance and Data Protection with Parity (RAID 5)** if you want fast performance and data protections, and you have three or more disks available for the array. This kind of array contains redundant (parity) data distributed across all disks in the array. If any one disk fails, data can be reconstructed from the parity information. If a second disk fails before the array has been reconstructed, all data is lost. The actual usable data capacity of the array is equal to one less than the total number of disks. (One disk's worth of capacity is needed to hold the parity information.)
- Select **Performance and Data Protection with Mirroring (RAID 0/1)** if you want fast performance and data protection, and have an even number of disks available for the array. This kind of array stripes and mirrors data on two or more pairs of disks. If one disk in a pair fails, data is available. The actual data capacity of the array equals half the total available disk space.

5 When the next menu appears, select the type of applications that you will run on your system. (Select **Others** if you are not sure what type of applications you will use.) Array*Config*U2 will use your answer to create the best array configuration for your applications.

6 When the next menu appears, select a boot order for the new array.

- Select **Disk Array will be Boot Drive** if you want your workstation to boot from the new array. If you selected **Optimized for Data Protection** in Step 4, booting from an array safeguards the information on your boot drive. (To boot from an array, you must also install the operating system software on the array, as described in later chapters.)
- Select **Disk Array will not be a Boot Drive** if you do not want your workstation to boot from the new array.

7 When you have finished all these menu selections, wait while Array*Config*U2 creates the array. This may take a long time, especially if the drives are large.

A message appears when the array has been created. An error message appears if fewer than two drives are available or if Array*Config*U2 encounters some other problem. If this happens, install more drives or run Array*Config*U2 again and use the **Custom Setup** option.

8 When the array is created, exit Array*Config*U2, remove the Array*Config*U2 diskette, and reboot the system. After you reboot you can write data to the arrays. At this point, you can make the array bootable as described in *Making the Array Bootable* on page 4-8.

Creating an Array with Custom Setup

Follow these instructions to create an array with Array*Config*U2:

1. Insert the Array*Config*U2 diskette in the system's drive *A* and reboot the system. Array*Config*U2 starts automatically.
2. Select **Disk Array Operations** from the Main Menu.
3. Select **Create New Array** from the Disk Array Operations menu.
4. Type an array name and press **Enter**. The name can be up to 15 characters long and can include spaces and any other printable characters.
5. Select an array type. Your options are
   - **RAID 0**: Data is striped across the disks in a RAID 0 array, allowing for faster I/O performance than a single disk. RAID 0 arrays do not store redundant data; if any disk in the array fails, all data is lost.
   - **RAID 1**: Data is mirrored on one pair of disks. If one disk fails, data is available. The actual data capacity of the array equals half the available disk space.
   - **RAID 5:** The array contains redundant (parity) data distributed across all disks in the array. If any one disk fails, data can be reconstructed from the parity information. If a second disk fails before the array has been reconstructed, all data is lost. The actual usable data capacity of the array is equal to one less than the total number of disks. (One disk's worth of capacity is needed to hold the parity information.)
   - **RAID 0/1**: Data is striped and mirrored on two or more pairs of disks. If one disk in a pair fails, data is available. The actual data capacity of the array equals half the total available disk space.

   See the *Adaptec CI/O Management Software User's Guide* for more information on selecting a RAID level.

6 Select the number of drives you want in the array and press **Enter**. This number should not include *spares* (drives that automatically replace failed array drives). The number of drives available for assignment is listed on the screen.

Note: This step does not apply to RAID 1 arrays, which have two drives by definition.

7 Select array members. When the next screen appears, press **Tab** to highlight a channel (if more than one SCSI channel is available). Select drives for the array by pressing the ↑ and ↓ keys until the drive name is highlighted, and then press **Ins** or **Enter**. The names of selected drives appear in the Adaptec Array # box.

To select drives on a different channel press **Tab** to select another channel and then select the drives from the SCSI IDs on the Channel menu. To deselect the drive you most recently added, press **Del**.

Caution: A warning appears if you select a disk that has partitions. *Do not* select a partitioned disk if it contains data you want to keep, because any existing data will be erased when the disk becomes part of the array.

When you have selected the number of drives you specified in Step 6, the next screen appears automatically. If you are creating a RAID 1, RAID 0/1, or RAID 5 array, and if there are any unassigned drives, the screen prompts you to define dedicated spare drives for the array. (We recommend that you use a *spare pool* instead of dedicated spares.)

Note: A spare must have at least the capacity of the smallest drive in the array.

8 Select spares. If you do not want a spare, type n and continue with Step 10. If you want to select dedicated spares, follow these steps:

   a At the prompt, type y.

   b At the next prompt, type 1 or 2.

   c Select one or two spares, using the same method you used to select disks for the array.

9 Initialize array. When the Initialize Mode menu appears, select **Initialize Array to Zero**. A graph on the screen shows the progress of this operation.

Caution: If the drives contain data, all the data is lost when you initialize the array.

   Select **Low-Level Format** only if the drives were previously formatted on another computer or if you think they may have surface defects. Low-level formatting takes a long time for large capacity disk drives.

10 Select array block size. When the menu of block sizes appears, select a block size. (This menu does not appear if the array is a mirrored array with only two drives.)

   The allowable block sizes are 8, 16, 32, 64 (the default), and 128 KBytes. The default block size gives the best overall performance in most environments.

11 Wait for initialization to complete. When you see the message Initialization of [*array name*] is complete, press any key to return to the Disk Array Operations menu.

12 Create additional arrays. You may use Array*Config*U2 to create additional arrays (if disks are available), however we recommend using Adaptec CI/O Management Software to create additional arrays. (CI/O is required for array management in order to provide the proper level of fault tolerance and event notification.) See the *Adaptec CI/O Management Software User's Guide* for more information.

13 When all arrays are created, exit Array*Config*U2, remove the Array*Config*U2 diskette, and reboot the system. After you reboot you can write data to the arrays. At this point, you can make the array bootable as described in the next section.

Making the Array Bootable

You can make the array bootable so that the system boots from the array instead of from a stand-alone (single) disk.

To make the array bootable, the array must be set to #0 in the boot order. Follow these steps if you want the system to boot from the newly created array:

Note: The system will always attempt to boot from any installed non-SCSI disks (for example, any IDE disk drive at drive *C*). You must disable or remove all non-SCSI disks if you want the system to boot from a SCSI disk or array.

1 Insert the Array*Config*U2 diskette in the system's floppy disk drive *A*.

2 Reboot the system from the diskette. Array*Config*U2 starts automatically.

3 Select **Display Boot Order** from the Main Menu. The Boot Order for Singles and Arrays window appears.

4 If the newly created array is at the top of the list, preceded by the words Unit 0, no changes are necessary; if it has some other unit number, highlight the array name and press **Enter**.

5 Use the arrow keys to move the selected array to the top of the list. Then press **Enter**. If you want to change the boot order of another array, select it, move it with the arrow keys, and press **Enter** again.

6 Press **Esc** to return to the Main Menu.

7 Exit Array*Config*U2, remove the diskette from drive *A*, and reboot the system.

8 Prepare the array as you normally would prepare a boot disk drive for your operating system. See either Chapter 5, *Installing the Software Driver for Windows NT*, Chapter 6, *Installing the Software Driver for Novell NetWare*, or Chapter 7, *Installing the Software Driver for SCO UnixWare*.

Note: You cannot use this procedure to change the boot order of a SCSI disk drive that is not part of an array. If you want to do this, create a one-disk RAID 0 array from the disk. (Data is not actually striped on a one-disk array.)

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5

Installing the Software Driver for Windows NT

This chapter explains how to install the ARO-1130U2 software driver (*cda1000.sys*) for Windows NT (Windows NT 4.0 Server and Workstation). Before installing the driver, make sure you have completed the following:

- Installed the ARO-1130U2 in your system. (See Chapter 2)
- Run the Array1000 BIOS & Driver Selection Utility to determine which Array1000U2 Family Manager Set driver diskettes (Disk A or Disk B) is required to install the Windows NT driver. (See Chapter 3)
- Created the first array using the Array*Config*U2 Utility, if you plan to boot from an array. (See Chapter 4)

Once Windows NT and the driver are installed, install Adaptec CI/O Management Software and use it to add, delete, and manage arrays from the server console. Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

Note: If your RAID*port* III system has an additional Adaptec AIC™-78xx device (for example, AHA®-2940 or AHA-3940 host adapter) installed (which is not associated with the RAID*port*), the NT driver for these adapters must be from the Adaptec 7800 Family Manager Set 2.10 or higher. Ultra2 SCSI host adapters require v3.00 or higher of the Family Manager Set. Furthermore, if the Array1000 BIOS & Driver Selection Utility determines you require Disk B, refer to Appendix B.

Installing the Array1000U2 Driver for Windows NT

To begin driver installation, see either *Installing the Driver When Installing Windows NT* on page 5-3, or *Installing the Driver When Windows NT is Already Installed* on page 5-4.

Note: We recommend that you install your Windows NT operating system on a fault-tolerant array (RAID 5, 1, or 0/1) to take advantage of the redundancy and performance features of the array.

Note: If your system: 1) is RAID*port* II or III equipped; AND 2) has an Adaptec AHA-294x host adapter installed; AND 3) requires driver Disk B (as determined by the Array1000 BIOS & Driver Selection Utility), see *Using the ARO-1130U2 with an AHA-294x, AHA-3940, or Other AIC-78xx Based Host Adapter and Driver Disk B (Windows NT Only)* on page B-2 for instructions on installing the Array1000U2 Miniport Driver.

Installing the Driver When Installing Windows NT

To install the *cda1000.sys* driver when you are installing Windows NT, follow these steps:

Note: During Windows NT installation, if your system configuration has multiple arrays and / or single drives, Windows NT limits the size of the partitions you can create to 1 GByte. To work around this 1 GByte limitation, see *Windows NT 1 GByte Partition Limitation* on page 5-5.

1. Start your system with the Windows NT Boot Diskette in the floppy drive or the Windows NT Boot CD-ROM in the CD-ROM drive.

   

   Note: When using a SCSI CD-ROM drive to install Windows NT from the bootable CD-ROM, make sure BIOS Support for Bootable CD-ROM is *enabled* in SCSI*Select*.

2. *Windows NT Boot Diskette installation*: When prompted, insert diskette #2 in your floppy drive. After a few moments you will see a blue screen. To setup Windows NT now, press **Enter** and continue with Step 3 below.

   Windows NT Boot CD-ROM installation: When the following message appears onscreen, press the **F6** key and skip to Step 4 below.

   Setup is inspecting your computer system's hardware...

3. Press **S** to skip autodetection of your SCSI host adapter.
4. Press **S** again to specify an additional device.
5. Press **Enter** to select **Others**; insert the Appropriate Adaptec Array1000U2 Family Manager Set driver diskette (Disk A or Disk B) in your floppy disk drive and press **Enter**. (See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.)
6. The screen displays the adapter drivers supported on the diskette. Select the **Adaptec Array1000U2 Family Adapter** driver and press **Enter**.

7 If you want to add drivers (other than for the ARO-1130U2), press **S** and repeat Step 5 for each additional adapter and insert the appropriate disk provided by the hardware manufacturer.

8 Press **Enter** to continue with the Windows NT operating system setup. Follow the instructions onscreen and in the Windows NT documentation to complete the installation.

Installing the Driver When Windows NT is Already Installed

To update or install the *cda1000.sys* driver if Windows NT is already installed, follow these steps:

1 Start Windows NT.

2 Click the **Start** button on the Windows NT task bar, and then point to Settings.

3 Click the **Control Panel**.

4 Double-click the **SCSI Adapters** icon.

5 Click the **Drivers** tab, and then click the **Add** button.

6 In the Install Driver window, click the **Have Disk** button.

7 Insert the appropriate Adaptec Array1000U2 Family Manager Set driver diskette (Disk A or Disk B) in your floppy disk drive and press **Enter;** (See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.) Enter the following path to the installation files and then click **OK**.

```
a:\winnt
```

The *Adaptec Array1000U2 Family Adapter* driver is highlighted by default.

8 In the Install Driver window, Click **OK**.

9 You must restart your computer for the changes to take effect. Click **Yes** to restart your computer.

Windows NT Installation and Configuration Notes

Windows NT 1 GByte Partition Limitation

During Windows NT installation, if your system configuration has multiple arrays and / or single drives, Windows NT limits the size of the partitions you can create to 1 GByte. To work around this 1 GByte limitation, try the following:

- During Windows NT installation, create the 1 GByte partition (do not finish setup); reboot the system and then delete the partition. This allows Windows NT Setup to create a system partition larger than 1 GByte, but limited to 4 GBytes or 1024 cylinders of data, whichever is less.

  or

- Using MS-DOS, create a partition using FDISK. During Windows NT installation, delete the partition created with MS-DOS. This allows Windows NT Setup to create a system partition larger than 1 GByte, but limited to 4 GBytes or 1024 cylinders of data, whichever is less.

If Windows NT Setup Hangs

During Windows NT installation, the system may hang while the Windows NT Setup floppy diskette is being used to copy the SCSI disk device driver. A workaround is to boot from a DOS boot disk, create a DOS partition on the array using fdisk, and then install Windows NT on the array.

Windows NT Disk Administrator

When creating a new array on a system running under Windows NT, the array is not listed as “usable” in the NT Disk Administrator until it is initialized. This is normal Windows NT functionality.

Boot Order In Windows NT vs. Array*Config*U2

During Windows NT installation, Windows NT does not show the devices in the boot order. Instead, it shows the arrays with the lower SCSI ID (on lower channel) first. To minimize confusion during Windows NT installation, try one of the following:

- Disconnect all devices other than members of the boot array, so that only one logical device is present in the Windows NT installation. Reconnect all other devices after Windows NT is successfully installed.
- Configure the boot array in the Array*Config*U2 Utility so that the lowest SCSI ID on the lowest channel is a member of the boot array.

Microsoft BackOffice Small Business Server

Microsoft BackOffice Small Business Server features a nonbootable installation CD and setup boot diskettes which do not ask for a third-party driver disk. (Manufacturer-supplied hardware support disks.) To have the installation program prompt you for the third-party driver disk, do the following:

1. Copy the *winnt.sif* file from the *I386* directory on the BackOffice Small Business Server CD to Disk 2 of the setup boot diskettes (overwrite existing file).
2. **B**oot the system using the setup boot diskettes. Press **<F6>** while the message "Setup is inspecting your computer system's hardware..." is displayed.
3. You will be prompted for the driver disk during the installation process.

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Installing the Software Driver for Novell NetWare

This chapter explains how to install the ARO-1130U2 software driver (*cda1000h.ham*) for Novell NetWare (NetWare 4.11 and 5.0). Before installing the driver, make sure you have completed the following:

- Installed the ARO-1130U2 in your system (See Chapter 2)
- Run the Array1000 BIOS & Driver Selection Utility to determine which Array1000U2 Family Manager Set driver diskettes (Disk A or Disk B) is required to install the NetWare driver. (See Chapter 3)
- Created the first array using the Array*Config*U2 Utility, if you plan to boot from an array. (See Chapter 4)

Once NetWare and the driver are installed, install Adaptec CI/O Management Software from the server console. Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

Note: If your RAID*port* III system has an Adaptec AIC-78xx device (for example, AHA-2940 or AHA-3940 host adapter) installed (which is not associated with the RAID*port*), the NetWare driver for these adapters must be from the Adaptec 7800 Family Manager Set 2.10 or higher. Ultra2 SCSI host adapters require v3.01 or higher of the Family Manager Set. Furthermore, if the Array1000 BIOS & Driver Selection Utility determines you require Disk B, refer to Appendix B.

Installing the Array1000U2 Driver for Novell NetWare

To begin driver installation, see either *Installing the Driver When Installing NetWare* on page 6-3, or *Installing the Driver When NetWare is Already Installed* on page 6-9.

Note: We recommend that you install your Novell NetWare operating system on a fault-tolerant array (RAID 5, 1, or 0/1) to take advantage of the redundancy and performance features of the array.

Note: If your system: 1) is RAID*port* II or III equipped; AND 2) has an Adaptec AHA-294x, AHA-3940, or any other AIC-78xx based host adapter installed; AND 3) requires driver Disk B (as determined by the Array1000 BIOS & Driver Selection Utility); see Appendix B, *Using the ARO-1130U2 with Other Adaptec Products*.

Installing the Driver When Installing NetWare

To install the *cda1000h.ham* driver when you are installing NetWare, follow the instructions below for the version of NetWare you are installing.

NetWare 4.11

Follow these instructions only if you are installing NetWare 4.11 for the first time:

1. Install DOS on your system and create a DOS partition.
2. Copy the *aspi8u2.sys* and *aspicd.sys* files from the *\dos* directory on the Adaptec Array1000U2 Family Manager Set driver diskette to a directory (e.g., *c:\scsi*) on your hard disk drive.
3. Edit the *config.sys* file to include command lines for *aspi8u2.sys* and *aspicd.sys*. The following sample command lines for the *config.sys* file are appropriate for most systems:

   ```
   device=c:\scsi\aspi8u2.sys /d
   device=c:\scsi\aspicd.sys /d:aspicd0
   ```

   

   Note: For non-Ultra2 systems, use *aspi8dos.sys* instead of *aspi8u2.sys* in the command line (for example, device=c:\scsi\aspi8dos.sys /d).

4. Edit the *autoexec.bat* file to include a command line for *mscdex.exe* (the *mscdex.exe* file is included with MS-DOS 6.x and above). The following sample command lines for the *autoexec.bat* file are appropriate for most systems:

   ```
   c:\dos\mscdex.exe /d:aspicd0 /M:12
   ```

   (This assigns the CD-ROM the next available drive letter, typically *D* if there is only one DOS drive.)
5. Reboot the system to the DOS partition.
6. Insert the NetWare 4.11 CD in your CD-ROM drive.
7. Go to the CD-ROM drive.
8. Type Install and press **Enter**.

9. Follow the procedures in your NetWare documentation for installing a new server.
10. If prompted to load an SMP Module, select **No**. (The SMP Module can be installed once NetWare is up and running.)
11. When a screen appears that asks you to select a disk driver, press **Enter**.
12. Press **Insert** to install an unlisted driver.
13. Insert the appropriate Adaptec Array1000U2 Family Manager Set driver diskette (Disk A or Disk B) into your floppy disk drive. (See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.)
14. Press **F3** and specify the path to the *cda1000h.ham* driver. For NetWare 4.1, the driver is located in *\netware\v4_1x* on the diskette.
15. Select **cda1000h.ham** and press **Enter**.
16. When prompted to save existing file *c:\nwserver\nbi.nlm*, select **No**.
17. When prompted to save existing file *c:\nwserver\nwpaload.nlm*, select **No**.
18. When prompted to save existing file *c:\nwserver\nwpa.nlm*, select **No**.
19. When prompted, select **Select/Modify driver parameters**.
20. Enter a valid slot number, then press **Enter** to Save field data.
21. Press **F10** to Save parameter settings.
22. When prompted, select **Save parameters and continue**.
23. Select **No** when prompted to select an additional disk driver.
24. Select **Continue Installation**.
25. When NetWare installation is complete, install Adaptec CI/O Management Software from the server console. Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

Note: To load the driver automatically at server bootup, make sure the *startup.ncf* file includes the load command line for the *cda1000h.ham* driver. (If you also have an Adaptec host adapter that uses the Adaptec *aic78xx.dsk* driver, make sure the driver loads after the *cda1000h.ham* driver.)

Note: Older versions of the *aic78xx.dsk* driver (before v1.30) are compatible with *cda1000h.ham* as long as the ARO-1130U2 PCI slot is not specified on the command line (e.g., load aic7870.dsk slot=z). If there is an AIC-78xx based card (e.g., AHA-2940) in the system, z must point to that card's slot number and not to the ARO-1130U2 slot number. If loaded without command line parameters, NetWare lists valid slot numbers. The ARO-1130U2 will be listed in the parameter list; however, *do not* select it.

NetWare 5.0

Follow these instructions only if you are installing NetWare 5.0 for the first time:

1. Install DOS on your system and create a DOS partition.
2. Copy the *aspi8u2.sys* and *aspicd.sys* files from the *\dos* directory on the Adaptec Array1000U2 Family Manager Set driver diskette to a directory (e.g., *c:\scsi*) on your hard disk drive.
3. When using a SCSI CD-ROM, edit the *config.sys* file to include command lines for *aspi8dos.sys* and *aspicd.sys*. The following sample command lines for the *config.sys* file are appropriate for most systems:

   ```
   device=c:\scsi\aspi8u2.sys /d
   device=c:\scsi\aspicd.sys /d:aspicd0
   ```

   

   Note: For non-Ultra2 systems, use *aspi8dos.sys* instead of *aspi8u2.sys* in the command line (for example, device=c:\scsi\aspi8dos.sys /d).

4. Edit the *autoexec.bat* file to include a command line for *mscdex.exe* (the *mscdex.exe* file is included with MS-DOS 6.x and above). The following sample command lines for the *autoexec.bat* file are appropriate for most systems:

   ```
   c:\dos\mscdex.exe /d:aspicd0 /M:12
   ```

   (This assigns the CD-ROM the next available drive letter, typically *D* if there is only one DOS drive.)
5. Reboot the system to the DOS partition.
6. Insert the NetWare 5.0 CD in your CD-ROM drive.
7. Go to the CD-ROM drive.
8. Type Install and press **Enter**.
9. Follow the procedures in your NetWare documentation for installing a new server.

10 When NetWare detects device drivers for the server, you are prompted to Add, Change, or Delete drivers as needed:

   – Delete any Multiple Processor Support module that is detected (for example, MPS14).

   – Delete the Storage Adapters drivers for adapters that are not present in your system.

11 Insert the Adaptec Array1000U2 Family Manager Set driver diskette in your floppy drive.

12 Select **Storage Adapters** and press **Enter**.

13 To add Storage Adapter driver, press **Insert**.

14 Press **Insert** again to add an unlisted driver.

15 Press **F3** to specify a different path. Enter the following path:

```
a:\netware
```

16 Select **Return to Driver Summary** and press **Enter**. CDA1000 is listed as your storage adapter.

17 Remove the diskette from your floppy drive.

18 Select **Continue**.

19 Follow the procedures in your NetWare documentation to complete the installation.

20 When installation is complete, restart the system to the NetWare partition.

21 At the server prompt, down the server by entering

```
down
```

22 From the DOS prompt, edit the *config.sys* file to include command lines for *aspi8dos.sys* and *aspicd.sys*. The following sample command lines for the *config.sys* file are appropriate for most systems:

```
device=c:\scsi\aspi8u2.sys /d
device=c:\scsi\aspicd.sys /d:aspicd0
```

Note: For non-Ultra2 systems, use *aspi8dos.sys* instead of *aspi8u2.sys* in the command line (for example, device=c:\scsi\aspi8dos.sys /d).

23 Edit the *autoexec.bat* file to include a command line for *mscdex.exe.* The following sample command lines for the *autoexec.bat* file are appropriate for most systems:

```
c:\dos\mscdex.exe /d:aspicd0 /M:12
```

24 Remove the NetWare 5.0 CD from the CD-ROM drive and reboot the server to the DOS prompt (C:\).

25 Change to the *c:\nwserver* directory and enter

```
server
```

26 At this point, install Adaptec CI/O Management Software from the server console. Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

Installing the Driver When NetWare is Already Installed

To update or install the *cda1000h.ham* driver if NetWare is already installed, follow the instructions below for the version of NetWare you have installed.

NetWare 4.11

1. Copy the *cda1000h.ham* file from the appropriate Adaptec Array1000U2 Family Manager Set driver diskette (Disk A or Disk B) into the server's startup directory (e.g., *c:\nwserver*) on your hard disk drive. (See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.)

Note: For NetWare 4.11, the *cda1000h.ham* file is in *a:\netware\v4_1x*.

2. If necessary, modify the load command line in the *startup.ncf* so that the proper path to the driver is specified. The correct syntax to load the *cda1000h.ham* driver is

```
load [pathname]cda1000
```

NetWare 5.0

1. Copy the *cda1000h.ham* file from the appropriate Adaptec Array1000U2 Family Manager Set driver diskette (Disk A or Disk B) into the server's startup directory (e.g., *c:\nwserver*) on your hard disk drive. (See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.)

Note: For NetWare 5.0, the *cda1000h.ham* file is in *a:\netware*.

2. If necessary, modify the load command line in the *startup.ncf* so that the proper path to the driver is specified. The correct syntax to load the *cda1000h.ham* driver is

```
load [pathname]cda1000
```

Netware Installation and Configuration Notes

Larger Than 4 GByte Arrays

When installing NetWare on an array 4 GBytes or larger, the Install program erroneously reports that the DOS partition is too small. It, however, does allow you to continue installation. Ignore this error message.

Unloading *cda1000h.ham*

When running Adaptec CI/O Management Software, do not unload *cda1000h.ham* while *iomgr.nlm* is still loaded. Unstable behavior may result.

7

Installing the Software Driver for SCO UnixWare

This chapter explains how to install the ARO-1130U2 software driver (*cda1000*) for SCO UnixWare 7.0. Before installing the driver, make sure you have completed the following:

- Installed the ARO-1130U2 in your system. (See Chapter 2)
- Run the Array1000 BIOS & Driver Selection Utility to determine which of the two Array1000U2 Family Manager Set driver diskettes (Disk A or Disk B) is required to install the UnixWare driver. (See Chapter 3)
- Created the first array using the Array*Config*U2 Utility, if you plan to boot from an array. (See Chapter 4)

Once UnixWare and the driver are installed, install Adaptec CI/O Management Software from the server's X Window. Refer to the *Adaptec CI/O Management Software User's Guide* for instructions on installing and using the software.

Installing the Array1000U2 Driver for UnixWare

To begin driver installation, see either *Installing the Driver When Installing SCO UnixWare* below, or *Installing the Driver When SCO UnixWare is Already Installed* on page 7-3.

Installing the Driver When Installing SCO UnixWare

To install the *cda1000* driver at the same time you install SCO UnixWare, follow the instructions below:

1. Insert the SCO UnixWare Installation Diskette in the floppy boot drive. Reboot your computer.

   Wait for the first SCO UnixWare installation screen and prompt to appear, then follow the onscreen instructions.

2. When prompted to Install HBA Diskette, first remove the Installation Diskette, then insert the appropriate Adaptec Array1000U2 Family Manager Set driver diskette for SCO UnixWare (Disk A or Disk B) into your floppy disk drive (See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.)

3. Select **Install HBA Diskette** and press **F10**.

4. If you have additional HBA diskettes, insert the next HBA diskette, select **Install HBA Diskette** and press **F10**.

   If all of your HBA diskettes have been installed, select **Proceed With Installation** and press **F10**. (Do not reinstall the *cda1000* HBA diskette.)

5. If necessary, enter the DCU (Device Configuration Utility) to view / change the SCO UnixWare device driver configuration data; otherwise select **Continue With Installation**.

Note: If you used Disk B of the Adaptec Array1000U2 Family Manager Set driver diskette for SCO UnixWare in Step 2 above, enter the DCU to edit the Hardware Device Configuration before continuing with installation. See *Editing Hardware Device Configuration in DCU* on page 7-4 for instructions.

6 When prompted, reinsert the HBA diskette (Adaptec Array1000U2 Family Manager Set driver diskette for SCO UnixWare) that you inserted in Step 3 above, and press **Enter**.

7 Follow the onscreen instructions to complete the installation.

Note: If your installation fails, do not attempt to use the update installation pkgadd procedure to fix the installation. Follow the instructions in the SCO UnixWare documentation and in this document to retry the installation.

Installing the Driver When SCO UnixWare is Already Installed

To update or install the *cda1000* driver on a system where SCO UnixWare is already installed, follow the instructions below:

1 At the system prompt, type the following and press **Enter**:

```
pkgadd -d diskette1
```

2 Follow the instructions onscreen to insert the HBA diskette [the appropriate Adaptec Array1000U2 Family Manager Set driver diskette for SCO UnixWare (Disk A or Disk B)] into your floppy disk drive and press **Enter**.

Note: See *Running the Array1000 BIOS & Driver Selection Utility* on page 3-2 to determine the appropriate driver diskette.

3 When prompted to select packages, select all packages (press **Return**). The package is loaded into your SCO UnixWare operating system.

4 When the package has loaded, you may be prompted to install the diskette again. Do not reinsert the HBA diskette (Adaptec Array1000U2 Family Manager Set driver diskette for SCO UnixWare). Instead, type q (quit) and press **Enter**.

5 Shutdown or reboot the system.

6 When prompted to rebuild the kernel, select **go**.

UnixWare Installation and Configuration Notes

Editing Hardware Device Configuration in DCU

If you used Disk B of the Adaptec Array1000U2 Family Manager Set driver diskette for SCO UnixWare in Step 3 on page 7-2, you need to enter the DCU to edit the Hardware Device Configuration. Follow the instructions below:

1. Enter the DCU when prompted during installation.
2. Select **Hardware Device Configuration** and press **Enter**.
3. Search for entries with a device name of AIC-7895.
4. Tab over, press **F2** for choices (device name choices appear).
5. Page down to find device name of "*cda1000*"
6. Find any other entries with a device name of AIC-7895 and change them to "*cda1000*."
7. Press **F10.**
8. Select **Apply Changes and Exit DCU** and press **Enter**.

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A

Configuring ARO-1130U2 with the SCSI*Select* Utility

The SCSI*Select* configuration utility allows you to change SCSI settings without opening the server chassis or handling the card. SCSI*Select* also contains utilities that allow you to low-level format or verify the disk media of your SCSI hard disk drives.

The SCSI*Select* settings are listed in the table below. If you want to view and/or change the current settings, or if you would like to format or verify a disk, see *Starting the SCSISelect Utility* on page A-2. Detailed descriptions of each setting begin on page A-4.

SCSI Bus Interface Definitions
Host Adapter SCSI ID
SCSI Parity Checking
Host Adapter SCSI Termination
Host Adapter Ultra*SCSI*
SCSI Device Configuration
Initiate Sync Negotiation
Maximum Transfer Rate
Enable Disconnection
Initiate Wide Negotiation[1]
Send Start Unit Command
Include in BIOS Scan
Additional Options
Array1000U2 BIOS
BIOS Support for Bootable CD-ROM

[1] This option is available only if Wide SCSI is supported on the motherboard.

Starting the SCSI*Select* Utility

To start SCSI*Select*, press the **F6** key when the following prompt appears when you turn on or reboot your system:

Press <F6> for SCSISelect (TM) Utility!

The menu that appears displays the options Configure/View Host Adapter Settings and SCSI Disk Utilities, as shown in Figure A-1.

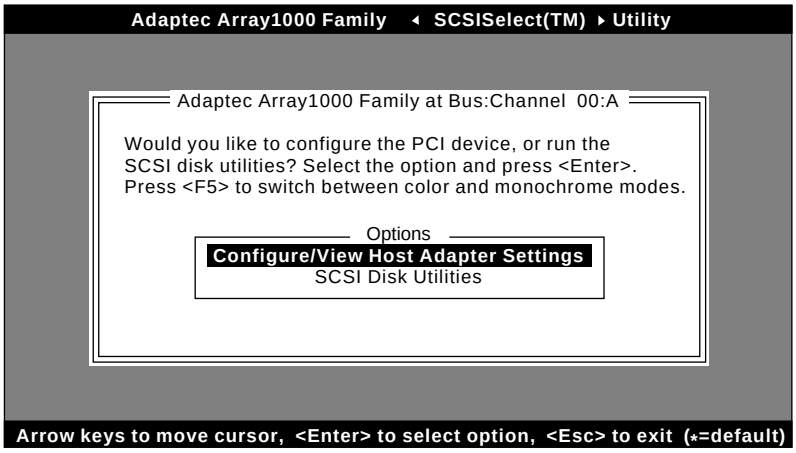

Figure A-1. SCSI*Select* Menu

Using SCSI*Select* Menus

To select a SCSI*Select* menu option, move the cursor to the option with the ↑ and ↓ keys, then press **Enter**. In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing **Esc**.

To restore the original SCSI*Select* default values, press **F6** from the Configure/View Host Adapter Settings screen. To toggle the display between color and monochrome modes, press **F5** from the main SCSI*Select* screen (this feature does not work on some monitors).

Exiting SCSI*Select*

To exit SCSI*Select*, press **Esc** until a message prompts you to exit (if you changed any host adapter settings, you are prompted to save the changes before you exit). Select **Yes** to exit, then press any key to reboot the system. Any changes you made in SCSI*Select* take effect after the server boots.

Using the SCSI Disk Utilities

To access the SCSI disk utilities, select the **SCSI Disk Utilities** option from the menu that appears after starting SCSI*Select*. Once the option is selected, SCSI*Select* immediately scans the SCSI bus (to determine the devices installed) and displays a list of all SCSI IDs and the devices assigned to each ID.

When you select a specific ID and device, a small menu appears, displaying the options Format Disk and Verify Disk Media.

- **Format Disk**—This utility allows you to perform a low-level format on a hard disk drive. Each hard disk drive must be low-level formatted before you can use your operating system's partitioning and file preparation utilities, such as MS-DOS *Fdisk* and *Format*.

  Most SCSI disk devices are preformatted at the factory and do not need to be formatted again. The Adaptec Format Disk utility is compatible with the vast majority of SCSI disk drives.

  

  Caution: A low-level format destroys all data on the drive. Be sure to back up your data before performing this operation. You *cannot* abort a low-level format once it is started.

- **Verify Disk Media**—This utility allows you to scan the media of a hard disk drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them; if you select *yes*, those blocks are longer used. You can press **Esc** at any time to abort the utility.

SCSI*Select* Settings

SCSI Bus Interface Definitions

The following settings are the SCSI*Select* settings most likely to require any modification:

- **Host Adapter SCSI ID**— This option sets the ARO-1130U2's SCSI ID. We recommend that you leave the ARO-1130U2 set to SCSI ID 7, which gives the ARO-1130U2 the highest priority on the SCSI bus.
- **SCSI Parity Checking**—This option determines whether the ARO-1130U2 verifies the accuracy of data transfer on the SCSI bus. You should disable SCSI Parity Checking on the ARO-1130U2 and all SCSI devices if any SCSI device supported by the ARO-1130U2 does not support SCSI parity; otherwise, leave it enabled. Most SCSI devices do support SCSI parity. If you are not sure whether a device supports SCSI parity, consult the documentation for the device.
- **Host Adapter SCSI Termination**—This option is used in conjunction with your motherboard termination settings. Refer to your motherboard documentation for instructions on properly setting termination.
- **Host Adapter UltraSCSI** —This option determines whether the ARO-1130U2 supports Ultra SCSI data transfer speeds. If you have any Ultra SCSI devices installed, you should enable this setting. When this setting is enabled, the ARO-1130U2 negotiates for data transfer speeds of up to 40 MBytes / sec (80 MBytes / sec for Wide SCSI devices).

Note: If you use Ultra SCSI data transfer speeds, be sure to use high-quality cables to connect the disk drives supported by the ARO-1130U2. The quality of the cable is much more critical when you use higher-speed data transfer.

SCSI Device Configuration

The SCSI device settings allow you to configure certain parameters for each device on the SCSI bus. To configure settings for a specific device, you must know the SCSI ID assigned to that device. If you are not sure of the SCSI ID, see *Using the SCSI Disk Utilities* on page A-3.

- **Initiate Sync Negotiation**—This option determines whether synchronous data transfer negotiation (Sync Negotiation) between the device and SCSI channel is initiated by the SCSI channel. Normally, you should leave Initiate Sync Negotiation set to *Enabled*, because most SCSI devices support synchronous negotiation and because it allows for faster data transfer.
- **Maximum Transfer Rate**—This option determines the maximum data transfer rate that the SCSI channel supports.
- **Enable Disconnection**—This option determines whether the SCSI channel allows the SCSI device to disconnect from the SCSI bus (sometimes called Disconnect / Reconnect). This option should be enabled for maximum performance.
- **Initiate Wide Negotiation**—This option determines whether the SCSI channel attempts 16-bit data transfer instead of 8-bit data transfer. The effective data transfer rate is doubled when 16-bit data transfer is used. For example, a transfer rate of 10 MBytes / sec becomes 20 MBytes / sec for a Wide SCSI device. If you have a Wide SCSI device, make sure this option is enabled.
- **Send Start Unit Command**—This option determines whether the Start Unit Command is sent to the SCSI device at bootup (most devices do not require this).
- **Include in BIOS Scan**—This option determines whether the Array1000U2 BIOS supports hard disk drives attached to the SCSI channel. When set to *Yes*, the ARO-1130U2 BIOS controls the hard disk drive. When set to *No*, the ARO-1130U2 BIOS does not control the hard disk drive.

Additional Options

Array1000U2 BIOS

This option determines whether the ARO-1130U2 BIOS is installed at boot time. When set to *Enabled*, the ARO-1130U2 BIOS is installed and all Int13 (except bootable CD-ROM) devices are supported. When set to *Disabled*, the ARO-1130U2 BIOS is not installed.

BIOS Support for Bootable CD-ROM

This option determines whether the Array1000U2 BIOS supports booting from a CD-ROM drive attached to the ARO-1130U2 channel. When set to *Enabled*, the ARO-1130U2 allows booting from the CD-ROM drive.

B

Using the ARO-1130U2 with Other Adaptec Products

You cannot install more than one ARO-1130U2 card in the same system; however, you can install an ARO-1130U2 in servers that have other PCI-, ISA-, or EISA-based host adapters installed. When installing multiple adapters, consider the following:

- Adaptec AAA™-130SA Series of RAID cards (AAA-131SA, AAA-132SA / 133SA) cannot coexist with an ARO-1130U2 inside the same system.
- All drives in a single array must be connected to the same host adapter. A single array cannot be created with drives from two or more host adapters.
- If you are booting from a SCSI disk drive or array supported by the ARO-1130U2, then the ARO-1130U2 must be the card that the server scans first. Some computers boot from the device with the lowest PCI device number; others boot from the device with the highest number. (See also *Making the Array Bootable* on page 4-8.) You can disable the BIOS on cards that are scanned before the desired boot card.
- In systems with EISA- and ISA-based host adapters, the boot host adapter must have the lowest BIOS base address. The system BIOS automatically controls the ARO-1130U2 base address (the user has no control over the assigned address).

Using Driver Disk B

If the Array1000 BIOS & Driver Selection Utility determines you require Disk A of the manager set driver diskettes, the rest of this appendix does not apply. If Disk B is required, then note the following for these Adaptec products:

- **AHA-294x, AHA-3940, or any other AIC-78xx based host adapter**: These host adapters can coexist with an ARO-1130U2 inside a RAID*port* II or III system using Windows NT or NetWare. In Windows NT, however, it is necessary to make some modifications to your Windows NT configuration. See *Using the ARO-1130U2 with an AHA-294x, AHA-3940, or Other AIC-78xx Based Host Adapter and Driver Disk B (Windows NT Only)* below.
- **AHA-3940AU/3940AUW**: Due to a PCI ID conflict with the hardware on the motherboard that requires driver Disk B, these host adapters *cannot* coexist with an ARO-1130U2 inside a RAID*port* II or III system.

Using the ARO-1130U2 with an AHA-294x, AHA-3940, or Other AIC-78xx Based Host Adapter and Driver Disk B (Windows NT Only)

This section offers two scenarios for using the ARO-1130U2 in a system also containing any of the above host adapters. If the Array1000 BIOS & Driver Selection Utility (see Chapter 3) determines you require Disk B of the manager set driver diskettes, follow the scenario below that matches your situation. You will need to install drivers and make changes to the Windows NT Registry.

If the Array1000 BIOS & Driver Selection Utility determines you require Disk A, this section does not apply. To install the driver, follow the instructions in *Installing the Array1000U2 Driver for Windows NT* on page 5-2.

Caution: We recommend that you do *not* attempt to change the Windows NT Registry unless you are an experienced computer user.

Scenario #1: Adding an ARO-1130U2 to a RAID*port* II or III System with an AHA-294x, AHA-3940, or Other AIC-78xx Based Host Adapter

These instructions assume that Windows NT is *already installed* on the server and that the boot drive is currently connected to an AHA-294x, AHA-3940, or any other AIC-78xx based host adapter. If the ARO-1130U2 is already installed, shut down the server, remove the ARO-1130U2 from the expansion slot, and restart the server.

Installing the ARO-1130U2 Driver

1. Start the Windows NT Control Panel and double click the **SCSI Adapters** icon.
2. Click the **Drivers** tab and click **Add**.
3. Click **Have Disk ...**, and insert Disk B of the Array1000U2 Family Manager Set diskettes in the floppy disk drive. (This diskette is included with your ARO-1130U2 adapter.)
4. When the Install from Disk dialog box appears, type a:\winnt on the command line and click **OK**.
5. Select **Adaptec Array1000U2 Family Adapter** and click **OK**.
6. When a message appears asking you if you want to restart Windows NT, click **No**.
7. Exit from Control Panel.

Changing Registry Settings

1. Back up the NT Registry, using one of the techniques described in *Backing up the Windows NT Registry* on page B-10.

Caution: It is very important to back up the NT Registry before you make any changes to it. This allows you to restore the original NT Registry settings if there is a problem with the new configuration.

2. Run the Registry Editor (*regedit.exe*).

3. When the Registry Editor window appears, expand the tree on the left until you can see the nodes under *\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services*.

4. Select **cda1000** on the left part of the screen. Write down the cda1000 Tag value that appears on the right part of the screen.

   The Tag value is a hex number followed by an equivalent decimal equivalent in brackets: for example, 0x00000002 [2].

5. Select **aic78xx** on the left part of the screen. Write down the aic78xx Tag value that appears on the right part of the screen.

6. Expand the tree on the left until you can see the nodes under *\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\GroupOrderList*.

7. Select **GroupOrderList**.

8. Click the right mouse button on **SCSI Miniport** on the right side of the window and select **Modify** from the pop-up menu. A table appears with columns of two- and four-number groups, something like this:

   0005 02 00 00 00 03 00 00 00
   0010 01 00 00 00 01 01 00 00
   0015 04 00 00 00 05 00 00 00
   0020 06 00 00 00 07 00 00 00
   etc.

   This table of hexidecimal numbers indicates the Tag-value sequence in which the SCSI Miniport drivers are loaded when you start Windows NT.

9. Determine what the Tag value loading sequence is. Here is how you do this:

   a. Ignore the four-digit groups on the left of each row.

   b. Going from left to right, and starting on the first row, divide the two-digit numbers into groups of eight. In this example, the groups are

      02 00 00 00
      03 00 00 00
      01 00 00 00

01 01 00 00
etc.

You need to write down *all* the number groups from all rows in the table.

c In each group of eight numbers, reverse the sequence of the two-digit pairs, like this:

00 00 00 02
00 00 00 03
00 00 00 01
00 00 01 01
etc.

d Write down the series of resulting numbers, without all the extra zeroes. In this example, it is 2, 3, 1, 101, etc. This is the Tag value loading sequence for SCSI Miniport drivers. In other words, when Windows NT loads these miniport drivers, the one with Tag value 2 is loaded first, then the one with Tag value 3, and so on.

10 Compare the Tag value loading sequence to the actual tag values of cda1000 and aic78xx that you determined in steps 4 and 5. If cda1000 is loading before aic78xx, skip to step 16. If aic78xx is loading first, continue with the next step.

11 Expand the tree on the left until you can see the nodes under \HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services.

12 Select **cda1000** on the left part of the screen. Click the right mouse button on **Tag Value** on the right part of the screen and select **Modify** from the pop-up menu.

13 Type the tag value of the aic78xx miniport driver in the space provided and click **OK**.

14 Select **aic78xx** on the left part of the screen. Click the right mouse button on **Tag Value** on the right part of the screen and select **Modify** from the pop-up menu.

15 Type the tag value of the cda1000 miniport driver in the space provided and click **OK**. You have now reversed the tag values for the two miniport drivers, and the cda1000 driver will load first.

16 Exit from the Registry Editor and from Windows NT. Then shut down the server.

17 Physically install the ARO-1130U2 in the PCI/RAID*port* expansion slot.

18 Attach your boot drive to one of the SCSI channels controlled by the ARO-1130U2 and boot the server.

Scenario #2: Adding an AHA-294x, AHA-3940, or Other AIC-78xx Based Host Adapter to a RAID*port* II or III System with an ARO-1130U2

These instructions assume that Windows NT is *already installed* on the server and that the boot drive is connected to the SCSI channel controlled by the ARO-1130U2. If the AHA-294x, AHA-3940, or any other AIC-78xx based host adapter is already installed, shut down the server, remove the adapter from the slot, and restart the system.

Installing the AHA-2940, AHA-3940, or AIC-78xx Family Driver

1 Start the Windows NT Control Panel and double click the **SCSI Adapters** icon.

2 Click the **Drivers** tab and click **Add**.

3 Click **Have Disk ...**, and insert AIC-78xx Family Manager Set diskette in the floppy disk drive. (This diskette was included with your 2940 Family adapter.)

4 When the Install From Disk dialog box appears, type a:\winnt\4_0 on the command line and click **OK**.

5 Select **Adaptec AHA290x/291x/394x/494x/4944/AIC78xx PCI SCSI Controller (NT 4.0)** and click **OK**.

6 When a message appears asking if you want to restart Windows NT, click **No**.

7 Exit from Control Panel.

Changing Registry Settings

1. Back up the NT Registry, using one of the techniques described in *Backing up the Windows NT Registry* on page B-10.

   

   Caution: It is very important to back up the NT Registry before you make any changes to it. This allows you to restore the original NT Registry settings if there is a problem with the new configuration.

2. Run the Registry Editor (*regedit.exe*).
3. When the Registry Editor window appears, expand the tree on the left until you can see the nodes under *\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services*.
4. Select **cda1000** on the left part of the screen. Write down the cda1000 Tag value that appears on the right part of the screen.

   The Tag value is a hex number followed by an equivalent decimal equivalent in brackets: for example, 0x00000002 [2].
5. Select **aic78xx** on the left part of the screen. Write down the aic78xx Tag value that appears on the right part of the screen.
6. Expand the tree on the left until you can see the nodes under *\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\GroupOrderList*.
7. Select **GroupOrderList**.

8 Click the right mouse button on **SCSI Miniport** on the right side of the window and select **Modify** from the pop-up menu. A table appears with columns of two- and four-number groups, something like this:

```
0005 02 00 00 00 03 00 00 00
0010 01 00 00 00 01 01 00 00
0015 04 00 00 00 05 00 00 00
0020 06 00 00 00 07 00 00 00
etc.
```

This table of hexidecimal numbers indicates the Tag-value sequence in which the SCSI Miniport drivers are loaded when you start Windows NT.

9 Determine what the Tag value loading sequence is. Here is how you do this:

a Ignore the four-digit groups on the left of each row.

b Going from left to right, and starting on the first row, divide the two-digit numbers into groups of eight. In this example, the groups are

```
02 00 00 00
03 00 00 00
01 00 00 00
01 01 00 00
etc.
```

You need to write down *all* the number groups in all rows of the table.

c In each group of eight numbers, reverse the sequence of the two-digit pairs, like this:

```
00 00 00 02
00 00 00 03
00 00 00 01
00 00 01 01
etc.
```

d Write down the series of resulting numbers, without all the extra zeroes. In this example, it is 2, 3, 1, 101, etc. This is the Tag value loading sequence for SCSI Miniport drivers. In other words, when Windows NT loads these miniport drivers, the one with Tag value 2 is loaded first, then the one with Tag value 3, and so on.

10 Compare the Tag value loading sequence to the actual tag values of cda1000 and aic78xx that you determined in steps 4 and 5. If cda1000 is loading before aic78xx, skip to step 16. If aic78xx is loading first, continue with the next step.

11 Expand the tree on the left until you can see the nodes under *\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services*.

12 Select **cda1000** on the left part of the screen. Click the right mouse button on **Tag Value** on the right part of the screen and select **Modify** from the pop-up menu.

13 Type the tag value of the aic78xx miniport driver in the space provided and click **OK**.

14 Select **aic78xx** on the left part of the screen. Click the right mouse button on **Tag Value** on the right part of the screen and select **Modify** from the pop-up menu.

15 Type the tag value of the cda1000 miniport driver in the space provided and click **OK**. You have now reversed the tag values for the two miniport drivers, and the cda1000 driver will load first.

16 Exit from the Registry Editor and from Windows NT. Then shut down the server.

17 Physically install the AHA-2940 Family adapter in the expansion slot.

18 Boot the server.

Backing up the Windows NT Registry

It is very important to back up the Windows NT Registry before making any changes to it. This will allow you to recover if the changes make your system unusable. Here are two ways to back up the Windows NT Registry. The backup utilities described here are included with NT Workstation:

- Use the *ntbackup* utility to create a tape copy of all data files and Registry information. Be sure to select the **Backup Local Registry** option when performing the backup.
- Run the *rdisk* utility with the /s option to create a copy of the Registry on a hard disk. (A typical backup file is 5 MBytes to 10 MBytes in size.) Then use xcopy or some other command to copy the information to removable media. You must have the three NT boot floppy disks to restore an RDISK-saved registry to your workstation.

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Troubleshooting

Troubleshooting Checklist

Check the following if you have problems installing or running the ARO-1130U2 and SCSI devices:

- Does the ARO-1130U2 BIOS sign-on message appear during bootup? If not, check the following items:
  - Is the ARO-1130U2 properly seated in a RAID*port* expansion slot? Refer to your computer documentation for the slot location.
  - Does your computer CMOS setup require you to enable PCI bus parameters (see your computer documentation)? If so, run the CMOS Setup program and assign the parameters—usually IRQ, Enable PCI Slot, and Enable Master.
  - Have you run the Array1000 BIOS & Driver Selection Utility?
- Is the SCSI bus terminated properly, and are all SCSI devices turned on?
- Are all SCSI bus cables and power cables connected?
- Does each channel and each device on the channel have a unique SCSI ID?
- If you are having trouble booting from a SCSI disk drive or array, make sure your computer's CMOS setup is set to **No Drives Installed** (the required setting for SCSI drives). Also, verify that the drive or array has been selected as the boot-first (boot) device and has boot order # 0.

Windows NT Troubleshooting

Error Messages While Setting Up Windows NT

"Setup is unable to locate the hard drive partition prepared by the MS-DOS portion of setup"
or
"xxxx MB disk y at Id z on bus 0 on cda1000.sys does not contain a partition suitable for starting Window NT"
If these messages appear during Windows NT setup, do the following:

1. Re-boot the server using the Array*Config*U2 diskette.
2. Run the Array*Config*U2 Utility to ensure that the boot array includes the drive with the lowest SCSI target ID.

"Boot: Couldn't find NTLDR"
If this message appears when attempting to boot from the Windows NT installation CD, boot from the Windows NT installation floppy diskettes instead, and proceed to load Windows NT from the CD-ROM.

"No Accessible Boot Device"
When attempting to boot from the Windows NT installation CD, this message indicates that the NT CD-ROM does not contain Array1000U2 drivers. To avoid this failure, try the following:

1. Reboot the Windows NT installation CD.
2. When the prompt "Setup is inspecting your computer system's hardware" appears, press the **F6** key repeatedly.
3. Windows NT will later prompt you for the Array1000U2 driver diskette and the installation should continue as normal.

"Partition Size Too Large"
When installing Windows NT, this message appears if attempting to create a system partition larger than 4 GBytes. Windows NT has a maximum system partition size of 4096 MBytes. Create a partition that is smaller than 4 GBytes and continue the Windows NT installation. When Windows NT is completely installed, use the Windows NT Disk Administrator to partition the remaining available space of the array.

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Using a CD-ROM Drive

Should you need to install a SCSI CD-ROM, the Array1000U2 Family Manager Set drivers diskette included with the ARO-1130U2 contains the DOS driver software you need in order to use a CD-ROM controlled by the ARO-1130U2. This appendix explains how to set up your CD-ROM drive so that you can initially install your software.

Using a CD-ROM Drive with DOS

To operate a CD-ROM drive supported by the ARO-1130U2 under DOS, you need

- The SCSI driver, *aspi8u2.sys* (for Ultra2 systems) or *aspi8dos.sys* (for non-Ultra2 systems)
- The CD-ROM driver, *aspicd.sys*
- The Microsoft CD-ROM extensions, *mscdex.exe*

The *aspi8u2.sys* (or *aspi8dos.sys*) and *aspicd.sys* files must be copied from the *\dos* directory on the Adaptec Array1000U2 Family Manager Set driver diskette to a directory (e.g., *c:\scsi*) on your hard disk drive. The *mscdex.exe* file is included with MS-DOS 6.x and above (see your MS-DOS documentation for details).

Note: If you use MS-DOS 5 and do not have *mscdex.exe*, we recommend that you upgrade to MS-DOS 6 or above. You can also obtain *mscdex.exe* from Microsoft's Web site, online bulletin board, or the CompuServe forum.

To complete the driver installation, edit the *config.sys* file to include command lines for *aspi8dos.sys* and *aspicd.sys*, and edit the *autoexec.bat* file to include a command line for *mscdex.exe*. The following examples illustrate the command line format and the command options appropriate for most systems:

- Sample command lines for *config.sys* file:

  ```
  device=c:\scsi\aspi8u2.sys /d
  device=c:\scsi\aspicd.sys /d:aspicd0
  ```

Note: For non-Ultra2 systems, use *aspi8dos.sys* instead of *aspi8u2.sys* in the command line (for example, device=c:\scsi\aspi8dos.sys /d).

- Sample command line for *autoexec.bat* file:

  ```
  c:\dos\mscdex.exe /d:aspicd0
  ```

  (This assigns the CD-ROM the next available drive letter, typically *D* if there is only one DOS drive.)

The following tables describe the *aspi8u2.sys* (or *aspi8dos.sys*) and *aspicd.sys* command line options. For a description of *mscdex* command line options, see your Microsoft DOS documentation. You can type command line options in uppercase or lowercase letters. Leave a blank space between options.

Command Line Options for *spi8dos.sys* (or *aspi8u2.sys*)

Option	Example	Use
/ccbs<*count*>	/ccbs8	Specifies the maximum number of concurrent ASPI commands that can be supported. The valid range is 1 through 16. The default is 4. If you increase this value, the size of the ASPI manager also increases. Use this option only if you want to run an ASPI program that specifies a higher number of concurrent commands.
/d	/d	Displays information about the ARO-1130U2 and attached SCSI devices when the computer boots.
/L	/L	Enables aspi8dos to recognize all eight possible LUNs associated with each SCSI ID. If the option is not used, *aspi8dos* can recognize only LUN 0 for each SCSI ID.
/m*n*	/m1	Causes *aspi8dos* to scan the PCI bus. The method used to scan the bus is determined by the value of *n*: /mb = scan PCI bus using PCI BIOS calls /m1 = scan PCI bus using Mechanism #1 /m2 = scan PCI bus using Mechanism #2 *aspi8dos* automatically scans the PCI bus for SCSI devices. It tries to determine which scanning method will work best for the given system configuration. Use the /mb, /m1, and /m2 options only if you want to override the *aspi8dos* internal scanning mechanism. Usually *aspi8dos* can determine which scanning method is optimal for your system. (PCI BIOS calls are described in the PCI BIOS spec; scanning mechanisms #1 and #2 are described in the PCI spec.
/norst	/norst	Prevents *aspi8dos* from resetting the SCSI bus when you boot your computer. By default, *aspi8dos* resets the SCSI bus when you boot the computer if the host adapter BIOS is not present. You can use /norst to prevent this from happening.
/pause	/pause	Pauses the system after loading *aspi8dos* at bootup, so you can read the message on the screen. After you read the message, press any key to resume booting.
/rst	/rst	Forces *aspi8dos* to reset the SCSI bus when you boot your computer. By default, *aspi8dos* does not reset the SCSI bus when you boot your computer if the host adapter BIOS is present.
/s<*slot number*>	/s1 /s3	Indicates the slot number(s) where you want *aspi8dos* to look for host adapters. Valid slot numbers = 1 to 15. If you do not use this option, *aspi8dos* scans all slots for host adapters, beginning at slot 1.

Command Line Options for *aspicd.sys*

Option	Example	Use
/d:*<name>*	/d:aspicd0	Required in the *config.sys* command line. Assigns a name to the CD-ROM drive so that *mscdex* can assign the CD-ROM a logical drive letter. The name must exactly match the CD-ROM drive name in the *mscdex* command line in *autoexec.bat*. Use any eight-character name.
/id=*{...}*	/id=2+4 /id=3+5+1:4	Specifies CD-ROM drives controlled by *aspicd*. By default, *aspicd* controls all drives. In the first example, which is for a computer with one host adapter, *aspicd* controls the devices with SCSI IDs 2 and 4. In the second example, for a computer with two host adapters, *aspicd* controls the devices with SCSI IDs 3 and 5 on host adapter 0 and SCSI ID 4 on host adapter 1 (if you do not specify the host adapter number, *aspicd* assumes it is 0).
/L	/L	Enables *aspicd* to recognize all eight possible LUNs associated with each SCSI ID. If the option is not used, *aspicd* can recognize only LUN 0 for each SCSI ID. Add the /L option to the command line if you have a CD-ROM drive that can access multiple discs. If your computer system includes a Pioneer DRM-600 or DRM-604x multiple-disc CD-ROM drive, you do not need to add the /L option. The *aspicd* device driver automatically scans multiple LUNs if it detects one of these devices on the SCSI bus.
/norst	/norst	Prevents *aspicd* from issuing a SCSI Bus Reset message at system start-up. The default is to issue it. The SCSI Bus Reset message (supported by Toshiba, Hitachi, and NEC drives) resets drives that are playing audio CDs when the computer reboots.
/pause	/pause	Makes your system pause after loading *aspicd* at bootup, so you can read the message on the screen. Press any key to resume booting.
/type:*<drive vendor>*	/type:sony	Allows *aspicd* to support audio play mode for CD-ROM drives that are compatible with a supported drive type but are not included on the list of supported drives. If you use the /type:*<drive vendor>* option, *aspicd* assumes that all CD-ROM drives on the SCSI bus are made by this vendor—you cannot combine different brands of CD-ROM drives on the bus. The valid entries for this option are chinon, denon, hitachi, lms, nec, panasonic, sony, texel, and toshiba.

▼▼▼▼ Index

E

F

H

I

L

M

N

P

R

S

T

U

V

W

❒