Installation and Hardware Guide

AAA-130 Series

PCI-to-Wide UltraSCSI Array Adapters

adaptec®

AAA-130 Series Installation and Hardware Guide
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▼▼▼▼ AAA-130 Series

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Federal Communications Commission Radio Frequency Interference Statement

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.	AAA-131, AAA-132, AAA-133
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.

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Introduction

The Adaptec® AAA™-130 Series PCI-to-Wide UltraSCSI Array Adapters provide powerful disk array support in servers that have a PCI bus. The AAA-130 Series includes these three models:

AAA-131 - single-channel, half-size PCI array adapter, with 50-pin and 68-pin internal connectors and a 68-pin external connector

AAA-132 - two-channel, full-size PCI array adapter with 50-pin and 68-pin internal connectors for both channels and 68-pin external connector for Channel A

AAA-133 - three-channel, full-size PCI array adapter with 50-pin and 68-pin internal connectors for all three channels and 68-pin external connector for Channel A

This *Installation and Hardware Guide* explains how to initially install the AAA-130 Series adapter and its supporting server and client software and how to create a bootable array. The *Array1000™ Family Array Management Guide*, which is also included with your array adapter, explains how to use the server and client software to create and manage additional arrays.

Note: If you are installing and using the AAA-130 Series adapter in a desktop computer system, you should interpret *server* or *server console* to mean *desktop system* wherever the term is used in this document.

System Requirements

The minimum system requirements for the AAA-130 Series are

- PCI-based 90-MHz Pentium or equivalent motherboard with PCI-to-PCI bridge support
- An available half-length (AAA-131) or full-length (AAA-132/133), unobstructed PCI slot that supports Bus Mastering
- A minimum of one SCSI hard disk drive
- A standard 72-pin, 1- or 4-MByte, Fast-page mode 70-ns or faster SIMM (non-EDO). (See the Adaptec Web Site at *http://www.adaptec.com/RAID* for a list of approved SIMMs and vendors.)
- Five MBytes of hard disk space for the AAA-130 Series 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)
- Novell NetWare 3.12, 4.1 or 4.11; or Windows NT™ 3.51 or 4.0
- A 3.5-inch 1.44-MByte primary (boot) floppy disk drive
- 64 MBytes system memory for NetWare; more than 64 MBytes memory recommended for Windows NT
- Installed CD-ROM drive, for installation of Adaptec CI/O Array Management Software (optionally, you can request the installation files on floppy diskettes)

Installation Overview

- Install the AAA-130 Series adapter in the server
- Connect the SCSI devices to the AAA-130 Series
- Create the first (bootable) array with the Array*Config*™ program
- Install the AAA-130 Series driver along with your network operating system
- Install the Adaptec CI/O™ Array Management Software on your server
- Install the Adaptec CI/O Array Management Software on your networked Windows-based client (optional)

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Installing the AAA-130 Series Adapter and Connecting SCSI Devices

This chapter explains how to install the hardware. To install the AAA-130 Series and devices, you will need to

- Install SIMM memory
- Back up any existing data
- Install the AAA-130 Series in your server
- Connect SCSI devices

AAA-130 Series Layout

Figure 2-1 identifies the major components on the AAA-131, and Figure 2-2 the components on the AAA-132/133. You may find it helpful to refer to these figures while installing your adapter.

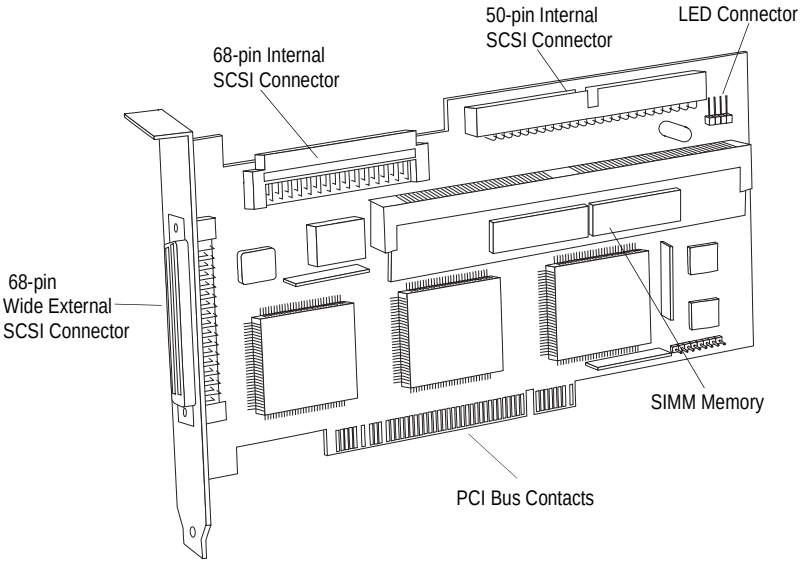

Figure 2-1. AAA-131 Major Components

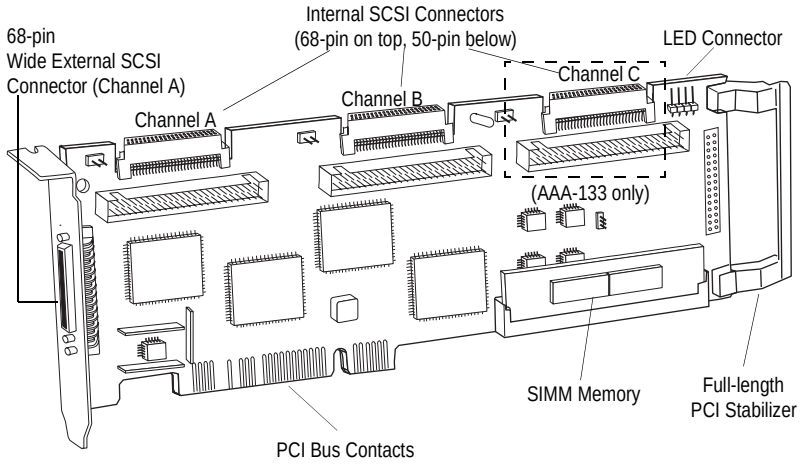

Figure 2-2. AAA-132/133 Major Components

Installing SIMM Memory

Before you can use the AAA-130 Series adapter, the SIMM memory socket must be populated with a standard 72-pin 1- or 4-MByte Fast-page mode SIMM, as shown in Figure 2-3. (The SIMM may already be installed in the socket.) Visit the Adaptec Web Site at *http://www.adaptec.com/RAID* for a list of approved SIMMs and vendors.

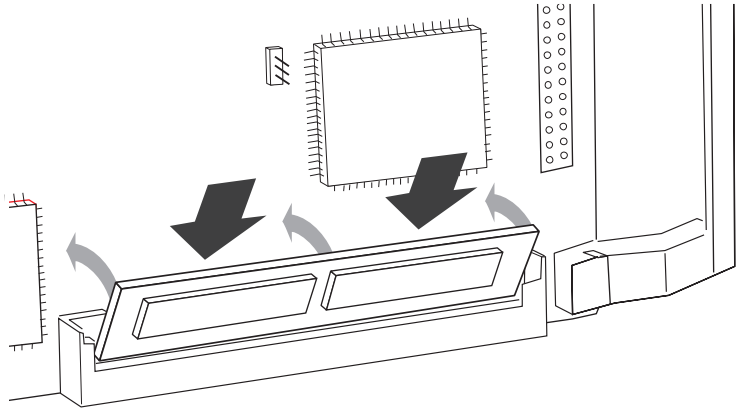

Figure 2-3. Installing SIMM in the SIMM Memory Socket

Installing the AAA-130 Series Adapter

Follow these steps to install the AAA-130 Series adapter:

Note: If you are installing the AAA-130 Series adapter in an existing system, back up all data before continuing with installation. You can restore this data later once your devices are connected and your array(s) created. If you have one or more existing arrays created with an Adaptec AHA®-398x / 398xW adapter and you would like to migrate the array(s) to an AAA-130 Series adapter, see Appendix B, *Advanced Topics*.

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 an unused, unobstructed, 5-volt PCI expansion slot that supports bus mastering. Unscrew and remove the expansion slot bracket that covers the card-slot opening.

4 Insert the AAA-130 Series adapter in the PCI slot; press down firmly so that the PCI bus contacts are securely seated in the slot. Secure the adapter bracket with the screw you removed in Step 3. (Figure 2-4 shows the installation of an AAA-132 / 133 adapter.)

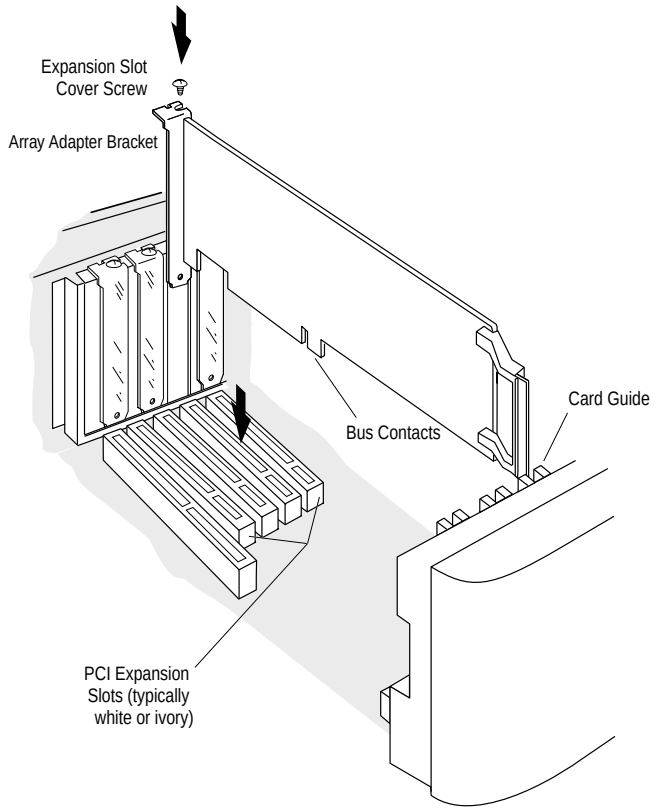

Figure 2-4. Installing an AAA-132/133 in an Expansion Slot

Connecting the LED Activity Indicator

(Optional) An LED on the front panel of most computers lights to indicate non-SCSI hard disk activity. If you want the LED to light whenever there is activity on the AAA-130 Series adapter instead, you must disconnect the LED cable from the motherboard and connect it to the LED connector on the AAA-130 Series adapter. If the LED has a two-position cable, connect the cable to pins 1 and 2 of the LED connector. (Figure 2-5 shows the connection on an AAA-132/133 adapter.)

Note: If you are using non-SCSI disk drives (e.g., IDE), the LED will no longer indicate activity on these drives when you connect the LED cable to the AAA-130 Series adapter.

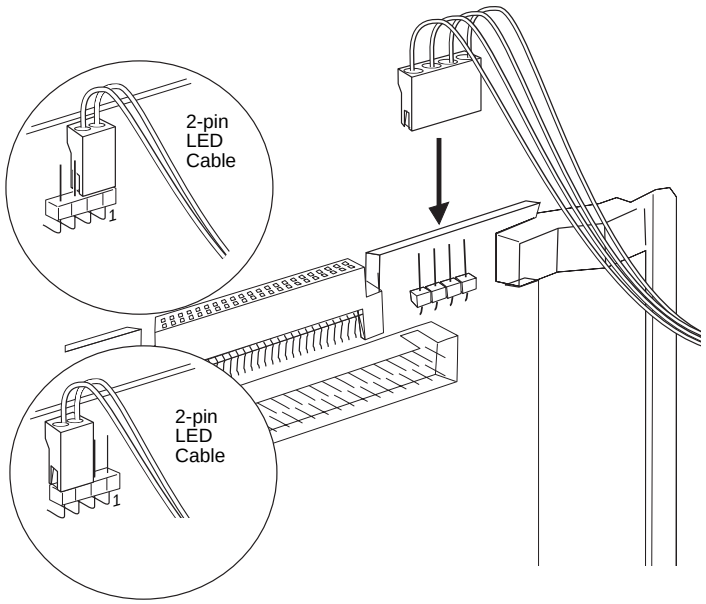

Figure 2-5. Connecting the LED Activity Indicator

Connecting SCSI Devices

The AAA-130 Series adapters support both internal and external SCSI devices. Up to 15 SCSI devices can be supported on each SCSI channel—either 16-bit devices alone or a combination of 16-bit and up to seven 8-bit devices.

Note: If you are installing your SCSI devices inside an external array enclosure, see *Connecting External SCSI Array Enclosures (Storage Subsystems)* on page 2-12.

Choosing SCSI Cables

To connect your SCSI devices, make sure you have the appropriate cable and connectors as described in the following table (see *Installation Hints for Connecting SCSI Devices* on page 2-13 as well as Appendix D, *Obtaining SCSI Cables and Converters* for additional information on cabling SCSI devices):

To Install...	You WIll Need...
8-bit Internal SCSI Devices	• A 50-pin Internal SCSI cable with enough connectors to accommodate all of your internal SCSI devices.
8-bit External SCSI Devices	• A 68-pin to 50-pin external converter. • A 50-pin Ultra external SCSI cable.
16-bit Internal SCSI Devices	• A 68-pin Ultra Wide internal SCSI cable with enough connectors to accommodate all of your internal SCSI devices.
16-bit External SCSI Devices[1]	• A 68-pin Ultra Wide External SCSI cable for each device.
16-bit External Array Enclosure[1]	• A 68-pin Ultra Wide External SCSI cable.
8-bit External Array Enclosure	• A 68-pin to 50-pin external converter. • A 50-pin Ultra external SCSI cable.

[1] Use only high-quality external cables with a single-ended impedance range of 80-110 ohms.

Connecting Internal SCSI Devices

Follow these steps to connect internal devices:

1. Prepare each SCSI device for installation:
   - Make sure each device (internal and external) is assigned a unique SCSI ID number from 0 to 15—no duplicate IDs are permitted on a channel. Do not assign SCSI ID 7, because each SCSI channel uses this ID by default. (See *SCSI ID Numbers* on page 2-14 for additional information.)
   - Install (or enable) the terminators on the internal device you are attaching to the end of the cable only. (See *SCSI Termination* on page 2-14 for additional information.)
2. Install and mount each internal SCSI device in an available drive bay inside your computer. (Refer to your computer and device documentation for instructions.)
3. If you are connecting 8-bit internal SCSI devices, attach one end of the 50-pin cable to the 50-pin internal SCSI connector on the AAA-130 Series adapter. If you are connecting 16-bit internal SCSI devices, attach one end of the 68-pin cable to the 68-pin internal SCSI connector on the AAA-130 Series adapter.

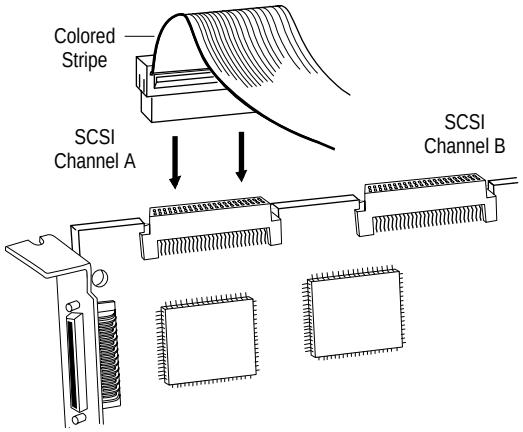

Figure 2-6. Attaching 68-pin Internal Ribbon Cable

Note: *Do not* connect SCSI devices to all three Channel A SCSI connectors on the AAA-132/133. To ensure proper termination, only two of the three Channel A connectors can be used at the same time.

4 Attach the remaining connectors on the cable to the remaining internal devices.

5 Connect an available DC power cable (from your computer's power supply) to the power input connector on each SCSI device.

Connecting External SCSI Devices

For each external SCSI device, you must obtain a high-quality external cable with a single-ended impedance range of 80-110 ohms. For additional information on cabling SCSI devices, see *Installation Hints for Connecting SCSI Devices* on page 2-13. Follow these steps to connect external SCSI devices:

1 Make sure each device (internal and external) is assigned a unique SCSI ID number from 0 to 15—no duplicate IDs are permitted on a channel. (See *SCSI ID Numbers* on page 2-14 for additional information.)

2 Attach one end of the 68-pin cable to the 68-pin Ultra Wide external SCSI connector on the adapter (shown in Figure 2-7.)

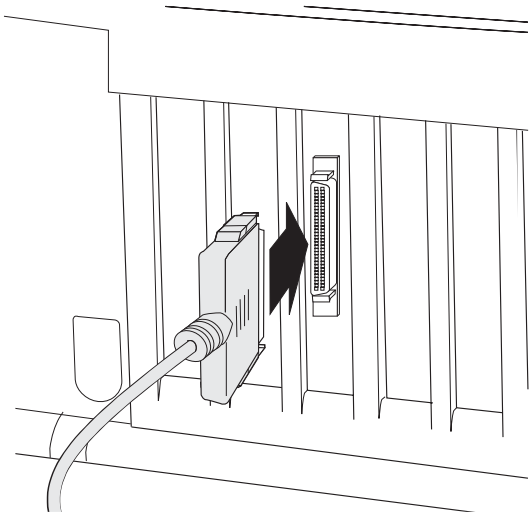

Figure 2-7. Attaching an External Cable to the External SCSI Connector

3 Attach the connector at the other end of the cable to either one of the SCSI connectors on the external SCSI device, as shown in Figure 2-8. (If you are installing only one external device, attach an active terminator to the device.)

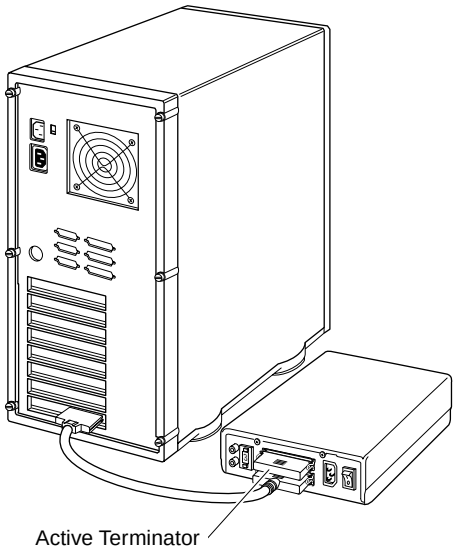

Figure 2-8. Attaching a Single External Device

4 Connect other external SCSI devices by daisy-chaining each device to the previous device until all external SCSI devices have been connected, as shown in Figure 2-9. (The device at the end of the chain must have an active terminator installed. See *SCSI Termination* on page 2-14 for additional information.)

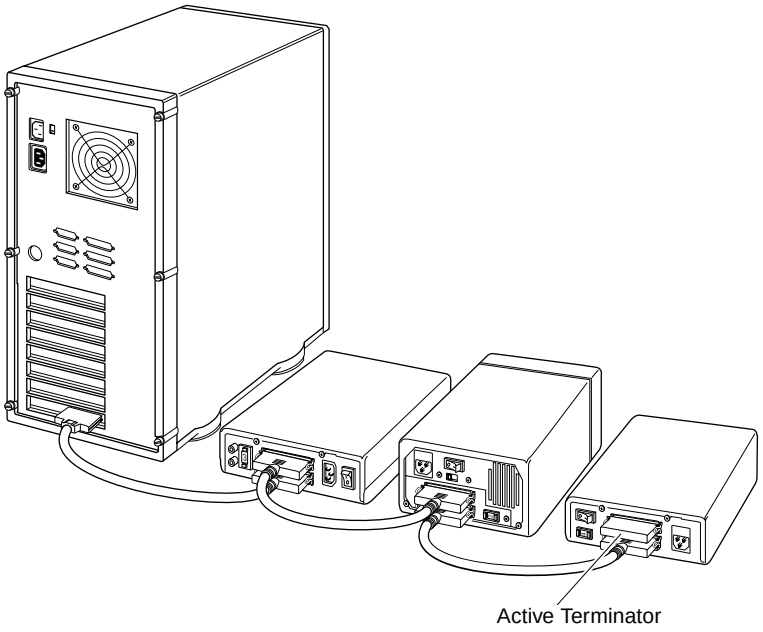

Figure 2-9. Attaching Multiple External Devices

Connecting External SCSI Array Enclosures (Storage Subsystems)

To help you conveniently manage your SCSI storage subsystems, a variety of external array enclosures are available from different manufacturers. Figure 2-10 shows a typical setup between the array enclosure and the server. To install your SCSI devices in these enclosures, refer to the enclosure's documentation. The following information is provided to help you properly connect your enclosure to the server: (See Appendix E, *Listing of Vendors* for a list of popular array storage enclosure and disk drive manufacturers.)

- All rules for SCSI ID and termination must be followed when installing SCSI devices in an array enclosure.
- Ideally, the array enclosure itself should provide termination capability, either on the SCSI backplane or with an attachable active terminator, as shown in Figure 2-10, and you should disable termination on all the drives in the enclosure. If you terminate the SCSI bus by enabling termination on a drive, you may run into problems if you have to replace that drive and you then forget to terminate the replacement drive.
- If the enclosure you are using for the array drives is not specifically designed as a array enclosure (such as a standard *tower* unit), be sure it has adequate cooling and ventilation.

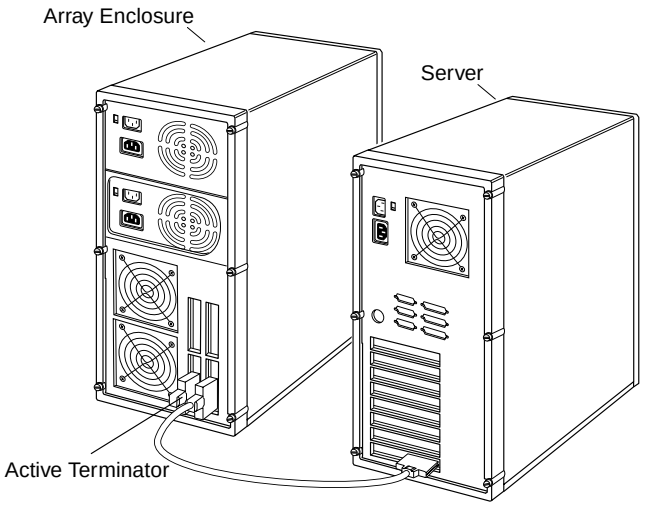

Figure 2-10. A Typical Array Enclosure Setup

Installation Hints for Connecting SCSI Devices

All SCSI Devices

- If you are booting your server from a single SCSI hard disk drive or bootable array, the boot order (or *virtual device order*) of the disk or array must be set to 0. (See *Making the Array Bootable* on page 3-5.)
- Enable termination power on all SCSI devices in the server so that if you remove a drive that is supplying termination power other devices will still provide it.
- Symptoms of SCSI cabling-related problems are drives not being recognized, drives locking up, or drives that deactivate.
- Use good-quality SCSI cabling, and minimize the stub lengths. Good-quality cables should not be limp when you pick them up.

Cable Lengths

- The total length of cabling (internal and external) on each SCSI channel should not exceed the following:
  - Three m (9.8 ft) if you are using Fast SCSI data transfer rates (10 MBytes / sec).
  - Three m (9.8 ft) if you are using Ultra*SCSI* data transfer rates (20 MBytes / sec for 8-bit devices, and 40 MBytes / sec for 16-bit devices) and have four or less devices (including the Array controller).
  - One and one-half m (4.9 ft) if you are using Ultra*SCSI* data transfer rates and have between four and eight devices (including the Array controller).

Note: Ultra*SCSI* data transfer rates do not currently support more than eight devices per channel.

  - Six m (19.7 ft) if you are using 5-MByte / sec asynchronous or synchronous data transfer rates.
- When calculating the total length of the bus, be sure to include the cabling inside any array enclosure.

SCSI ID Numbers

Each device attached to a SCSI channel on the AAA-130 Series adapter, as well as the SCSI channel itself, must be assigned a unique SCSI ID number from 0 to 15—no duplicate IDs are permitted on a channel.

- We recommend that you leave each adapter channel set to its default setting of SCSI ID 7.
- SCSI ID 7 has the highest priority on the channel. The priority of the remaining IDs, in descending order, is 6 to 0, then 15 to 8.
- If you have 8-bit SCSI devices, they must use SCSI IDs 0, 1, 2, 3, 4, 5, or 6. (To change the SCSI ID on your hard disk and other SCSI devices, refer to the device's documentation.)
- If you wish to use a single SCSI disk drive (instead of an array) as your boot device, we recommend that you set the SCSI ID for the device to zero.
- In general, use lower SCSI IDs for single disks; and use higher SCSI IDs for drives used as array members or spares.

SCSI Termination

To ensure reliable communication on the SCSI bus, *terminators* must be installed (or enabled) on the devices at the physical ends of each SCSI channel. The terminators on all devices between the physical ends must be removed (or disabled).

Terminating SCSI Channels on the AAA-130 Series Adapter

Termination on the AAA-130 Series adapter itself is controlled via the SCSI*Select* utility. We recommend that you leave each channel on the AAA-130 Series adapter set to its default setting of *Auto Mode* (the terminators are enabled or disabled according to the SCSI connectors in use). If you want to manually disable the AAA-130 Series adapter termination setting, see Chapter 7, *Configuring the AAA-130 Series Adapter with SCSISelect*.

Terminating SCSI Devices

On most internal SCSI devices the termination setting is controlled by setting a jumper or a switch, or by physically removing or installing a resistor module(s). On most external SCSI devices, termination is controlled by installing or removing a terminating plug (see Figures 2-8 and 2-9). Read the device's documentation to

determine how to enable or disable termination on your particular SCSI device.

The internal SCSI cables supplied in the Adaptec AAA-130 Series kits have attached terminators, so you should disable termination on all internal SCSI devices connected to the cable. In general, we recommend that you terminate the internal cable instead of terminating the SCSI devices. If you are using an external array enclosure, we recommend that you terminate the SCSI backplane or install an active terminator on the second SCSI connector on the rear panel instead of terminating the individual SCSI devices. If you follow these recommendations, SCSI bus termination will not be affected when you remove or replace SCSI devices.

Note: We recommend that you enable termination power on all SCSI devices in the server so that termination power will still be supplied if you replace one or more drives on the SCSI bus.

Completing the Installation

Reinstall the computer cover and connect all power cables. To verify that the SCSI devices work properly, turn on the external SCSI devices first, then turn on the computer. When the computer boots, the adapter BIOS sign-on message should appear on the screen, and each device connected to the adapter should be listed. If the BIOS message does not appear, see Appendix A, *Troubleshooting*.

Note: If you need to configure the SCSI options (e.g., ID, Parity Checking, and Termination) of your system after the AAA-130 Series adapter is installed, see Chapter 7, *Configuring the AAA-130 Series Adapter with SCSISelect*.

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Creating the First Array With the Array*Config* Initial Boot Array Installation Utility

This chapter explains how to use the Array*Config* Initial Boot Array Installation Utility to create the first bootable or non-bootable array on your server. Before creating the array, make sure the disks for the array are connected and installed in your server (or array enclosure).

Note: Array*Config* runs from a convenient, self-booting diskette. If you are changing the configuration of a server 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*.

Additional information on using Array*Config* to create, delete, and manage arrays and spares is available in the *Adaptec Array1000 Family Array Management Guide*.

Creating an Array

Follow these instructions to create the first array with Array*Config*:

1. Insert the Array*Config* diskette in the server's drive *A* and reboot the server. Array*Config* 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 from the list. 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 still safe. 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 still safe. The actual data capacity of the array equals half the total available disk space.

   See the *Adaptec Array1000 Family Array Management Guide* for more information on selecting a RAID level.
6. Type 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 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 (if necessary) press **Tab** to select another channel and then select the drives from the SCSI IDs on 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 disks with partitions if they contain 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 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 When the Initialize Mode menu appears, select **Initialize Array to Zero**. Formatting begins immediately. 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 disk drives.

10 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 network server environments.

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

12 To create additional arrays (if disks are available), return to Step 3. When all arrays are created, exit from Array*Config*, remove the Array*Config* diskette, and reboot the server. After you reboot you can write data to the arrays.

At this point, you can make your initial array bootable as described in the next section.

For information on using Array*Config* to create, delete, and manage arrays and spares, refer to the *Adaptec Array1000 Family Array Management Guide*.

Making the Array Bootable

You can make the array bootable so that the server 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. We recommend that you make your initial array bootable. Follow these steps if you want the server to boot from the newly created array:

Note: The server 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 server to boot from a SCSI disk or array.

1. Insert the Array*Config* diskette in the server's floppy disk drive *A*.
2. Reboot the server from the diskette. Array*Config* 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*, remove the diskette from drive *A*, and reboot the server.
8. Prepare the array as you normally would prepare a boot disk drive for your operating system. See Chapter 4, *Installing Software on a Windows NT System* or Chapter 5, *Installing Software on a Novell NetWare Server*.

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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Installing Software on a Windows NT System

This chapter explains how to install the software required to use the AAA-130 Series in a system using Windows NT 3.51 or 4.0. Before installing the software, make sure the AAA-130 Series adapter is already installed. If you plan to boot from an array, make sure the array is already created. To install all of the software, you must complete the following in the order presented:

- Install the *cda1000.sys* driver for Windows NT
- Install the Adaptec CI/O Array Management Software for Windows NT

Once all software is installed, refer to the *Adaptec Array1000 Family Array Management Guide* for instructions on adding, deleting, and managing your arrays.

Note: If your server has an Adaptec AHA-2940, AHA-3940 or any other AIC™-78x0 based host adapter installed), the *aic78xx.sys* driver for these host adapters must be from the Adaptec 7800 Family Manager Set v1.3 or later.

Installing the Array1000 Driver for Windows NT

This section explains how to install the Adaptec Array1000 Miniport Driver (*cda1000.sys*) for Windows NT. To begin driver installation, see either *Installing the Driver When Installing Windows NT* below, or *Installing the Driver When Windows NT is Already Installed* on page 4-4.

Note: We recommend that you install your Windows NT operating system on an array to take advantage of the redundancy and performance features of the array.

Installing the Driver When Installing Windows NT

To install the *cda1000.sys* driver when you are installing Windows NT, follow the instructions below for the version of Windows NT you are installing.

Note: If you have multiple arrays, we recommend temporarily powering off all devices except for the boot array before installing Windows NT; otherwise, Windows NT limits the size of the partitions you can create to 1 GByte. When Windows NT installation is complete, power on all devices and reboot the system.

Windows NT 3.51

To install the *cda1000.sys* driver when you are installing Windows NT 3.51, follow these steps:

1. If you are installing Windows NT from a floppy drive, locate the Windows NT Setup Disk 1 for Floppy Installation.

   If you are installing from a CD-ROM drive, locate the Windows NT Setup Disk 1 for CD-ROM Installation.
2. Insert the diskette into drive *A* (not drive *B*) and turn ON your computer. When prompted, insert Windows NT Disk 2.
3. From the Welcome to Setup Screen, press **Enter** to set up Windows NT.
4. When prompted, select **Custom** setup.

5 Press **S** to skip mass storage device detection. This allows you to manually select the driver for your host adapter.

6 Since mass storage device detection was skipped in the previous step, Windows NT Setup displays none in the list of recognized devices. Press **S** to configure additional SCSI adapters.

7 From the list of additional SCSI adapters, expand the list, select **Other,** and press **Enter**.

8 Insert the Adaptec Array1000 Family Manager Set drivers diskette into drive *A* and press **Enter**.

9 Browse to the *a:\winnt* directory. The screen displays the adapter drivers supported on the diskette. The Adaptec Array1000 Family Adapter driver is highlighted by default; press **Enter.**

10 If you want to add drivers for other host adapters (other than the AAA-130 Series), do so at this time by repeating Step 7 for each additional adapter and inserting the appropriate disk provided by the hardware manufacturer.

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

Windows NT 4.0

To install the *cda1000.sys* driver when you are installing Windows NT 4.0, follow these steps:

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: To install Windows NT from a bootable CD-ROM, make sure BIOS Support for Bootable CD-ROM is *enabled* in SCSI*Select*. See Chapter 7, *Configuring the AAA-130 Series Adapter with SCSISelect*.

2 *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.

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's hardware…

3 Press **S** to skip auto-detection of your AAA-130 Series array adapter.

4 Press **S** again to specify an additional device.

5 Press **Enter** to select Others; insert the Adaptec Array1000 Family Manager Set drivers diskette in your floppy drive.

6 The screen displays the adapter drivers supported on the diskette. Select the Adaptec Array1000 Family Adapter and press **Enter**.

7 If you want to add drivers for other host adapters (other than the AAA-130 Series), do so at this time by pressing **S** and repeating Step 5 for each additional adapter and inserting the appropriate disk provided by the hardware manufacturer.

8 Press **Enter** to continue with the Windows NT operating system setup. Follow the onscreen instructions 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 the instructions below for the version of Windows NT that is already installed.

Windows NT 3.51

To install the *cda1000.sys* driver when Windows NT 3.51 is already installed, follow these steps:

1 Start the Windows NT Setup program. (Its icon is usually found in the Main program group.) There is a brief pause while Windows NT Setup scans your hardware configuration.

2. Select the **Options** menu and then select **Add/Remove SCSI Adapters**. The SCSI Adapter Setup program displays a list of all host adapters currently installed.
3. Click **Add** to add another host adapter type to the list. A list of additional SCSI adapters appears.
4. Expand the list of additional SCSI adapters. Select **Other**, and press **Enter**.
5. Insert the Adaptec Array1000 Family Manager Set drivers diskette into drive *A*. Enter the following path to the installation files and then click **OK**:

   a:\winnt

6. The screen displays the adapter drivers supported on the diskette. The Adaptec Array1000 Family Adapter driver is highlighted by default; click **OK**. The driver is added to the list of SCSI adapters.
7. Select Adaptec Array1000 Family Adapter from the list of SCSI adapters, and click **Install**. At this point, Windows NT Setup checks if the specified driver (in this example, *cda1000.sys*) has already been copied to the system disk.
8. If the following message appears, click **New** to replace the existing driver and skip to Step 10:

   The driver(s) for this SCSI Adapter are already on the system. Do you want to use the currently installed driver(s) or install new one(s).

   If the following message appears, continue with Step 9:

   Please enter the full path to the Windows NT SCSI Adapter files

9. Change the path to the directory with the desired device driver (i.e., *a:\winnt*), and then click **Continue**. The device driver is copied to your system disk, and the Windows NT configuration is updated so that the new device driver loads when Windows NT reboots.
10. When the installation is complete, Windows NT Setup again displays a list of currently installed host adapter types. Verify that the new host adapter appears on the list; the text string should look similar to Adaptec Array1000 Family Adapter.

11 Add other types of host adapters if necessary (see Step 4 above), or click **Close** to exit the SCSI adapters portion of Windows NT Setup, and then close the program.

12 When you see this message, click **OK** to exit:

> The changes you have made will not take effect until the computer is restarted

If this message does not appear, no changes have been made to the Windows NT system configuration.

13 Restart your computer and Windows NT. Some drive letter assignments may change from the previous configuration.

Windows NT 4.0

To install the *cda1000.sys* driver when Windows NT 4.0 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 Adaptec Array1000 Family Manager Set drivers diskette into drive *A*; enter the following path to the installation files and then click **OK**.

> a:\winnt

The Adaptec Array1000 Family Adapter is highlighted by default.

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

9 Click the **New** button when asked if you want to use the currently installed driver(s) or install new one(s).

10 Type a:\winnt again, and click **Continue**. The driver is now installed.

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

Installing Adaptec CI/O Array Management Software for Windows NT

Follow these steps to install the Adaptec CI/O Array Management Software for Windows NT:

1. Start Windows NT.
2. Insert the Adaptec CI/O Array Management Software CD-ROM in your CD-ROM drive. If you are installing the software from diskettes, insert Disk 1 of the Adaptec CI/O Array Management Software for Windows NT in the floppy disk drive.
3. Select **Run** from the File menu (Windows NT 4.0 users select **Start**, and then **Run**), type the following and press **Enter**:

   *[pathname]*setup.exe

   (The *setup.exe* file is located at *\win_nt\disk1\setup.exe* on the CD-ROM, and at *\setup.exe* on Disk 1 of the Adaptec CI/O Array Management Software for Windows NT.)
4. Follow the directions that appear on the screen.
5. When installation is complete, reboot the system. The following NT Services start automatically in the background:

   CIO Array Management Service
   CIOArrayManager RPC Command
   CIOArrayManager RPC Event
   NobleNet Portmapper

Note: These NT Services are configured to start automatically at boot time. After installation you can start or stop these services through the Services icon in the Windows NT Control Panel.

6 Double-click the CI/O Array Management Software icon to start the program.

See the *Adaptec Array1000 Family Array Management Guide* for information on using the Adaptec CI/O Array Management Software to add, delete, or manage your arrays. If you are experiencing problems starting the software, see *Problems Running the Software On Your Windows NT Server* on page A-2.

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5

Installing Software on a Novell NetWare Server

This chapter explains how to install the software required to use the AAA-130 Series in a Novell NetWare (NetWare v3.12, 4.1, and 4.11) server. Before installing the software, make sure the AAA-130 Series is already installed. If you plan to boot from an array, make sure the array is already created. To install all of the software, you must complete the following in the order presented:

- Install the *cda1000.dsk* driver for Novell NetWare
- Install the TIRPC Communications Module
- Install the Adaptec CI/O Array Management Software for Novell NetWare

Once all software is installed, refer to the *Adaptec Array 1000 Family Array Management Guide* for instructions on adding, deleting, and managing your arrays from the server console.

Installing the Array1000 Driver for Novell NetWare

This section explains how to install the Adaptec Array1000 driver (*cda1000.dsk*) for NetWare. To begin driver installation, see either *Installing the Driver When Installing NetWare* below, or *Installing the Driver When NetWare is Already Installed* on page 5-4.

Note: We recommend that you install your Novell NetWare operating system on an array to take advantage of the redundancy and performance features of the array.

Installing the Driver When Installing NetWare

To install the *cda1000.dsk* driver when you are installing NetWare, follow the instructions below for the version of NetWare you are installing.

NetWare 4.1 and 4.11

Follow these instructions only if you are installing NetWare 4.1 or 4.11 for the first time:

1. Begin installation of NetWare 4.1 on your server as instructed in your NetWare documentation.
1. Follow the procedures in your NetWare documentation for installing a new server. (For information on using a CD-ROM drive on a NetWare server, see Appendix C, *Using a CD-ROM Drive* in this installation guide.)
2. When a screen appears that asks you to select a disk driver, press **Insert**.
3. Insert the Adaptec Array 1000 Family Manager Set drivers diskette into your disk drive.
4. Press **F3** and specify the path to the *cda1000.dsk* driver. For NetWare, the driver is located in *\netware\v4_1x* on the diskette.
5. Select *cda1000.dsk* and press **Enter**.
6. Specify the server's startup directory (usually *c:\nwserver* for NetWare 4.1) and press **Enter**. The *install* program copies the necessary files to this directory.

7 Select **Continue the Installation** to complete the installation.

Note: To load the driver automatically at server bootup, make sure the *startup.ncf* file includes the load command line for the *cda1000.dsk* driver. (If you also have an Adaptec host adapter that uses the Adaptec *aic78xx.dsk* driver, make sure the driver loads after the *cda1000.dsk* driver.)

NetWare 3.12

Follow these instruction only if you are installing NetWare 3.12 for the first time:

1 Follow the procedures in your NetWare documentation for installing a new server. (For information on using a CD-ROM drive on a NetWare server, see Appendix C, *Using a CD-ROM Drive* in this installation guide.)

2 When you see the NetWare colon prompt (:), use the load command to install the driver from the Adaptec Array 1000 Family Manager Set drivers diskette.

The correct syntax to load the *cda1000.dsk* driver is

:load [*pathname*]cda1000

(For example, :load a:\netware\v3_1x\cda1000)

Note: To load the drivers automatically at server bootup, copy the *aspitran.dsk* and *cda1000.dsk* drivers to the server's startup directory and modify the *startup.ncf* so that the proper path to the driver is specified.

The *aspitran.dsk* driver must reside in the same path as *cda1000.dsk*, because NetWare attempts to load this file automatically. If you also have an Adaptec host adapter that uses the Adaptec *aic78xx.dsk* driver, make sure the driver loads after the *cda1000.dsk* driver.

3 Load the NetWare *install* program from the NetWare colon prompt (:load install). Follow the instructions in the NetWare documentation to complete the installation (e.g., creating disk partitions, system volumes, etc.) of your server.

Installing the Driver When NetWare is Already Installed

To update or install the *cda1000.dsk* driver if NetWare is already installed, follow the instructions in this section. The procedures are similar for all versions of NetWare. Procedures that are specific to a NetWare version are noted when necessary.

1 Copy the *cda1000.dsk* and *aspitran.dsk* files from the Adaptec Array 1000 Family Manager Set drivers diskette into the server's startup directory (e.g., *c:\nwserver, c:\server.40, c:\server.312*) on your hard disk.

Note: For NetWare 3.12, the *cda1000.dsk* and *aspitran.dsk* files are located in the *\netware\v3_1x* subdirectory on the diskette; for NetWare 4.1, the files are in *\netware\v4_xx*.

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 *cda1000.dsk* driver is

load [*pathname*]cda1000

Note: If you unload *cda1000.dsk* driver, you must also unload *cioams.nlm*. When you load *cda1000.dsk* driver again, you must also load *cioams.nlm*. If *cioams.nlm* is not unloaded when you unload *cda1000.dsk*, your system may work erratically.

Installing the TIRPC Communications Module

The TIRPC communications module must be installed before you install the Adaptec CI/O Array Management Software. The module allows communications between the server and remote clients. Follow the instructions below for the version of NetWare installed.

NetWare 3.12

1. Insert the Adaptec CI/O Array Management Software CD-ROM in your CD-ROM drive. If you are installing the software from diskettes, insert Disk 1 of the Adaptec CI/O Array Management Software for NetWare (TIRPC).
2. From the NetWare colon prompt (:), type the following and press **Enter**:

   load install

3. Select **Product Options** from the Installation Options Menu.
4. Press the **<Ins>** key.
5. Enter the path to the CD-ROM or Disk 1 (do not include the backslash).
6. Select **NetWare 3.x TIRPC Runtime and Configuration Files**. (TIRPC must be installed in the *sys:system* directory only.)

NetWare 4.1 and 4.11

1. Insert the Adaptec CI/O Array Management Software CD-ROM in your CD-ROM drive. If you are installing the software from diskettes, insert Disk 1 of the Adaptec CI/O Array Management Software for NetWare (TIRPC).
2. From the NetWare colon prompt (:), type the following and press **Enter**:

   load install

3. Select **Product Options** from the Installation Options Menu.
4. Select **Install a Product Not Listed**.
5. Press **<F3>** key.

6 Enter the path to the CD-ROM or Disk 1 (include the back-slash).

7 Select **NetWare 4.0 TIRPC Runtime and Configuration Files**. (TIRPC must be installed in the *sys:system* directory only.)

Installing the Adaptec CI/O Array Management Software for Novell NetWare

Follow these steps to install the Adaptec CI/O Array Management Software for Novell NetWare:

1 Insert the Adaptec CI/O Array Management Software CD-ROM in your CD-ROM drive. If you are installing the software from diskettes, insert Disk 2 of the Adaptec CI/O Array Management Software for NetWare in the floppy disk drive.

2 From the NetWare colon prompt (:), type the following and press **Enter**:

load *[pathname]*nwsetup

(The *nwsetup* NLM is located at *\netware\disk2\nwsetup.nlm* on the CD-ROM, and at *\nwsetup.nlm* on Disk 2 of the Adaptec CI/O Array Management Software for NetWare.)

Note: If you are using NetWare 3.12 or 4.10, you may receive a Failed to allocate resources error message at this point. This is because the CD-ROM (or floppy drive) is not part of the default search path. If this happens, you must add the CD-ROM or floppy drive to your search path by entering the following command before loading nwsetup:

search add *[pathname]*

3 From the NWSETUP Installation menu, select **Default Installation** or **Custom Installation** (press **F1** for help).

4 At the end of the installation process, select **Yes** when you are prompted to update the *autoexec.ncf* file. (This adds the appropriate NLM command lines to the file so that all software is automatically loaded when the server starts.)

See the *Adaptec Array 1000 Family Array Management Guide* for information on using the Adaptec CI/O Array Management Software to add, delete, or manage your arrays from your server console.

CI/O Array Management Software Installation Hints

- For communications supported over TCP/IP, the *tcpip.nlm* must be loaded and the IP protocol must be bound to a valid IP address. The IP protocol generally needs to be bound to an ethernet frame type, ETHERNET_II, which must be specified when loading the LAN driver. A LAN driver can be loaded multiple times for different ethernet frame types.
- Command lines similar to the following are automatically added to the *autoexec.ncf* file when you run the *nwsetup* utility:

```
#
# NWSETUP LAST UPDATE XX-XX-XX
#
IOMGR.NCF
IOMGRSRV.NCF
RPCSTART
IOMGRRPC.NCF
```

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6

Installing Software on a Remote Client

This chapter explains how to install the Adaptec CI/O Array Management Software on a network client running under Windows® (Windows 3.11, Windows® 95, and Windows NT 3.51 or 4.0). Once installed, refer to the *Adaptec Array 1000 Family Array Management Guide* for instructions on using the software.

Note: Installation of Adaptec CI/O Array Management Software on a network client is optional since all functions of the software performed at the client can also be performed at the server console. If you want the capability to manage your arrays on the server from the networked client, continue with the remainder of this chapter.

Installing Adaptec CI/O Array Management Software

Follow these steps to install the software:

Note: Before you install the Adaptec CI/O Array Management Software, be sure that communication with the server via the network is already established. As long as communication is established, it is not a requirement to log-on to the server to install the software and to monitor the server via the network. (See the documentation provided with your TCP/IP or SPX/IPX software for instructions on establishing communications, and also *Hints for Establishing Communications With Your Server* on page 6-3.)

1. Start Windows on the client.
2. Insert the Adaptec CI/O Array Management CD-ROM in your CD-ROM drive. If you are installing the software from diskettes, insert Disk 1 of the Adaptec CI/O Array Management Software for Windows 3.11, Windows 95, and Windows NT Clients.
3. Select **Run** from the File menu (Windows 95 and NT users select **Start**, and then **Run**), type the following and press **Enter**.

   *[pathname]*setup.exe

   (The *setup.exe* file is located in *\win_3x\disk1\setup.exe* on the CD-ROM, and in *\setup.exe* on Disk 1 of the Adaptec CI/O Array Management Software for Windows 3.11, Windows 95, and Windows NT Clients.)
4. Follow the directions that appear on the screen.

   During installation you will be prompted to enter the host name of the client PC. If you do not know the host name, you can add the information later by inserting a line in the *autoexec.bat* file. Instructions for this step appear on the screen during installation.

See the *Adaptec Array 1000 Family Array Management Guide* for information on using the Adaptec CI/O Array Management Software to add, delete, or manage your arrays from the remote client.

Note: You must have the proper level of Adaptec CI/O Array Management Software password authorization if you want to add and delete arrays and spares from a networked client. See the *Adaptec Array 1000 Family Array Management Guide* for information on setting security options.

Hints for Establishing Communications With Your Server

Communication with the server via the network must be established prior to installing the Adaptec CI/O Array Management Software on a networked client. The following information is provided to help you set up proper communication:

TCP/IP Networks

- When installing your TCP/IP software (not provided by Adaptec), follow the installation instructions provided with your TCP/IP software. You will be asked to enter information such as IP address, host name, host file, etc.
- The TCP/IP stack uses the *host name* from TCP/IP setup.

SPX/IPX Networks

- On an SPX/IPX network, make sure to install the NetWare Client Software for Windows (provided by Microsoft). During installation, certain DLLs required by the Adaptec CI/O Array Management Software are installed.
- The *host name* is identified through the SET RPCHOST= environment variable. You can enter this variable through the setup process, or you can manually add it to the *autoexec.bat* file.

Note: Under dual stack situations, we recommend using the same *host name* for both TCP/IP and SPX/IPX to minimize any naming confusion.

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7

Configuring the AAA-130 Series Adapter with SCSI*Select*

The AAA-130 Series adapter has the onboard SCSI*Select* configuration utility, which allows you to change adapter settings without opening the computer or handling the adapter. This chapter describes the default settings, explains when you should change them, and gives instructions for doing so.

SCSI*Select* also includes SCSI disk utilities to list the SCSI IDs of devices on the AAA-130 Series adapter, format SCSI disk drives, and check them for defects. Instructions for using these utilities are included.

Default AAA-130 Series Adapter Settings

The default SCSI*Select* settings, shown in the table below, are appropriate for most systems. For situations where you might want or need to change the settings, see the descriptions of each setting beginning on page 7-5. To change any setting, or if you would like to run the SCSI*Select* utilities, see *Starting the SCSISelect Utility* on page 7-3.

SCSI Bus Interface Definitions	**Default**
Host Adapter SCSI ID	7
SCSI Parity Checking	Enabled
Host Adapter SCSI Termination	Auto Mode
Host Adapter UltraSCSI	Disabled
Additional Options (SCSI Device Configuration)	**Default**
Initiate Sync Negotiation	Yes (Enabled)
Maximum Synchronous Transfer Rate	20.0 MBytes/ sec.[1]
Enable Disconnection	Yes (Enabled)
Initiate Wide Negotiation	Yes (Enabled)
Send Start Unit Command	No (Disabled)
Include In BIOS Scan	Yes (Enabled)
Additional Options	**Default**
Array 1000 BIOS	Enabled
BIOS Support for Bootable CD-ROM	Disabled

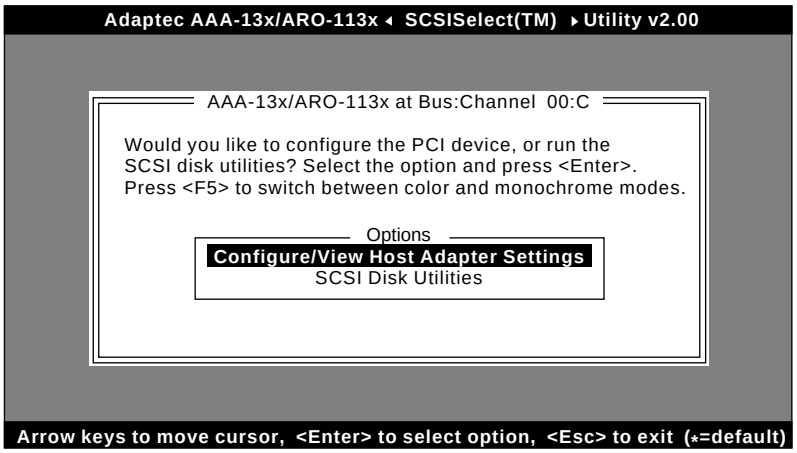
[1] This is 10 Mbytes/sec if Wide Negotiation is not enabled.

Starting the SCSI*Select* Utility

To start SCSI*Select*, press **Ctrl-A** when the following prompt appears when you turn on or reboot your computer:

Press <Ctrl><A> for SCSISelect (TM) Utility!

The menu that appears displays the options Configure/View Host Adapter Settings and SCSI Disk Utilities.



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 main SCSI*Select* screen. To toggle the display between color and monochrome modes, press **F5** from the main SCSI*Select* screen (this feature may not work on all 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 computer. Any changes you made in SCSI*Select* take effect after the computer 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.

- **Array Adapter SCSI ID**— This option sets the array adapter's SCSI ID. The default setting is SCSI ID *7*, which gives the adapter the highest priority on the SCSI bus. We recommend that you leave the AAA-130 Series adapter set to SCSI ID 7.
- **SCSI Parity Checking**—This option determines whether the AAA-130 Series adapter verifies the accuracy of data transfer on the SCSI bus. The default setting is *Enabled*. You should disable SCSI Parity Checking on the adapter and all SCSI devices if any SCSI device connected to the adapter 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.
- **Array Adapter SCSI Termination**—This option sets termination on the AAA-130 Series adapter. The default setting is *Auto Mode*. This means the adapter will detect whether internal or external SCSI devices are connected to it and whether they are Wide or Narrow SCSI devices. The adapter will then adjust its termination accordingly. Under normal operation, you should never need to change this setting.
- **Array Adapter UltraSCSI**—This option determines whether the adapter supports UltraSCSI devices. The default setting is *Disabled*. If you have any installed UltraSCSI devices installed, you should enable this setting. When this setting is enabled, the adapter negotiates for data transfer speeds of up to 20 MBytes / sec. (or 40 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 to the adapter. The quality of the cable is much more critical when you use higher-speed data transfer. See *Installation Hints for Connecting SCSI Devices* on page 2-13 for additional information on cabling SCSI devices.

Additional Options (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 7-4.

- **Initiate Sync Negotiation**—This option determines whether synchronous data transfer negotiation (Sync Negotiation) between the device and AAA-130 Series adapter is initiated by the adapter. Normally, you should leave the Initiate Sync Negotiation setting enabled, because most SCSI devices support synchronous negotiation and because it allows for faster data transfer. The default setting is *Yes*.
- **Maximum Sync Transfer Rate**—This option determines the maximum synchronous data transfer rate that the AAA-130 Series adapter supports. The default setting is 10.0 MBytes / sec. (The effective data transfer rate is doubled when Initiate Wide Negotiation is set to *Yes*. For example, a transfer rate of 10 MBytes / sec becomes 20 MBytes / sec.)
- **Enable Disconnection**—This option determines whether the AAA-130 Series adapter allows the SCSI device to disconnect from the SCSI bus (sometimes called Disconnect / Reconnect). The default setting is *Yes*.

  You should leave Enable Disconnection set to *Yes* if two or more SCSI devices are connected to the adapter. If only one SCSI device is connected to the adapter, you can set Enable Disconnection to *No* to achieve slightly better performance.
- **Initiate Wide Negotiation**—This option determines whether the AAA-130 Series adapter attempts 16-bit data transfer instead of 8-bit data transfer. The default setting Yes. (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.)

- **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). The default setting is *No*.
- **Include in BIOS Scan**—This option determines whether the AAA-130 Series BIOS controls hard disk drives connected to the adapter. When set to *Yes*, the BIOS controls the hard disk drive. When set to *No*, the BIOS does not control the hard disk drive, and device driver software is needed to control the device. The default setting is *Yes*. You should leave the setting at the default for all drives that are part of an array.

Additional Options

Array1000 BIOS

This option determines whether the AAA-130 Series BIOS is installed at boot time. When set to *Enabled*, the AAA-130 Series BIOS is installed, and all Int13 devices are supported. When set to *Disabled*, the AAA-130 Series BIOS is not installed. The default setting is *Enabled*.

BIOS Support for Bootable CD-ROM

This option determines whether the AAA-130 Series BIOS supports booting from a CD_ROM drive. When set to *Enabled*, the AAA-130 Series BIOS allows booting from a CD-ROM drive.

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Troubleshooting

Troubleshooting Checklist

Check the following if you have problems installing or running the AAA-130 Series adapter and SCSI devices:

- Does the AAA-130 Series BIOS sign-on message appear during bootup? If not, check the following items:
  - Is the AAA-130 Series adapter properly seated in a PCI 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.
  - Does the motherboard chipset meet the minimum requirements listed on page 1-2 (especially PCI-to-PCI bridge support)? If not, contact your vendor for a motherboard firmware upgrade.
- 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 that the boot partition is active.

Problems Running the Software On Your Windows NT Server

If the Adaptec CI/O Array Management Software does not start when you double-click the program icon and you see a warning box with Unable to Initialize IOMAPI, try the following:

- Verify that the following NT services have a status of *Started* (double-click the **Services** icon in Control Panel). If they do not, select each service and press the **Start** button:

  CIO Array Management Service
  CIOArrayManager RPC Command
  CIOArrayManager RPC Event
  NobleNet Portmapper

- Make sure you have the proper security access rights to the Windows NT services. The Windows NT Services can be started, stopped, paused, etc., by different users (administrators, power users, local users, etc.) according to the NT service security rules defined by Microsoft (refer to the Windows NT documentation for more details).

- Verify that the Registry was updated correctly during installation. If the values do not match the values listed below, try reinstalling the Adaptec CI/O Array Management Software.

  The correct entries for *HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIOArrayManagement* are:

  DisplayName: REG_SZ: CIO Array Management Service (v x.xx)
  ErrorControl: REG_DWORD: 0x01
  ImagePath: REG_SZ: [*Pathname specified during installation*]iomgr.exe
  ObjectName: REG_SZ: LocalSystem
  Start: REG_DWORD: 0x02

Type: REG_DWORD: 0x110
SharedMemName: REG_SZ: iomgr.shm

The correct entries for *HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\EventLog\System\CIOArrayManagement* are:

EventMessageFile: REG_SZ: [*pathname to system32 directory*]\system32\iomgrmsg.dll
TypesSupported: REG_DWORD: 0x7

The correct entries for *HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\NobleNetPortmapper* are:

DisplayName: REG_SZ: NobleNet Portmapper
ErrorConrol: REG_DWORD: 0x1
ImagePath: REG_EXPAND_SZ: Absolute Path of "ports-erv.exe"
ObjectName: REG_SZ : LocalSystem
Start: REG_DWORD : 0x02
Type: REG_DWORD : 0x10

The correct entries for *HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIOArrayManager RPC Command* are:

DependOnService: REG_MULTI_SZ: NobleNet Portmapper CIOArrayManagement
DisplayName: REG_SZ: CIOArrayManager RPC Command
ErrorControl: REG_DWORD: 0x1
ImagePath: REG_EXPAND_SZ: Absolute Path of "iomrpccm.exe"
ObjectName: REG_SZ : LocalSystem
Start: REG_DWORD : 0x02
Type: REG_DWORD : 0x10

The correct entries for *HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIOArrayManager RPC Event* are:

DependOnService: REG_MULTI_SZ: CIOArrayManagement CIOArrayManager RPC Command
DisplayName:REG_SZ: CIOArrayManager RPC Event
ErrorControl: REG_DWORD: 0x1

ImagePath: REG_EXPAND_SZ: Absolute Path of "iomrpcev.exe"
ObjectName: REG_SZ : LocalSystem
Start: REG_DWORD : 0x02
Type: REG_DWORD : 0x10

- Verify that the following DLLs are located in your *system32* directory. If they are not present, try reinstalling the Adaptec CI/O Array Management Software:

  ctl3dnt.dll
  xnmhb420.dll
  xnmhn420.dll
  xnmte420.dll
  ezrpcw32.dll
  winrpc32.dll
  msvcrt20.dll
  mtld.dll
  xnmba420.dll
  iomgrmsg.dll

- Verify that the following files are located in the directory where you installed the Adaptec CI/O Array Management Software. If they are not present try reinstalling the software:

  iomgr.ems
  cioams.hlp
  cioams.exe
  portview.exe
  iomrpcev.exe
  iomrpccm.exe
  portserv.exe
  readme.txt
  iomgr.exe
  iomgr.ini
  iomgr.msg

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B

Advanced Topics

Installing Multiple Adapters

You can install an AAA-130 Series array adapter in computers that have other PCI-, ISA-, or EISA-based host adapters. When installing multiple adapters, keep the following considerations in mind:

- If you are booting from a SCSI disk drive or array supported by the AAA-130 Series adapter, then the adapter must be the card that the computer scans first. Usually, you need to determine by experimentation which PCI slot the computer scans first and then make sure the AAA-130 Series adapter is installed in that slot. Some computers boot from the device with the lowest PCI device number; others boot from the device with the highest number. If the system does not boot from the controller you want, move that controller to a different PCI slot and try again. Alternatively, you can disable the BIOS on controllers that are scanned before the desired boot controller. See *Making the Array Bootable* on page 3-5.
- 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 AAA-130 Series adapter's base address (the user has no control over the assigned address).

Migrating an Existing Adaptec AHA-398x/398xW Array

If you have an existing Adaptec AHA-398x / 398xW array running under NetWare, and would like to migrate the array to an AAA-130 Series array, follow these steps:

1. Backup all data on the existing array before installing the AAA-130 Series adapter.
2. Install the AAA-130 Series adapter, SCSI devices, and the existing array as described in Chapter 2, *Installing the AAA-130 Series Adapter and Connecting SCSI Devices*. Once the system is booted, the AAA-130 Series BIOS automatically converts the existing array to an AAA-130 Series adapter array; the data on the array should not be affected.

Note: You *cannot* revert back to using the older drives with an AHA-398x / 398xW for the array.

3. Install the new AAA-130 Series drivers and Adaptec CI / O Array Management Software as described in Chapter 4, *Installing Software on a Windows NT System* or Chapter 5, *Installing Software on a Novell NetWare Server*.
4. Remove the old AHA-398x / 398xW drivers (*aha3980.dsk* and *ardrvr.dsk*) and references to the driver in the *startup.ncf* and *autoexec.ncf* files. Also, remove references to all *aru*.** files (for example, *arumon.nlm*) in the *autoexec.ncf* file.

Note: Do not use any of the old array utilities with the AAA-130 Series adapter.

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Using a CD-ROM Drive

You may need to install a CD-ROM drive on your computer so you can load software. For example, NetWare 3.12, 4.1, and 4.11 are usually installed from a CD-ROM. The Array1000 Family Manager Set Drivers diskette contains the DOS and NetWare driver software necessary to use a CD-ROM connected to the AAA-130 Series adapter. With this software, the AAA-130 Series adapter supports

Using a CD-ROM with DOS

To operate a CD-ROM drive supported by the AAA-130 Series adapter under DOS, you need

- The SCSI driver, *aspi8dos.sys* (version 1.27 or later)
- The CD-ROM driver, *aspicd.sys*
- The Microsoft CD-ROM extensions, *mscdex.exe*

The *aspi8dos.sys* and *aspicd.sys* files must be copied from the Array 1000 Family Manager Set Drivers 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 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\aspi8dos.sys /d
device=c:\scsi\aspicd.sys /d:aspicd0
```

Sample Command Line for *autoexec.bat* File:

```
\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.)

The following tables describe the *aspi8dos* and *aspicd* 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 *aspi8dos.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 AAA-130 Series 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.

Using a CD-ROM with NetWare

To operate a CD-ROM drive connected to the AAA-130 Series under NetWare, you need the *aspicd.dsk* driver. The driver must be copied from the AAA-130 Series drivers diskette for NetWare to a directory on your hard disk.

Follow these steps to set up the CD-ROM drive under NetWare:

1. At the server prompt, enter

   load install

2. From the Installation Options menu, select **Available System Options** and then **Edit AUTOEXEC.NCF**.

3. Insert the following lines:

   load *[pathname]*aspicd.dsk
   load nwpa (NetWare 4.1 only)
   load npa312 (NetWare 3.12 only)
   load cdrom.nlm

4. Press the **Esc** key, save the changes, and exit the *install.nlm*.

5. Down the server normally and restart.

Note: To access your CD-ROM without restarting your server, simply enter each of the command lines listed in Step 3 at the server prompt (:); then proceed to Step 6.

6. At the server prompt (:), type cd device list and press **Enter**. A list of CD-ROM drives appears.

7. Write down the device number and volume name of the CD-ROM.

8. At the server prompt, enter

   cd mount <x> <name>

   where *<x>* is the device number and *<name>* is the volume name you wrote down in step 5.

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Obtaining SCSI Cables and Converters

High-quality cables are required in high-performance SCSI Array (RAID) systems to ensure data integrity. Adaptec provides the highest quality SCSI cables designed specifically for use with Adaptec AAA-130 Series PCI Array adapters. For purchasing information, contact Adaptec:

Adaptec, Inc.
691 S. Milpitas Boulevard
Milpitas, CA 95035
USA
Tel: (800) 442-7274

Adaptec Europe - Belgium
Tel: (32) 2-352-34-11
Fax: (32) 2-352-34-00

Adaptec Japan - Tokyo
Tel: (81) 3-5365-6700
Fax: (81) 3-5365-6950

Adaptec Singapore
Tel: (65) 278-7300
Fax: (65) 273-0163

See the following page for a list of SCSI cables and converters available directly from Adaptec.

External Cables

External Cables

Part Number	Connectors	Length
ACK-W2W-E	High-density 68-pin male to High-density 68-pin male	1 m

Internal Ribbon Cables

Internal Ribbon Cables

Part Number	Connectors	Length
ACK-F2F-5IT[1]	5 position (4 devices + SCSI Card), Standard 50-pin female connectors, terminated	2.1 m
ACK-W2W-5IT[1]	5 position (4 devices + SCSI Card), High-density 68-pin male connectors, terminated	1 m

[1] ACK-F2F-5IT and ACK-W2W-5IT have built-in active terminators which eliminate the need to terminate any internal SCSI devices

Converters

Cable Converters

Part Number	Description	Connectors
ACK-GCH2L	External Converter	High-density 50-pin female to Standard 50-pin female
ACK-68P-50P-E	External Converter	High-density 68-pin female to High-Density 50-pin male
ACK-68I-68E	Internal to External Converter	Internal High-density 68-pin male to External High-density 68-pin female
ACK-501-50E	Internal to External Converter	Internal Standard 50-pin female to External High-density 50-pin female

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Listing of Vendors

This appendix contains a partial listing of array storage enclosure and SCSI disk drive manufacturers.

Array Storage Enclosure Manufacturers

JMR Electronics, Inc.
20400 Plummer Street
Chatsworth, CA 91311
USA
Tel: (818) 993-4801
Fax: (818) 993-9173
Internet: *http://www.jmr.com*

Kingston Technology Corporation
17600 Newhope Street
Fountain Valley, CA 92708
USA
Tel (U.S.): (800) 435-0642
Fax (U.S.): (714) 438-1847
Tel (Intl): (714) 437-3334
Fax (Intl): (714) 438-1820
Internet: *http://www.kingston.com*

Trimm Technologies
350 Pilot Road
Las Vegas, NV 89119
USA
Tel: (800) 423-2024
Fax: (702) 361-6067
Internet: *http://www.trimm.com*

SCSI Disk Drive Manufacturers

Fujitsu Computer Products of America, Inc.
2904 Orchard Parkway
San Jose, CA 95134-2009
USA
Tel (U.S.): (800) 626-4686
Tel (Intl): (408) 432-6333
Internet: *http://www.fujitsu.com*

IBM Corporation
1 Old Orchard Road
Armonk, NY 10504
USA
Tel: (914) 765-1900
Internet: *http://www.ibm.com*

Quantum Corporation
500 McCarthy Boulevard
Milpitas, CA 95035
USA
Tel: (800) 624-5545
Internet: *http://www.quantum.com*

Seagate Technology, Inc.
920 Disc Drive
Scotts Valley, CA 95066
USA
Tel: (408) 438-6550
Fax: (408) 429-6356
Internet: *http://www.seagate.com*

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AAA-130 Series Installation and Hardware Guide
Stock Number: 511198-00, Rev. A Page: Index-2
Print Spec Number: 495456-00
Current Date: 3/3/99 ECN Date: 4/29/97

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AAA-130 Series Installation and Hardware Guide
Stock Number: 511198-00, Rev. A Page: Index-3
Print Spec Number: 495456-00
Current Date: 3/3/99 ECN Date: 4/29/97