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# User's Guide

# AHA-3940U / 3940UW / 3940UWD

**MultiChannel PCI-to-UltraSCSI Host Adapters with SCSI*Select* Utility**

AHA-3940U/3940UW/3940UWD User's Guide
Stock Number: 511041-00, Rev. B Page: Front Cover
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# AHA-3940U / 3940UW / 3940UWD

**MultiChannel PCI-to-UltraSCSI Host Adapters with SCSI*Select* Utility**

## User's Guide

adaptec®

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- For technical support, for information about the Adaptec World Wide Web (WWW) and File Transfer Protocol (FTP) Servers, the Adaptec forum on CompuServe, the Adaptec USA Bulletin Board Service (BBS), and for access to the Interactive Fax system, call 800-959-SCSI (7274) or 408-945-2550, 24 hours a day, 7 days a week. To speak with a product support representative, call 408-934-SCSI (7274), M–F 6:00 a.m. to 5:00 p.m., Pacific Time; after these hours, on weekends, and on holidays, product support is also available for a fee at 800-416-8066.
  - The Adaptec WWW and FTP Servers, and the Adaptec forum on CompuServe provide product literature, answers to commonly asked questions, and information on software upgrades and other topics. The WWW and FTP Servers are available from the Internet 24 hours a day, 7 days a week, at http://www.adaptec.com and ftp.adaptec.com. To access the Adaptec forum on CompuServe 24 hours a day, 7 days a week, type GO ADAPTEC.
  - The Adaptec BBS provides answers to commonly asked questions and information on software upgrades and other topics. The BBS is available 24 hours a day, 7 days a week, at 408-945-7727; 1200 / 2400 / 9600 / 14,400 / 28,800 baud, 8 data bits, 1 stop bit, no parity.



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- For sales information, call 800-959-SCSI (7274) or 408-945-2550, M–F 6:00 a.m. to 5:00 p.m., Pacific Time.
- To order Adaptec software and SCSI cables, call 800-442-SCSI (7274) or 408-957-SCSI (7274), M–F 6:00 a.m. to 5:00 p.m., Pacific Time.
- To request more documentation for Adaptec products, call 800-934-2766 or 510-732-3829, M–F 6:00 a.m. to 5:00 p.m., Pacific Time.

### FCC Compliance Statement

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 residential installations. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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
- Move the equipment away from the receiver
- Plug the equipment into an outlet on a circuit different from that to which the receiver is powered
- If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions

CAUTION: Only equipment certified to comply with Class B (computer input/output devices, terminals, printers, etc.) should be attached to this equipment, and must have shielded interface cables.

Finally, any changes or modifications to the equipment by the user not expressly approved by the grantee or manufacturer could void the user's authority to operate such equipment.

Each host adapter is equipped with an FCC compliance label that shows only the FCC identification number. The full text of the associated label follows:

> 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.

### Canadian Compliance Statement

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

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



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# 1

# Introduction

The Adaptec® AHA®-3940U, AHA-3940UW, and AHA-3940UWD MultiChannel PCI-to-UltraSCSI Host Adapters are designed for use in computers that have 5-volt Peripheral Component Interconnect (PCI) interface slots. PCI is a local bus interface that enables high-speed data transfer. Your computer must be PCI Rev. 2.1-compliant and the motherboard BIOS must support PCI-to-PCI Bridges. If you aren't sure whether the motherboard BIOS supports PCI-to-PCI Bridges, contact the motherboard vendor.

Each AHA-3940U / 3940UW / 3940UWD host adapter has two SCSI channels, each of which functions as an *independent host adapter.*

- With the AHA-3940U, you can connect up to seven 8-bit SCSI devices per channel.
- With the AHA-3940UW / 3940UWD, you can connect up to fifteen 16-bit (Wide) SCSI devices per channel. Using a 68-pin-to-50-pin converter, you can also combine 8-bit and 16-bit SCSI devices, up to 15 per channel; up to seven can be 8-bit devices.

The AHA-3940U is an 8-bit PCI-to-UltraSCSI host adapter with two internal connectors and one external connector. The AHA-3940UW is a 16-bit PCI-to-UltraSCSI host adapter with two internal connectors and one external connector. The AHA-3940UWD is a 16-bit PCI-to-UltraSCSI host adapter with two internal connectors and two external connectors.

This document uses the term AHA-3940U / 3940UW / 3940UWD to refer to all three host adapter models.

This *User's Guide* is a companion to the *Installation Guide* for the AHA-3940U / 3940UW / 3940UWD host adapters. Both guides



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discuss the same topics—installing and configuring the AHA-3940U / 3940UW / 3940UWD—but the *User's Guide* provides more detailed instructions. If you have installed SCSI devices before, you might find it faster to use the *Installation Guide*. Beginning users should use the more detailed instructions in this *User's Guide*.

## Product Features

AHA-3940U / 3940UW / 3940UWD host adapters provide a powerful dual channel, multitasking interface between your computer's PCI bus and SCSI disk drives, CD-ROM drives, scanners, and other SCSI devices. You can install multiple AHA-3940U / 3940UW / 3940UWD host adapters in your computer. Each host adapter functions as two independent host adapters, and its connected SCSI devices form a separate SCSI bus.

AHA-3940U / 3940UW / 3940UWD host adapters can manage multiple disk drivers and provide high performance. In addition, these host adapters minimize microprocessor overhead by transferring data into system memory without involving the computer's CPU.

The onboard AHA-3940U / 3940UW / 3940UWD PhaseEngine® sequencer independently manages data transfer between SCSI devices and the computer's memory without involving the host microprocessor. The PhaseEngine enables the best data transfer performance available in multitasking operating systems. It also automates SCSI command processing and significantly reduces interrupts and command overhead. Onboard BIOS allows AHA-3940U / 3940UW / 3940UWD host adapters to be used in place of, or together with, a standard hard disk controller.

AHA-3940U / 3940UW / 3940UWD host adapters can handle 32-bit bus master data transfers, including PCI-enhanced transfer commands. They support the same SCSI functions as other Adaptec host adapters, including new SCSI-2 features such as Tagged Queuing.

AHA-3940U / 3940UW / 3940UWD host adapters support multithreaded I / O operations, allowing simultaneous operations on multiple SCSI targets or logical units. The Disconnect / Reconnect feature maximizes SCSI bus usage in systems with multiple targets. The Scatter / Gather feature allows high performance even in computers with fragmented memory buffers.



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AHA-3940U / 3940UW / 3940UWD host adapters include the on-board SCSI*Select*™ configuration utility. SCSI*Select* lets you change settings such as SCSI Termination and SCSI Parity Checking without opening the computer and physically configuring the host adapter. SCSI*Select* also includes a SCSI low-level formatting utility.

## PCI Bus Interface

- Up to 132 MBytes / sec data transfer rate on the PCI bus
- Support for PCI single- and dual-address cycles
- PCI bus address and data parity generation
- PCI bus master for data transfer
- 32-, 24-, 16- and 8-bit host PCI bus data transfers

## PCI-to-PCI Bridges

The AHA-3940U / 3940UW / 3940UWD features an advanced PCI-to-PCI Bridges design that expands PCI bus connectivity. A separate PCI bus can improve overall system performance by off-loading processing to local PCI buses. This reduces bus traffic and increases system throughput.

To use the AHA-3940U / 3940UW / 3940UWD, your computer must be PCI Rev. 2.1-compliant, and the motherboard BIOS must support PCI-to-PCI Bridges. To find out whether your computer meets these requirements, check with the system or motherboard vendor.

## Data Transfer Rates

### AHA-3940U

- Up to 20.0 MBytes / sec synchronous UltraSCSI data rate per channel
- Up to 10.0 MBytes / sec synchronous Fast SCSI data rate per channel
- Up to 5.0 MBytes / sec synchronous SCSI data rate per channel
- Up to 3.0 MBytes / sec asynchronous SCSI data rate per channel



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### AHA-3940UW/3940UWD

- Up to 40.0 MBytes / sec synchronous Wide UltraSCSI data rate per channel
- Up to 20.0 MBytes / sec synchronous Wide Fast SCSI data rate per channel
- Up to 10.0 MBytes / sec synchronous Wide SCSI data rate per channel
- Up to 6.0 MBytes / sec asynchronous Wide SCSI data rate per channel

## Maximum Offloading of the Host CPU

- Onboard RISC sequencer (SCSI PhaseEngine processor) automates SCSI protocol
- Low SCSI processing overhead
- Bus Master DMA implementation
- Task scheduling and message-based communication

## Disk Array Support

- Boot from any drive on the SCSI bus
- Extensive support for leading disk array vendors

## UltraSCSI/Fast SCSI-2 Implementation

- Concurrent support for UltraSCSI synchronous devices
- Concurrent support for Fast SCSI synchronous and asynchronous devices
- Concurrent support for 8-bit and 16-bit SCSI devices (AHA-3940UW / 3940UWD only)
- Single-ended output
- Scatter / Gather
- Disconnect / Reconnect
- Fully multitasking / multithreading



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- Uses the superior SCSI-2 (Alternative 1) external connector and standard internal ribbon connector (on the AHA-3940UWD, there are two very high density external connectors)
- Tagged Queuing support
- SCSI termination power-down control
- Support for multiple logical units
- Parity handling in Data, Message, Status, Selection / Reselection, and Command phases
- Active negation

## Multiple Device Support

- AHA-3940U supports up to seven SCSI devices per channel (14 devices total)
- AHA-3940UW / 3940UWD support up to 15 SCSI devices per channel (30 devices total)
- Onboard BIOS fully supports capabilities of MS-DOS 5.0 and above for up to eight disk drives, without additional drivers
- Onboard BIOS supports disk drives as large as 8 GBytes



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## Conventions

The following typographic conventions are used in this document:

**bold**
Used for keystrokes (… press the **Enter** key …) and screen selection fields (… select **Advanced Configuration Options** …).

Helvetica
Used for operator entry that must be typed exactly as shown (… device=c:\scsi\aspi7dos.sys …) and for screen messages (…Enter Password …).

*Helvetica Italics*
Used to represent text you must determine and type in (… enter *nn* for number…). Also used for program and file names that appear in body text (… the *autoexec.bat* file …).

Hexadecimal Numbers
Are followed by an 'h', e.g., 330h.

End Mark
The ❒ symbol marks the end of the text for each chapter.



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## Advisories

Advisories are short notes that stress an important point or warn of a potential hazard to the system, data, or the user. This document uses three kinds of advisories:



**Note:** Text set off in this way presents reminders, tips, or suggestions that may simplify the assembly and use of the host adapter.



**Caution:** Failure to observe this type of advisory could result in damage to your system, devices, or data.



**WARNING:** Failure to observe this type of advisory could result in personal injury.

Use caution when handling any electrical equipment. Advisories in this document can only cover the procedures contained here, and not all situations may have been addressed. Adaptec does not claim to have included every condition or situation that might require a Caution or Warning. You must refer to the documentation for your computer peripheral equipment when you are installing equipment or changing its configuration.



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# Support and Information Services

AHA-3940U / 3940UW / 3940UWD host adapters are designed for easy installation and use. We have tried to make this document and our other documentation complete and clear. If you need further assistance, please contact Adaptec. We offer the following support and information services:

| Service Provided | Description | Availability | Telephone Number |
|---|---|---|---|
| Electronic Bulletin Board Service (BBS) | Information on software upgrades, new releases, technical topics, etc. | 24 hours a day, 7 days a week | 408-945-7727, 1200/ 2400/9600/14,400/ 28,800 baud, 8 data bits, 1 stop bit, no parity |
| Technical Support | Live phone help from technical support representatives | M–F: 6 a.m. to 5 p.m. Pacific Time | 408-934-7274 After-hours fee-based support: 800-416-8066 |
| Interactive FAX Service | Current information about Adaptec products and services | 24 hours a day, 7 days a week | 408-957-7150 |
| Product Order Line | Order Adaptec software and cables | M–F: 6 a.m. to 5 p.m. | 800-442-7274 or 408-957-7274 |
| Literature Hotline | Additional documentation for Adaptec products | M–F: 6 a.m. to 5 p.m. | 800-934-2766 or 510-732-3829 |

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# 2

# Installing the Host Adapter and SCSI Devices

This chapter explains how to physically install an AHA-3940U / 3940UW / 3940UWD host adapter in your computer and connect SCSI devices to it.

You may need to run your computer's *Setup* program as part of the installation process. See *Running the Computer's Setup Program* on page 2-17 for more information.

After the host adapter is physically installed, you can change its configuration with the SCSI*Select* utility, as described in Chapter 3, *Configuring Your Host Adapter*.

You can install multiple AHA-3940U / 3940UW / 3940UWD host adapters in your computer if enough PCI bus slots are available. Each AHA-3940U / 3940UW / 3940UWD host adapter has two separate SCSI channels. If you install multiple AHA-3940U / 3940UW / 3940UWD host adapters in your computer, you can enable the onboard BIOS on just one host adapter or on more than one of the host adapters.



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# Host Adapter Layout

Figure 2-1 identifies the major AHA-3940U components. Figure 2-2 identifies the major AHA-3940UW components. Figure 2-3 identifies the major AHA-3940UWD components. Following the figures, a table describes these components.

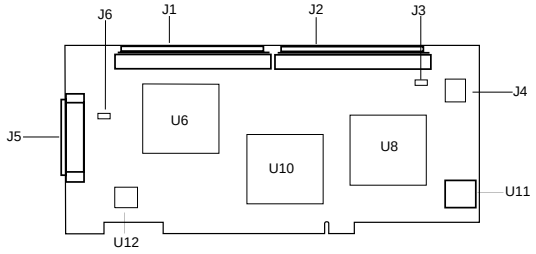



Figure 2-1. AHA-3940U Components

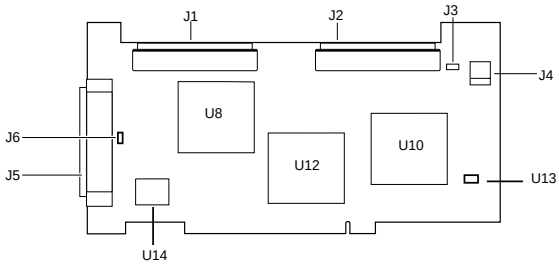



Figure 2-2. AHA-3940UW Components

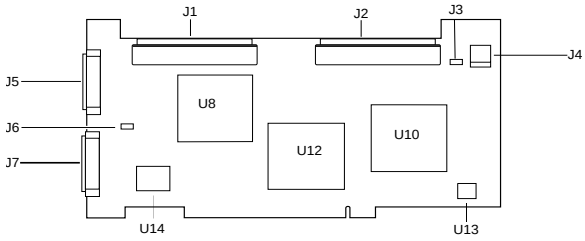



Figure 2-3. AHA-3940UWD Components



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| AHA-3940U | AHA-3940UW | AHA-3940UWD | Description |
|---|---|---|---|
| J1 | J1 | J1 | Internal SCSI Connector—Channel A[1] |
| J2 | J2 | J2 | Internal SCSI Connector—Channel B[1] |
| J3 | J3 | J3 | Multiple computer termination jumper, Channel B[2] |
| J4 | J4 | J4 | External LED Connector |
| J5 | J5 | J7 | External SCSI Connector—Channel A[1] |
| - | - | J5 | External SCSI Connector—Channel B[3] |
| J6 | J6 | J6 | Termination Jumper—Channel A |
| U6 | U8 | U8 | AIC-7880 Controller—Channel A |
| U8 | U10 | U10 | AIC-7880 Controller—Channel B |
| U10 | U12 | U12 | PCI-to-PCI Bridge |
| U11 | U13 | U13 | SEEPROM |
| U12 | U14 | U14 | BIOS ROM |

[1] 50-pin on AHA-3940U, 68-pin on AHA-3940UW/3940UWD only.
[2] See Appendix A, *Multiple Computer Configuration*.
[3] 68-pin on AHA-3940UWD only.

## Inserting the Host Adapter in a PCI Slot



**WARNING:** Be sure the power is turned OFF before you continue. Ground yourself by touching an unpainted surface on the computer chassis before you open the computer case.

1. Remove the cover from the computer case.
2. Carefully remove the host adapter from the antistatic bag. If you need to set the adapter down, put it on top of the bag.



**Caution:** Keep the host adapter in its antistatic bag until you are ready to install it. Before you pick up the adapter, ground yourself by touching an unpainted surface on the computer chassis. Even a little static electricity can destroy a host adapter component!

3. Find an unused 5-volt PCI bus expansion slot that supports bus mastering. Make sure this slot is unobstructed.

   Some computers have both bus master and non-bus master PCI slots. Read your documentation to find out which kind



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your computer has. PCI bus slots are typically white or ivory and are shorter than ISA or EISA slots. Usually, there are three PCI slots. One of these may be a *shared slot*. A shared slot has connectors for both ISA and PCI, but can accept only one kind of board at a time.

4 Remove the corresponding expansion slot cover from the computer chassis. The slot cover is the metal strip in the back of the computer chassis that covers the opening for the adapter's external connector.

5 Position the host adapter directly over the PCI slot and insert the end of the board in the card guide. Carefully press the bus connector on the bottom of the host adapter down into the slot, as shown in Figure 2-4. Be sure the metal contacts on the bottom of the host adapter are securely seated in the slot.

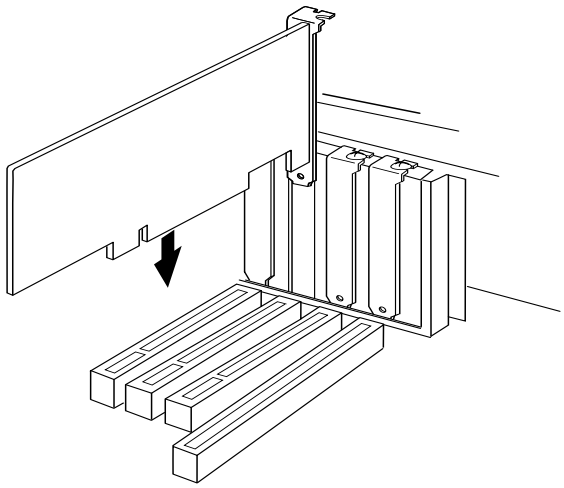


Figure 2-4. Inserting the Host Adapter

6 Attach the host adapter bracket to the computer chassis with the screw from the slot cover that you removed in step 4.

**Note:** *Do not* replace the computer cover or reconnect the power yet!



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# Connecting SCSI Cables and Devices

## Choosing SCSI Cables

Always use high-quality SCSI cables to connect the host adapter to devices on the SCSI bus. Poor-quality cables can cause data corruption, parity errors, and other problems. High-quality cabling is especially critical if you use UltraSCSI or Fast SCSI data transfer rates.

The round cables used for external SCSI devices vary widely in quality and electrical characteristics. Be sure external SCSI cables meet SCSI-2 standards (ask your cable vendor). For UltraSCSI applications, SCSI cables must meet Fast-20 SCSI standards. Here are some guidelines for external SCSI cables:

- SCSI-2: Use cables with a single-ended impedance range of 90 to 132 ohms.
- UltraSCSI: Use cables with a single-ended impedance range of 90 ± 10 ohms. For the REQ and ACK signals the impedance should be 90 ± 6 ohms.
- *Do not* use cables shorter than 30 cm (11.8 inches) between any two SCSI devices.

Adaptec sells high-quality internal and external UltraSCSI and SCSI-2 cables. If your reseller does not stock these cables, call Adaptec directly at the number listed on page ii.

## Maximum Cable Lengths

To assure reliable operation, the total length of the SCSI bus, including both internal and external cabling, should not exceed 6 meters (19.7 feet) for synchronous or asynchronous data transfer rates, and 3 meters (9.8 feet) for UltraSCSI data transfer rates.



**Caution:** AHA-3940U / 3940UW / 3940UWD host adapters support only *single-ended* SCSI devices. *Do not* connect *differential* SCSI devices, or the host adapter may be damaged. Read your device documentation to find out whether the device is single-ended or differential.



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## Connecting Internal SCSI Devices

Read the device documentation if you need to physically install a SCSI device inside your computer before attaching the cables. To connect internal SCSI devices to an AHA-3940U / 3940UW / 3940UWD host adapter, you need the following:

- A 50-pin internal SCSI ribbon cable for the AHA-3940U. (Or two cables, if you are using both internal SCSI connectors.)
- A 68-pin internal SCSI ribbon cable for the AHA-3940UW or AHA-3940UWD. (Or two such cables, if you are using both internal SCSI connectors.)

There must be more connectors in the middle of the cable if you are attaching more than one internal device. Make sure your cable has enough connectors. To connect three or more internal SCSI devices to a SCSI bus, make a SCSI ribbon cable that has enough connectors for all the SCSI devices.

You can connect both 8-bit and 16-bit SCSI devices to an AHA-3940UW or AHA-3940UWD host adapter. To attach 8-bit internal devices to a wide SCSI bus, use a 68-pin-to-50-pin converter.

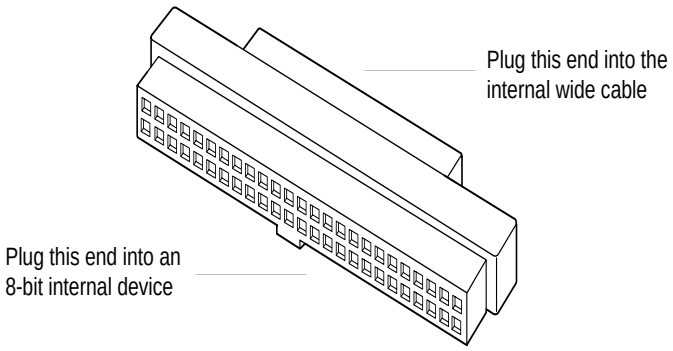



Figure 2-5. 68-pin-to-50-pin Converter

You can buy this internal 68-pin-to-50-pin converter from any authorized Adaptec reseller. Call Adaptec for more information at (800) 959-SCSI.

*Do not* use this converter at the end of the cable; the converter does not provide termination for the high data byte. To terminate a SCSI bus properly, you must put a 16-bit device at the end of the cable. If a



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converter with an 8-bit device is at the end of the cable, the bus does not terminate properly.

To attach a converter, first plug the converter into the A/B device and then connect the converter to the internal Wide SCSI bus.

**Note:** The following diagrams show the 50-pin internal connector used with the AHA-3940U. The AHA-AHA-3940UW and AHA-3940UWD use 68-pin high-density connectors.

To connect internal SCSI devices, follow these steps:

1. Plug the SCSI connector at one end of the SCSI ribbon cable into one of the host adapter's internal SCSI connectors, as shown in Figure 2-6. Line up the colored stripe on the ribbon cable with the number 1 printed below the connector on the host adapter. This is called maintaining *pin-1 orientation*. Maintain pin-1 orientation throughout the SCSI bus, or the devices will not work properly.

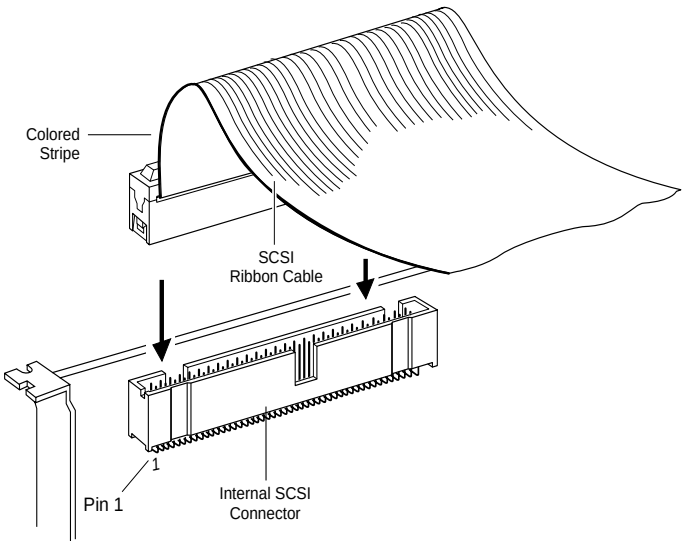



Figure 2-6. Internal SCSI Ribbon Cable to Host Adapter



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**2** Plug the last connector on the ribbon cable into the SCSI connector on the internal SCSI device, as shown in Figure 2-7.

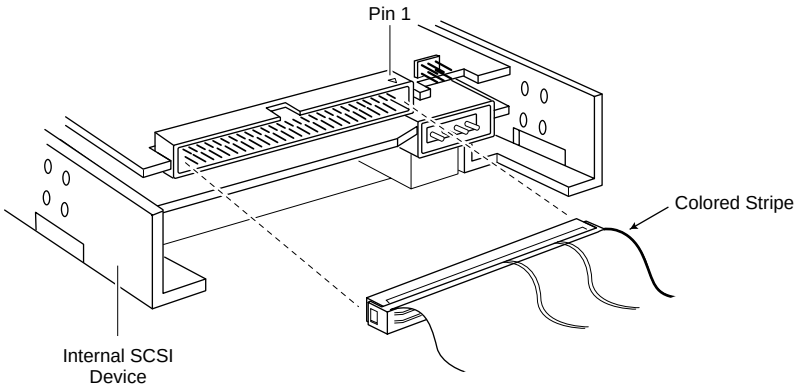



Figure 2-7. Internal SCSI Ribbon Cable to Internal SCSI Device

**3** To connect a second internal SCSI device, plug the middle connector of the SCSI ribbon cable into the SCSI connector on the second internal SCSI device, as shown in Figure 2-8.

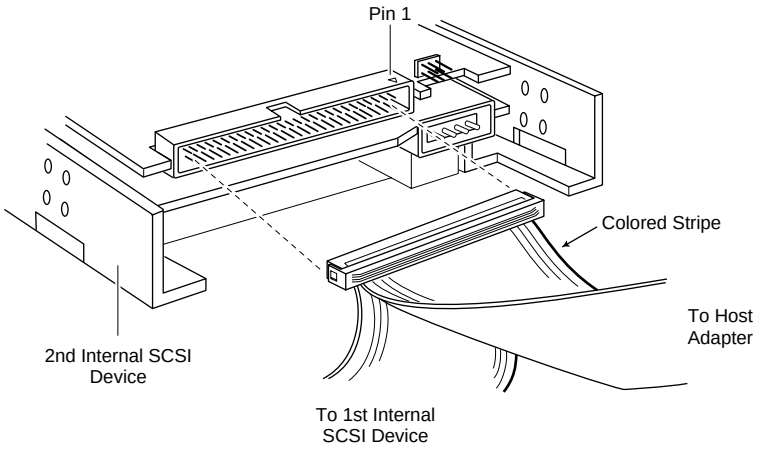



Figure 2-8. Connecting a Second Internal SCSI Device

**4** To connect three or more internal SCSI devices to a SCSI bus, plug the remaining middle SCSI connectors into the other internal devices.



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## Connecting External SCSI Devices

You can daisy-chain up to seven external SCSI devices to Channel A of the AHA-3940U. You can daisy-chain up to fifteen external SCSI devices to Channel A of the AHA-3940UW or Channels A and B of the AHA-3940UWD. *Daisy-chaining* means connecting multiple devices with multiple cables. For example, a cable runs from the external SCSI connector to the first external device; a second connector on the back of the external device allows another cable to connect with the second device in the chain, and so forth.

The external SCSI cables must meet the specifications listed in *Choosing SCSI Cables* on page 2-5. External cable connectors can only be plugged in one way, so pin-1 orientation is automatic. You can buy appropriate cables and other accessories from Adaptec; call (800) 442-SCSI.

Follow these steps to connect external SCSI devices:

1. Attach one connector of the external SCSI cable to the external SCSI connector, as shown in Figure 2-9.

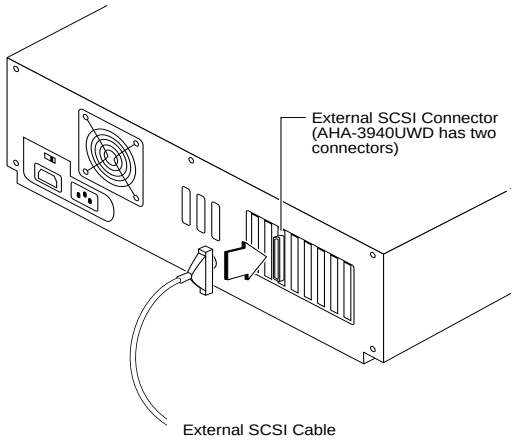



Figure 2-9. External Cable to Host Adapter

2. Attach the connector at the other end of the external cable to either one of the SCSI connectors on the external SCSI device,



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as shown in Figure 2-10. The AHA-3940UWD has two external connectors (not shown).

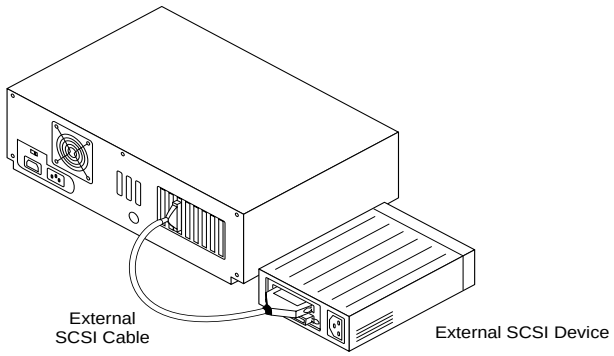



Figure 2-10. External Cable to External SCSI Device

**3** To connect other external SCSI devices, daisy chain each device to the previous device until all external SCSI devices have been connected, as shown in Figure 2-11. (Again, the AHA-3940UWD's two external connectors are not shown.)

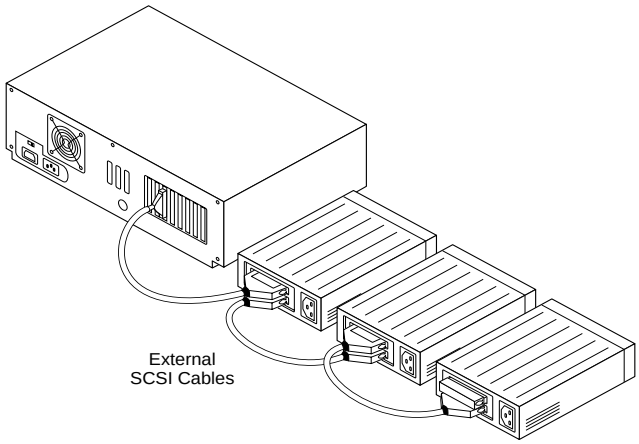



Figure 2-11. Connecting Multiple External SCSI Devices

### Connecting External 8-bit and 16-bit Devices (AHA-3940UW or AHA-3940UWD)

When daisy-chaining external 8-bit and 16-bit devices with standard SCSI-2 connectors to the AHA-3940UW or AHA-3940UWD, use an



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external SCSI-2 male 68-pin to SCSI-2 female 50-pin converter (available from Adaptec). Follow these steps:

1. Daisy-chain all 16-bit devices together with external SCSI-2 Wide cables.
2. Daisy-chain all 8-bit devices together with external SCSI-2 Narrow cables.
3. Connect the first device in the 16-bit device daisy chain to the host adapter with an appropriate external Wide cable.
4. Plug the converter into the last device in the 16-bit device daisy chain.
5. Use an external narrow cable to connect the first 8-bit device in the 8-bit device daisy-chain to the other end of the converter.

Remember the termination on all devices in the middle of the daisy chain has to be OFF and the termination on the last device in the daisy-chain has to be ON.

## Terminating the SCSI Bus

SCSI termination must be enabled on the first and last physical devices on SCSI Channels A and B of your AHA-3940U / 3940UW / 3940UWD host adapter; otherwise, the devices will not operate properly. You may need to change the termination setting on some SCSI devices when you install them. In general, the procedure for terminating the SCSI bus is as follows:

1. The host adapter is at one end of the SCSI channel (SCSI bus). Determine which SCSI devices is at the other end. Then terminate both of these, if they are not already terminated.
2. Disable termination on all other devices on the SCSI bus, if it is not already disabled.

### Terminating SCSI Devices

Most SCSI disk drives, CD-ROM drives, and other peripheral devices have a jumper or a switch close to the SCSI connector to control SCSI termination. Some SCSI devices have resistor modules that you can remove or insert to change the termination setting.



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Terminate the SCSI device at the end of the internal or external SCSI cable, and disable termination on all other devices on the SCSI bus. Read the device documentation if you are not sure how to enable or disable termination on your SCSI devices.



**Note:** Some SCSI disk drives allow termination power to be supplied to their resistor modules from the SCSI bus instead of from the drive's power supply. AHA-3940U / 3940UW / 3940UWD host adapters support this option, because they always supply termination power on the SCSI bus.

## Terminating the Host Adapter

Termination for Channels A and B is *Automatic* by default on AHA-3940U / 3940UW / 3940UWD host adapters. You can change this setting, if necessary, with the SCSI*Select* configuration utility, as described in Chapter 3, *Configuring Your Host Adapter*. The following section assumes that termination remains at *Automatic*.

### Terminating SCSI Channel A on the AHA-3940U/3940UW and Both Channels on the AHA-3940UWD

These SCSI channels have an external connector and an internal connector, as shown on page 2-2. You can attach SCSI devices to one of the two connectors or to both connectors. The default termination setting for the host adapter is *Automatic*.

The text uses Channel A as an illustration, but this section also applies to Channel B of the AHA-3940UWD.

- If you attach SCSI devices to only one of the two Channel A connectors, as shown in Figure 2-12, host adapter termination



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is automatically *Enabled.* Always connect the host adapter to the end of the internal cable.

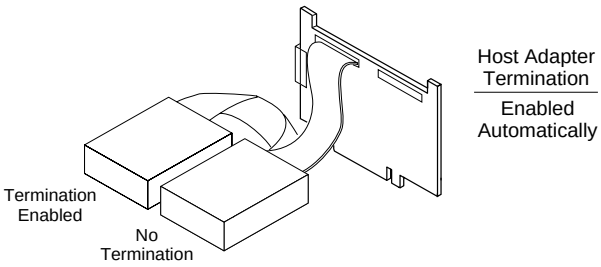



Figure 2-12. Internal Devices on SCSI Channel A

- If you attach SCSI devices to both internal and external connectors, as shown in Figure 2-13, host adapter termination is automatically *Disabled.* In this configuration, the host adapter is in the middle of the SCSI bus.

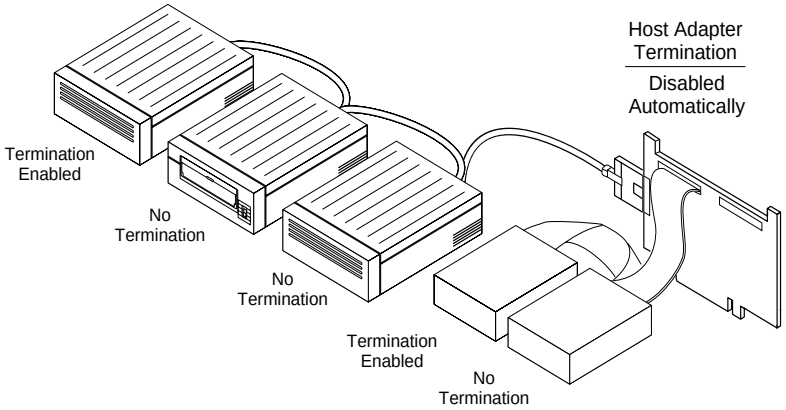



Figure 2-13. Internal and External Devices on SCSI Channel A

### Terminating SCSI Channel B on the AHA-3940U/3940UW

This SCSI channel has an internal connector and no external connector. The host adapter must always be at the end of the cable when you attach internal SCSI devices to this channel. The default termination setting for the host adapter is *Automatic*, so host adapter termination for this channel is always enabled, as shown in Figure 2-14.



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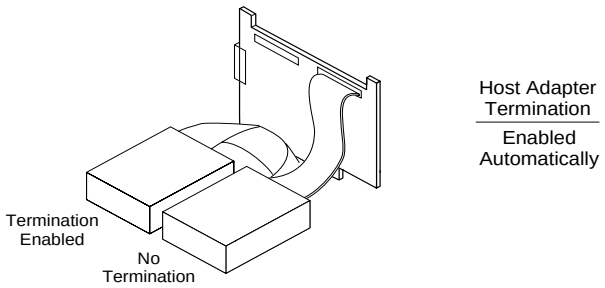



Figure 2-14. Host Adapter Termination on SCSI Channel B (AHA-3940U/3940UW)

**Note:** *Do not* set a channel's termination to *Disable* if there is no device on that SCSI bus. It may hang the system.

## SCSI IDs

Each device on the SCSI bus, including the host adapter, must have a unique SCSI ID. The SCSI ID serves two purposes:

- It uniquely defines each SCSI device on the bus.
- It determines which device controls the bus when two or more devices try to use it at the same time.

SCSI IDs on one channel do not interfere with the IDs on another channel. This applies to two SCSI host adapters that implement different buses as well as dual channels on a single host adapter.

### SCSI ID Priority

On an 8-bit SCSI bus, SCSI ID 7 has the highest priority, and SCSI ID 0 has the lowest priority. From highest to lowest, the complete order is: 7, 6, 5, 4, 3, 2, 1, 0.

On a 16-bit SCSI bus, the priority scheme goes from SCSI ID 7 (the highest priority) to SCSI ID 0, and then from SCSI ID 15 to SCSI ID 8, so that SCSI ID 8 is the very lowest priority. From highest to lowest, the complete order is: 7, 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, 8.



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### Setting SCSI IDs

Setting SCSI IDs is a two-step process:

1. Determine the SCSI ID of each device on the SCSI bus.

   The default SCSI ID for Channels A and B of the host adapter is 7, the highest priority on the bus. You can change the ID(s) using SCSI*Select*, if necessary, but we recommend that you leave the ID for both channels at 7.

   To determine the SCSI IDs, read the devices' documentation and examine their switch settings or jumper settings.

2. Set the SCSI IDs so that no IDs are duplicated on the same SCSI channel.

   If you have two host adapters connected to the same SCSI bus, make sure they are set to different SCSI IDs, preferably 7 and 6.



**Note:** A computer with an AHA-3940U / 3940UW / 3940UWD host adapter can share external SCSI devices with another computer. To do this, you must install a jumper before you install the host adapter. See Appendix A, *Multiple Computer Configuration*.

## SCSI Bus Activity LED Connector

Most computers have an LED disk activity light on the front panel. If you disconnect the cable from the motherboard and attach it to the LED connector on the host adapter, the LED will light whenever there is activity on either SCSI channel.



**Note:** You may not want to change this connection if your computer system includes non-SCSI disk drives, because the LED will no longer light when these drives are active.

Follow these steps to connect the LED cable to the host adapter:

1. Refer to your computer's documentation to locate the LED cable and unplug it from the connector on the motherboard.



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**2** Connect the LED cable to the SCSI activity LED connector on the host adapter, as shown in Figure 2-15.

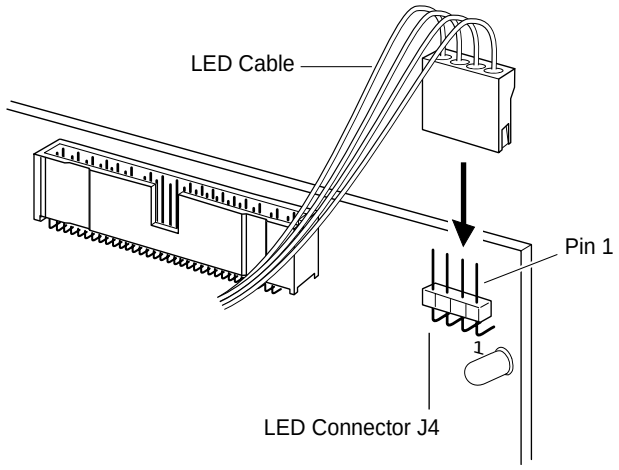



Figure 2-15. SCSI LED Connector

If the computer has a two-position LED cable, connect it to pins 1 and 2 of the LED connector.

## Completing Installation

Before you reassemble your computer, be sure that

- The devices on each SCSI channel are properly terminated
- Each SCSI device on each SCSI channel has a unique SCSI ID
- The host adapter is firmly seated and secured in a 5-volt bus master PCI bus slot
- Internal SCSI devices have power plugs attached
- Internal SCSI devices are firmly connected to the host adapter and pin-1 orientation is correct
- External SCSI devices are firmly connected to the host adapter



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Complete these steps to finish the installation process:

1. Replace and secure the cover of the computer case.
2. Reconnect the power cords to all external SCSI devices and the computer.
3. Turn ON the power to all devices.
4. Boot the computer.

If you need to change the configuration of the host adapter or SCSI devices, follow the directions in Chapter 3, *Configuring Your Host Adapter*. If you encounter any problems during installation, see Chapter 5, *Troubleshooting*.

## Running the Computer's Setup Program

Normally, PCI-bus computers automatically configure the AHA-3940U / 3940UW / 3940UWD IRQ, port address, and BIOS address. In some cases, depending on what kind of motherboard BIOS your computer uses, you may need to run the computer's *Setup* program to enable the PCI bus parameters before your computer can recognize the host adapter.

If your host computer does not recognize the host adapter after you install it, enter the *Setup* program and check for PCI configuration parameters. Usually you start the *Setup* program by pressing a key or key combination when your computer boots and the host computer BIOS message appears. The BIOS message normally states the key or keys you must press to enter the *Setup* program. If you are not sure, check the documentation for your computer.

If your computer has a combination of ISA (or EISA) boards and PCI boards, you may need to configure the settings so that the IRQs used by ISA / EISA boards are marked as *Used* and the PCI bus does not try to assign them to other PCI boards. Also, some BIOS's reserve a set of available IRQs for PCI boards, and you have to assign these IRQs manually.

Read the documentation for your computer's *Setup* program to find out more about configuration issues.

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# 3

# Configuring Your Host Adapter

AHA-3940U / 3940UW / 3940UWD host adapters include an onboard SCSI*Select* configuration utility that lets you change host adapter settings without opening the computer or handling the host adapter. SCSI*Select* also provides utilities for formatting SCSI disk devices and scanning them for defects. In addition, SCSI*Select* allows you to list the SCSI IDs of devices attached to the host adapter.

If you do not need to change any of the default settings listed in *Default Configuration Settings* on page 3-2, and you do not want to run any SCSI disk utilities, there is no need to run SCSI*Select*. Your host adapter is ready for operation; you can proceed to Chapter 4, *Operating System Support*.

If you need to change any settings, or if you want to run the SCSI disk utilities, the remainder of this chapter provides instructions for running the SCSI*Select* utility and changing settings.



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# Default Configuration Settings

This table lists the settings you can change with SCSI*Select* and the default value for each setting. Some settings apply to the channels; other settings apply individually to each device on the bus.

| Global Settings for Host Adapter | Default Setting |
|---|---|
| Host Adapter SCSI ID | 7 |
| SCSI Parity Checking | Enabled |
| Host Adapter SCSI Termination | Automatic |
| **Boot Device Settings** | **Default Setting** |
| Boot Channel | A First |
| Boot Target ID | 0 |
| Boot LUN Number[1] | 0 |
| **SCSI Device Settings** | **Default Setting** |
| Initiate Sync Negotiation | Yes (Enabled) |
| Maximum Sync Transfer Rate | 20 MBytes/sec[2] |
| Enable Disconnection | Yes (Enabled) |
| Initiate Wide Negotiation[3] | Yes (Enabled) |
| Send Start Unit SCSI Command[4] | No (Disabled) |
| Include In BIOS Scan | Yes (Enabled) |
| **Advanced Host Adapter Settings** | **Default Setting** |
| Reset SCSI Bus at IC Initialization | Enabled |
| Channel A BIOS (Configuration Utility Reserves BIOS Space) | Enabled |
| Support Removable Disks under BIOS as Fixed Disks[4] | Boot Only |
| Extended BIOS Translation for DOS Drives > 1 GByte[4] | Enabled |
| Channel A Display <Ctrl-A> Message During BIOS Initialization[4] | Enabled |
| Multiple LUN Support[4] | Disabled |
| BIOS Support for Bootable CD-ROM[4] | Enabled |
| BIOS Support for Int 13h Extensions[4] | Enabled |
| Support for UltraSCSI Speed[5] | Disabled |

[1] Setting is valid only if Multiple LUN Support is enabled.
[2] 10 MBytes/sec for AHA-3940U.
[3] AHA-3940UW/3940UWD only.
[4] Settings are only valid if channel BIOS is enabled.
[5] If this setting is changed to Enabled, the Maximum Sync Transfer Rates are 20 MBytes/sec for the AHA-3940U and 40 MBytes/sec for the AHA-3940UW/3940UWD.



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## When to Use SCSI*Select*

Use SCSI*Select* if you need to

- Change any of the default values
- Check or change SCSI device settings that may conflict with those of other devices (e.g., SCSI ID)
- Perform low-level formatting on new SCSI disk devices

## Starting SCSI*Select*

To start SCSI*Select*, press **Ctrl+A** when the BIOS banner appears during bootup, as shown in Figure 3-1.

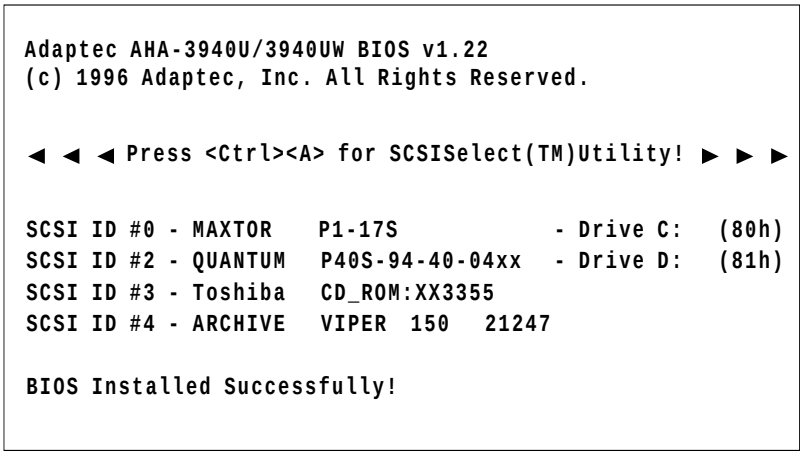



Figure 3-1. BIOS Banner

The BIOS banner lists the model number and SCSI ID of each SCSI device connected to the host adapter.



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## Selecting a SCSI Channel

Each AHA-3940U / 3940UW / 3940UWD host adapter has two SCSI channels. Each channel operates independently and must be configured separately in SCSI*Select*. The first SCSI*Select* screen allows you to select either Channel A or Channel B, as shown in Figure 3-2. Press the ↑ and ↓ keys to highlight the channel you want to configure, then press **Enter** to select it.

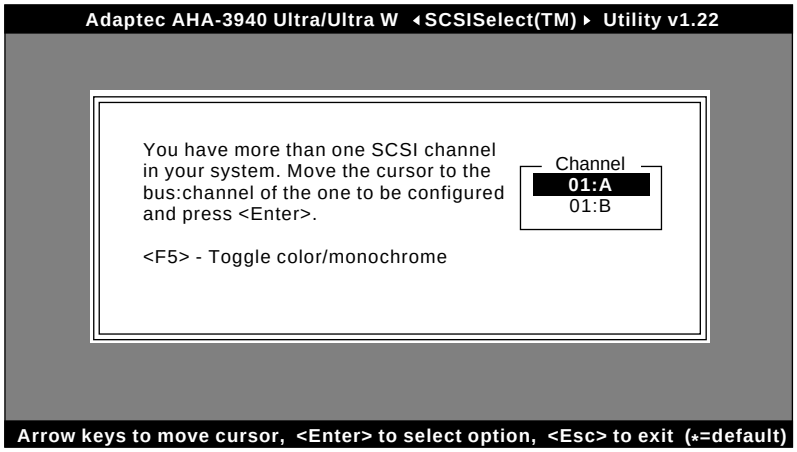



Figure 3-2. Selecting a SCSI Channel

If there are two or three AHA-3940U / 3940UW / 3940UWD host adapters in your computer, this screen lists the channels on all the host adapters. For example, if you have two host adapters, you will see additional entries for **Bus2:ChA** and **Bus2:ChB**. Select the host adapter and channel you want to configure, then press **Enter**.

**Note:** You must select SCSI Channel A if you want to enable or disable the host adapter BIOS. The BIOS setting cannot be changed when you are configuring Channel B. The same is true of the settings for boot channel, boot target ID, and boot LUN number.



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After you select the channel, the SCSI*Select* Options menu appears, as shown in Figure 3-3.

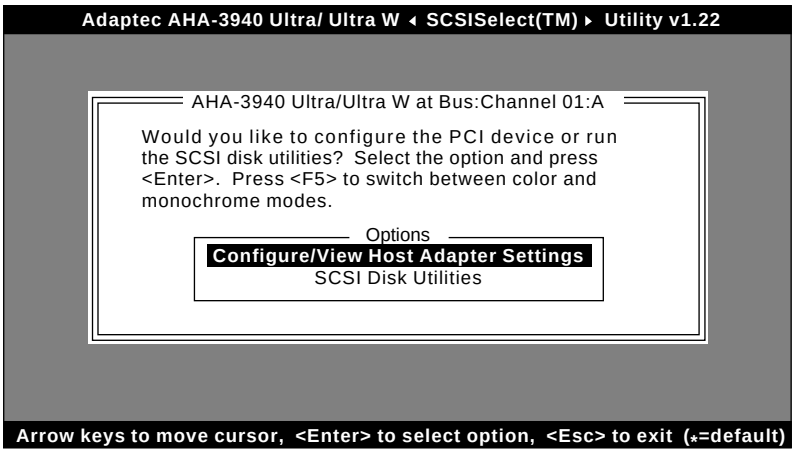



Figure 3-3. Options Menu Screen

## Using the Options Menu

The Options menu has the following selections:

- Configure / View Host Adapter Settings
- SCSI Disk Utilities

To choose an option in this and subsequent menus, press the ↑ and ↓ keys to highlight the option, then press **Enter**. Press **Esc** at any time to return to the previous menu.

**Note:** Press **F5** to toggle the display between color and monochrome. (This feature may not work on all monitors.)



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## Configure/View Host Adapter Settings

From the Options menu, select **Configure/View Host Adapter Settings** to see the Configuration menu, shown in Figure 3-4. This menu lists the following settings under **SCSI Channel Interface Definitions**:

- **Host Adapter SCSI ID**: Change the SCSI ID of the channel from its default ID of *7***.**
- **SCSI Parity Checking**: Enable or disable parity checking.
- **Host Adapter SCSI Termination**: Enable or disable channel termination. The default is *Automatic*.

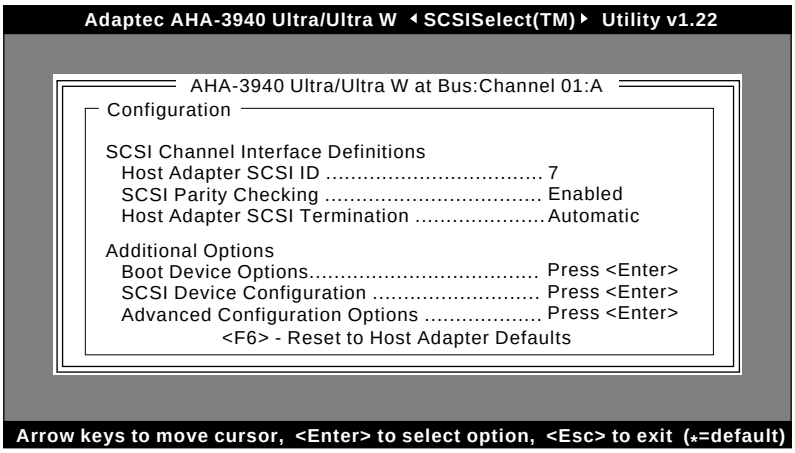



Figure 3-4. Configure/View Host Adapter Settings Screen

Current settings appear in the right column. In Figure 3-4, for example, the setting for SCSI Parity Checking is *Enabled*. To change a setting, press the ↑ and ↓ keys to highlight the setting; press **Enter** to display a pop-up menu of choices; and then choose a setting by highlighting it and pressing **Enter**. The following sections in this chapter have information about each setting.



**Note:** Channel default settings are marked with an asterisk (*) throughout the menus. Press **F6** to reset all settings to the channel defaults.



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The Configuration menu has the following additional options for advanced users:

- **Boot Device Options:** Specify ID and LUN to boot from.
- **SCSI Device Configuration:** Specify for each SCSI device the maximum synchronous transfer rate, use of the Start Unit command, and other criteria.
- **Advanced Configuration Options:** Select advanced options for configuring the channel.

See *SCSI Device Configuration* on page 3-11 and *Advanced Configuration Options* on page 3-15 for information on these selections.

### Host Adapter SCSI ID

Each SCSI device on the SCSI bus, including each channel on the host adapter, must have a unique SCSI ID. The SCSI ID uniquely identifies each SCSI device on the bus, and it determines the priority of the device on the bus when two or more devices request use of it.

The Host Adapter SCSI ID option on the Configuration menu lets you change the channel SCSI ID. The screen in Figure 3-5 shows the available IDs for each channel on the AHA-3940U / 3940UW / 3940UWD.

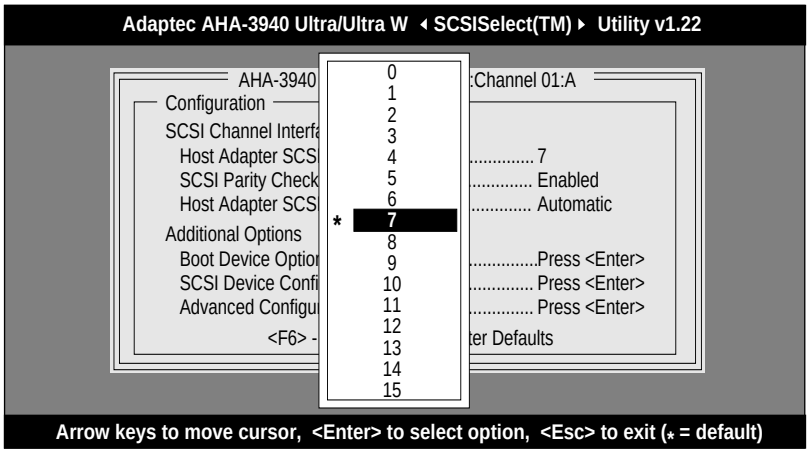



Figure 3-5. Host Adapter SCSI ID Selection Screen for AHA-3940UW/3940UWD

The default ID is *7*, which has the highest priority on the SCSI bus. We recommend that you keep this setting.



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Follow these steps to select a different ID for a channel:

1. Display the Configuration menu for the channel.
2. Highlight **Host Adapter SCSI ID**, then press **Enter**. A menu of IDs appears.
3. Highlight the ID you want to assign the channel, then press **Enter**.

When selecting the channel SCSI ID, consider the following:

- Two devices on the same channel cannot have the same ID. The host adapter itself uses one SCSI ID on each channel (SCSI ID 7, by default). See *SCSI Disk Utilities* on page 3-18 to learn how to determine the SCSI ID used by each device.
- If you plan to connect two host adapters in different computers to the same SCSI bus (see Appendix A, *Multiple Computer Configuration*), set the host adapters to different SCSI IDs. IDs 6 and 7 are best, since they have top priority on the SCSI bus.

### SCSI Parity Checking

Select this option to enable or disable SCSI parity checking on the channel. The default setting is *Enabled*.

When reading from the SCSI bus, the channel always checks parity to verify the correct transmission of data from your SCSI devices. Disable SCSI Parity Checking if any attached SCSI devices do not support SCSI parity. Most currently available SCSI devices do support SCSI parity. If you are not sure whether a device supports SCSI parity, check the documentation that accompanied the device.

To set parity checking for a channel, follow these steps:

1. Display the Configuration menu for the channel.



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**2** Highlight **SCSI Parity Checking**, then press **Enter**. The pop-up menu shown in Figure 3-6 appears.

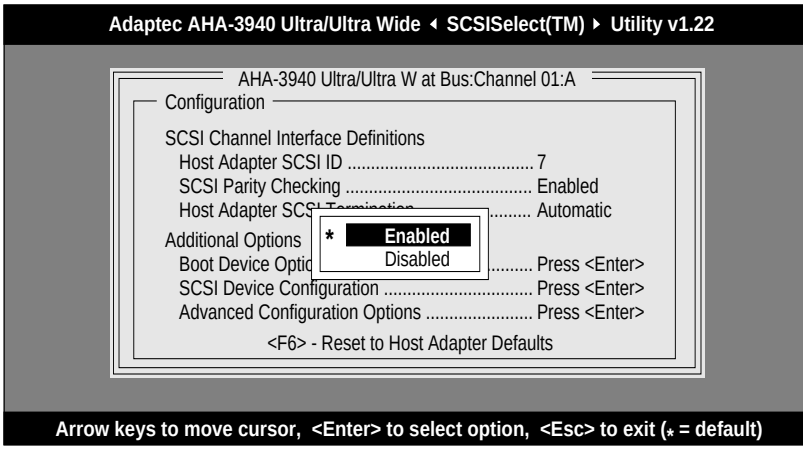



Figure 3-6. SCSI Parity Checking Selection

**3** Highlight **Enabled** or **Disabled**, then press **Enter**.

### Host Adapter SCSI Termination

The host adapter termination default setting for SCSI channels is *Automatic*. "Automatic" means that the host adapter automatically enables or disables termination, according to the following table.

| Connectors Used on Channel | Termination |
|---|---|
| Internal connector only; host adapter at end of channel | Enabled |
| External connector only; host adapter at end of channel | Enabled |
| Internal and external connectors; host adapter in middle of channel | Disabled |

We recommend leaving the setting at *Automatic*.



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To change the termination setting manually for a given channel:

1. Display the Configuration menu for the channel.
2. Highlight **Host Adapter SCSI Termination**, then press **Enter**. A pop-up menu appears, as shown in Figure 3-7.

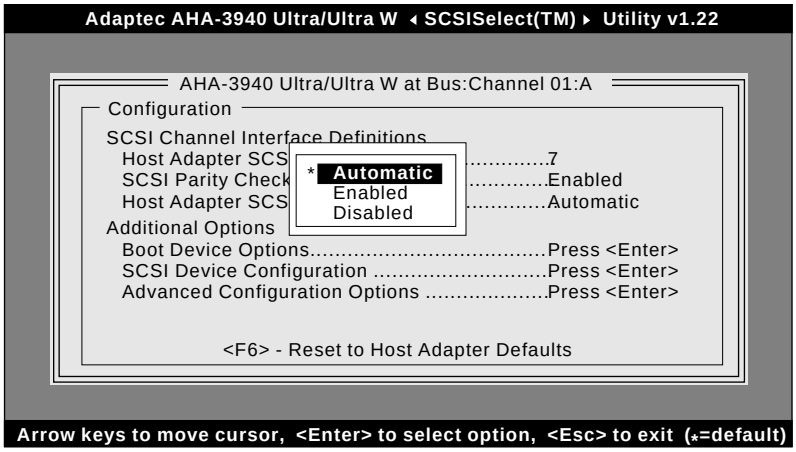



Figure 3-7. Host Adapter SCSI Termination Selection for AHA-3940U/3940UW/3940UWD

3. Highlight **Enabled** or **Disabled**, then press **Enter**.

## Boot Device Options

This option configures parameters for a SCSI boot device. When you select this option, a screen similar to Figure 3-8 appears.

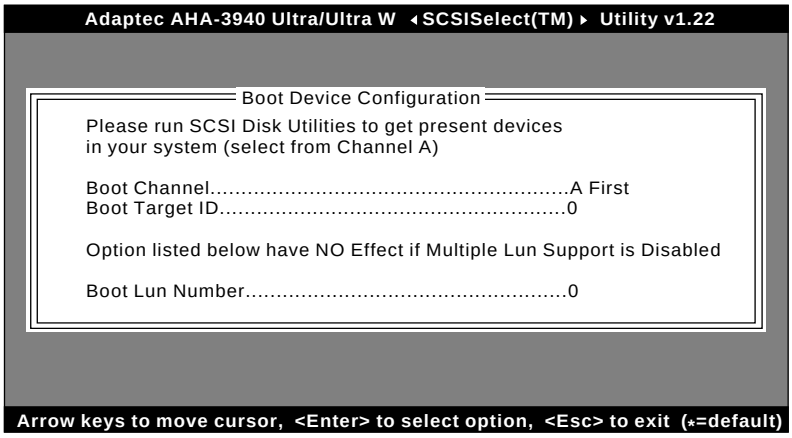



Figure 3-8. Boot Device Options



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#### Boot Channel

MultiChannel devices allow you to boot from either channel. Use this option to identify the channel which should be scanned first during bootup. The default is *A First*.

#### Boot Target ID

This option allows you to identify the SCSI device to be used as a boot device. The range is 0 to 15; the default is *0*.

#### Boot LUN Number

The AHA-3940U / 3940UW / 3940UWD supports up to eight logical units. This option allows you to identify the Logical Unit Number (LUN) to use during bootup. The default is *0*.

### SCSI Device Configuration

This option allows you to configure certain parameters of each SCSI device on the SCSI bus. When you choose this option for the AHA-3940UW / 3940UWD, a screen similar to Figure 3-9 appears. For the AHA-3940U, the screen differs in the Maximum Sync Transfer Rate and the absence of Initiate Wide Negotiation.

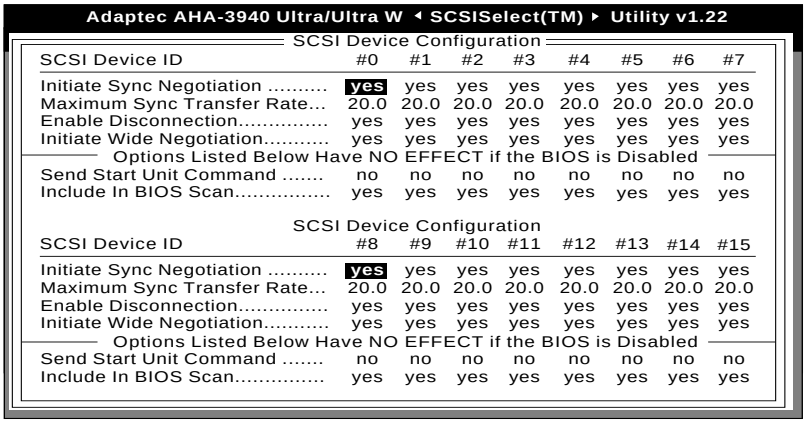



Figure 3-9. SCSI Device Configuration Screen for AHA-3940U

**Note:** The effective Maximum Sync Transfer Rate may differ from the listed Maximum Sync Transfer Rate. See *Maximum Sync Transfer Rate* on page 12.



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The screen has a column of information for each SCSI ID, including SCSI IDs that are not assigned to a device. To configure a specific SCSI device, you need to know its SCSI ID. See *SCSI Disk Utilities* on page 3-18 to learn how to determine the SCSI ID for each device.

To change a setting, use the arrow keys (↑↓) to highlight the setting, then press **Enter** to display a pop-up menu of choices. Use the arrow keys (↑↓) to highlight a choice, and press **Enter** to select it.

#### Initiate Sync Negotiation

This setting determines whether the channel initiates synchronous negotiation with the SCSI device. When set to **yes**, the channel initiates synchronous negotiation. When set to **no**, the channel does not initiate synchronous negotiation. The default setting is **yes**.

The channel always *responds* to synchronous negotiation when the SCSI device initiates it. Data is transferred in asynchronous mode if neither the channel nor the SCSI device negotiates for synchronous mode.



**Note:** Some older SCSI-1 devices do not support synchronous negotiation, so your computer might operate erratically if Initiate Sync Negotiation is enabled. Set Initiate Sync Negotiation to **no** for these devices.

#### Maximum Sync Transfer Rate

This setting determines the maximum synchronous data transfer rate that the channel can support.

- The AHA-3940U has a 8-bit channel that provides an *effective* maximum synchronous transfer rate of 20.0 MBytes / sec.
- The AHA-3940UW / 3940UWD has a 16-bit channel that provides an *effective* maximum synchronous transfer rate of 40.0 MBytes / sec (20.0 MBytes / sec per 8-bit channel).

The default is *10.0* MBytes / sec for the AHA-3940U, and *20.0* MBytes / sec for the AHA-3940UW / 3940UWD.The following table lists valid settings.



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| SCSI*Select* Transfer Rate (MBytes/sec) | AHA-3940U Effective Transfer Rate (MBytes/sec) | AHA-3940UW/AHA-3940UWD Effective Transfer Rate (MBytes/sec) |
|---|---|---|
| 20.0 | 20.0 | 40.0 |
| 10.0 | 10.0 | 20 |
| 8.0 | 8.0 | 16 |
| 6.7 | 6.7 | 13.4 |
| 5.0 | 5.0 | 10.0 |

In most cases, you can use the maximum value of 20.0. If Initiate Sync Negotiation is set to **no** for the device, then the value selected here is the maximum rate that the channel accepts from the device during negotiation. (This is standard SCSI protocol.)



**Note:** Some older SCSI-1 devices do not support Fast SCSI data transfer rates (20.0, 10.0, 8.0, and 6.7). This may cause your computer to operate erratically or hang at the higher transfer rates. Refer to the device's documentation and set the transfer rate accordingly.

#### Enable Disconnection

This setting determines whether the channel allows a SCSI device to disconnect from the SCSI bus (sometimes called Disconnect/Reconnect). Enabling disconnection allows the channel to perform other operations on the SCSI bus while the SCSI device is temporarily disconnected.

When set to **yes**, the SCSI device may disconnect from the SCSI bus. The SCSI device, however, may choose not to disconnect, even if permitted by the channel (this can usually be configured on the SCSI device). When set to **no**, the SCSI device cannot disconnect from the SCSI bus. The default setting is *yes*.

To optimize SCSI bus performance, leave Enable Disconnection set to **yes** if the channel connects to two or more SCSI devices. If the channel connects to only one SCSI device, set Enable Disconnection to **no** to achieve slightly better performance.



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#### Initiate Wide Negotiation

This setting, which appears only on AHA-3940UW / 3940UWD host adapters, determines whether the channel initiates negotiation with the SCSI device for Wide SCSI data transfers. When set to **yes** for a SCSI device, the channel initiates Wide negotiation with the SCSI device. When set to **no**, the channel does not initiate Wide negotiation with the device. The channel, however, always *responds to* Wide negotiation if the SCSI device initiates it. The default setting is *yes*.

#### Send Start Unit Command

This option, which is supported by some SCSI devices, determines whether the channel sends the Start Unit command (SCSI command 1B) to the SCSI device (most devices do not require this). Enabling this option reduces the load on your computer's power supply by allowing the channel to turn on SCSI devices one-at-a-time when the computer boots. Otherwise, all SCSI devices turn on at the same time. Most devices require you to set a jumper before they can respond to this command.

When set to **yes**, the channel sends the Start Unit command to the SCSI device during bootup. When set to **no**, each SCSI device powers up when the computer powers up. The default setting is *no*.



**Note:** The Send Start Unit Command setting is valid only if the channel BIOS is enabled.

If you set Send Start Unit Command to **yes** for more than one SCSI device, the channel first sends the Start Unit command to the device with the lowest SCSI ID. When this device responds, the Start Unit command is sent to the device with next highest SCSI ID with a setting of **yes**. The process continues until all supported devices respond to the channel.



**Note:** If many drives are set to **yes** for Send Start Unit Command, the boot time varies depending on how long it takes each drive to spin up.



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#### Include In BIOS Scan

During boot-up, the host adapter scans all devices looking for the boot device. This option allows you to include or exclude devices from this scan. It may be desirable to exclude certain non-boot devices from this scan in order to improve boot-up time. The boot device must not be excluded, otherwise your system will not boot.

### Advanced Configuration Options

When you select Advanced Configuration Options, a screen similar to Figure 3-10 appears. *Do not* change these nine settings unless you fully understand what they mean.

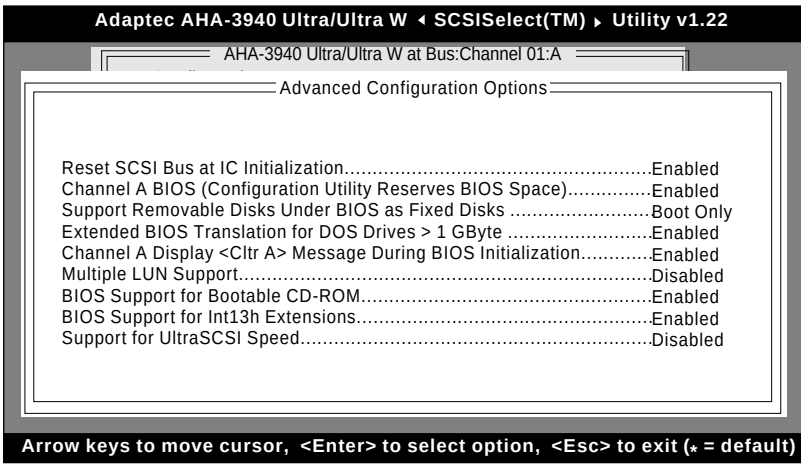



Figure 3-10. Advanced Configuration Options Screen

To change a setting, use the cursor keys (↑↓) to highlight the setting, then press **Enter** to display a pop-up menu of options. Use the arrow keys (↑↓) to highlight an option, and press **Enter** to select it.

#### Reset SCSI Bus at IC Initialization

During boot-up, the host adapter by default resets the entire SCSI bus. In certain configurations, particularly those with multiple host adapters on one SCSI bus, it may be desirable to disable this option. This option allos you to enable or disable the resetting of the SCSI bus by the host adapter at boot-up.

#### Channel BIOS

This setting enables or disables the host adapter BIOS. The default setting is *Enabled*. Each AHA-3940U / 3940UW / 3940UWD host



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adapter has one BIOS, which operates on both SCSI channels. The BIOS must be enabled if you want the computer to boot from a SCSI hard disk drive connected to either channel of the host adapter. Several SCSI*Select* options are only valid if the host adapter BIOS is enabled, as noted in the table on page 3-2.



**Note:** You can only change the Host Adapter BIOS setting when you are configuring SCSI Channel A. When you are configuring Channel B you can view the current BIOS settings in SCSI*Select*, but you cannot change them.

#### Support Removable Disks Under BIOS as Fixed Disks

This setting controls which removable-media drives are supported by the channel BIOS. The setting is valid only if the channel BIOS is enabled. The default setting is *Boot Only*. The following choices are available:

- **Boot Only:** Only the removable-media drive designated as the boot device is treated as a hard disk drive.
- **All Disks:** All removable-media drives supported by the BIOS are treated as hard disk drives.
- **Disabled:** No removable-media drives are treated as hard disk drives. In this situation, software drivers are needed because the drives are not controlled by the BIOS.



**Caution:** Support for removable-media drives means only that the channel BIOS *allows* you to use a removable-media drive as if it were a hard disk drive. It does *not* mean you can remove the disk during operation. If a removable-media SCSI device is controlled by the channel BIOS, *do not* remove the medium while the drive is on or you may lose data! If you want to remove media while the power is ON, install the removable-media device driver and set Support Removable Disks Under BIOS as Fixed Disks to **Disabled**.



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#### Extended BIOS Translation for DOS Drives > 1 GByte

This setting enables or disables extended translation for SCSI hard disks with a capacity greater than 1 GByte. The setting is valid only if the channel BIOS is enabled. The default setting is *Enabled*.

If extended translation is enabled, the following translation schemes are used:

- SCSI hard disks ≤ 1 GByte use a translation scheme of 64 heads, 32 sectors per track.
- SCSI hard disks > 1 GByte use a translation scheme of 255 heads, 63 sectors per track.

See Appendix C, *Disk Drives Over 1 GByte*, for more on this setting.

#### Channel A Display <Ctlr A> Message During BIOS Initialization

This option enables or disables the display of the SCSI*Select* message. The default is *Enabled*.

#### Multiple LUN Support

This option enables or disables support for multiple LUNs. The default is *Disabled*.

#### BIOS Support for Bootable CD-ROM

This option enables or disables BIOS support for bootable CD-ROM. The default setting is *Enabled*. The AHA-3940U / 3940UW / 3940UWD supports the El Torito specifications for bootable CD-ROMs.

#### BIOS Support for Int 13h Extensions

This option enables or disables BIOS support for Int 13h extensions. This feature provides a mechanism to support disks with more than 1024 cylinders and to add support for software control of drive locking for removable media. The default setting is *Enabled*.

#### Support for UltraSCSI Speed

This option allows you to enable or disable support for UltraSCSI speed. This is 20.0 MBytes for the AHA-3940U, and 40.0 MBytes for the AHA-3940UW / 3940UWD. The default is *Disabled*.

### Saving Configuration Changes

You save configuration changes as you exit SCSI*Select*. Press **Esc** until you are prompted to save the changes, then select **Yes** to save



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the changes or **No** to abandon them. If you select **Yes**, the system saves the changes and reboots with the new initial values.

## SCSI Disk Utilities

When you select SCSI Disk Utilities from the Options menu, SCSI*Select* scans the SCSI bus and lists all installed SCSI devices. A screen similar to Figure 3-11 appears, listing the SCSI ID assigned to each device on the SCSI bus.

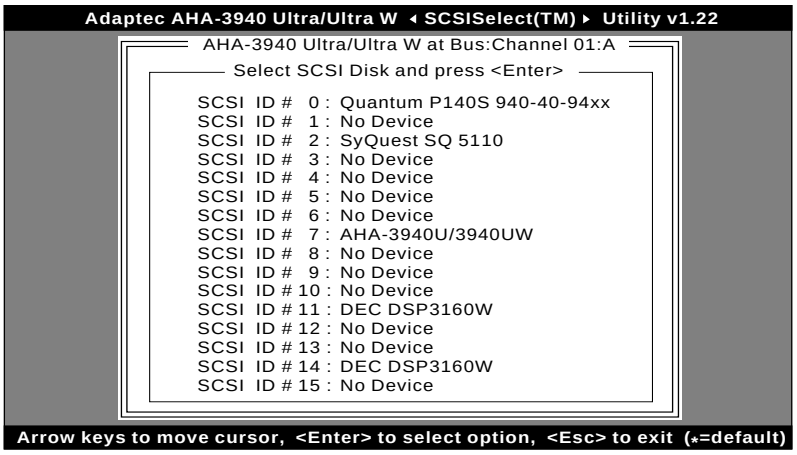



Figure 3-11. SCSI Disk Utilities Screen for AHA-3940UW/3940UWD

If you select a device, a small menu window appears. From this menu, you can select Format Disk or Verify Media. Use the arrow keys (↑↓) to highlight the option, then press **Enter** to display a pop-up menu with a list of values.

### Format Disk

The *Format Disk* utility performs a low-level format on disk devices. Your fixed disk media 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 and need not be formatted again. The Adaptec *Format Disk* utility is compatible with most SCSI disk drives. Run it on hard disk drives or removable-media drives that were previously used with a non-Adaptec host adapter.



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**Caution:** A low-level format destroys all data on the drive. Back up your data before performing this operation. You *cannot* abort a low-level format once it starts.

### Verify Disk Media

The *Verify Disk Media* utility scans the selected device's media for defects. If the utility finds bad blocks, it prompts you to reassign them; if you select **yes**, those blocks will no longer be used.



**Note:** You can press **Esc** at any time to abort the *Verify Disk Media* utility.

## Configuring Multiple Host Adapters

Follow these instructions if your computer has multiple host adapters:

- If you want your computer to boot from a specific SCSI drive, install that drive's host adapter in the slot with the lowest PCI Device number. The Device number is determined by the slot number on the PCI bus. Refer to your computer documentation to determine the PCI slot number and slot number order.
- If you are booting from a drive connected to an AHA-3940U / 3940UW / 3940UWD and you are using ISA / EISA-based host adapters to support secondary devices, disable the BIOS on all ISA / EISA-based host adapters.
- If you are booting from a drive connected to an ISA / EISA-based host adapter and you are using the AHA-3940U / 3940UW / 3940UWD to support a secondary device, read the documentation for the ISA / EISA-based host adapter to ensure that the host adapter is at the lowest BIOS base address.

  ISA / EISA-based host adapters that have their BIOS enabled boot before the AHA-3940U / 3940UW / 3940UWD.

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# 4

# Operating System Support

The Adaptec AHA-3940U/3940UW/3940UWD host adapter kit includes two software packages for managing devices. If your system runs on Windows or DOS, install the EZ-SCSI® software. If your system runs on NetWare®, OS/2, SCO UNIX, or UnixWare, install the Adaptec 7800 Family Manager.

You will find the management software particularly helpful if you intend to use any of the following:

- Any device other than CD-ROM drives or disk drives, such as SCSI tape drives, scanners, plotters, or WORM drives
- more than eight hard disk drives
- removable media, such as Bernoulli cartridges

## Adaptec EZ-SCSI Software

Adaptec EZ-SCSI 4.0, for DOS/Windows, Windows 95, and Windows NT™, is a menu-driven applications suite that manages all your SCSI peripherals. EZ-SCSI software includes these features:

- Graphical, fully automated Windows-based installation program with extensive on-line Help
- On-line tutorial with useful information about SCSI topics
- Support for a wide variety of SCSI devices, such as single-session/multisession Photo CD™, CD-ROM drives, Floptical®, and removable (MO) drives
- SCSI tape drive back-up utility



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- Audio CD-ROM player utility
- Scanner utility
- Utilities for viewing Photo CD images, writing to CD-ROMs, and more

To install support for SCSI devices such as optical disks, check the hardware documentation for those devices.

For details on how to install and use EZ-SCSI software, refer to the *Adaptec EZ-SCSI 4.0 Software Quick Reference Guide*, included in the AHA-3940U / 3940UW / 3940UWD package.

## Adaptec 7800 Family Manager

The Adaptec 7800 Family Manager Set, for the NetWare, OS / 2, SCO UNIX, and UnixWare operating systems, is included with the AHA-3940U / 3940UW / 3940UWD host adapter package. For details on how to install and use the Adaptec 7800 Family Manager Set, refer to the *Adaptec 7800 Family Manager Set User's Guide*.





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# 5

# Troubleshooting

AHA-3940U / 3940UW / 3940UWD host adapters have been tested for compatibility with a wide range of SCSI devices. Most problems that occur during installation result from errors in preparing and connecting devices on the SCSI bus. If you need more assistance after reading this troubleshooting information, see *Adaptec Technical Support and Services* on page ii.

Answer these questions first if a problem occurs during installation:

- Are you sure the motherboard BIOS supports PCI-to-PCI Bridges? If not, contact the computer vendor for a motherboard BIOS upgrade.
- Are the power cables and SCSI interface cables properly connected? (See *Connecting SCSI Cables and Devices* on page 2-5.) Connect internal SCSI devices to the computer power supply. Connect power cables of external SCSI devices to a grounded power outlet. Follow the instructions in the computer and SCSI device documentation.
- Is the host adapter firmly seated and secured in a 5-volt PCI bus slot that is capable of bus mastering? Check the computer's documentation, check its *Setup* program, or try another PCI slot.
- Is pin-1 orientation maintained throughout the SCSI bus? (See *Connecting Internal SCSI Devices* on page 2-6.)
- Are PCI bus and slot parameters set correctly in the computer's *Setup* program? (See *Configuring Multiple Host Adapters* on page 3-19.) The PCI bus is designed to assign IRQ, port address, and BIOS address settings automatically to the host



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adapter. But you may need to assign some of these values manually in the *Setup* program.

- Is the host adapter's IRQ or port address in conflict with any SCSI ID? Again, the PCI bus assigns IRQ, port address, and BIOS address settings automatically, but you may need to assign some of these values manually in *Setup*.
- Is each SCSI device, including the channel, set to a unique SCSI ID? (See *SCSI IDs* on page 2-14.)
- Is SCSI termination set correctly? (See *Terminating the SCSI Bus* on page 2-11.)

If your problem is still not resolved, continue with the next section.

## BIOS Startup Messages

After you install your host adapter, the host adapter BIOS displays a message when you boot your computer. Normally, this message lists the SCSI ID, manufacturer, model number, and other information for each SCSI device that the BIOS detects. If initialization fails, however, the host adapter BIOS displays a specific error message followed by a BIOS Installation Failure message. Here are some of these error messages and their meaning:

**Device connected, but not ready.**

This message appears if the channel receives no answer when it requests data from an installed SCSI device. The channel skips this device and moves on to the next device on the bus.

Do the following if you see this message when you request data from a SCSI drive:

1. Run SCSI*Select* and access SCSI Device Configuration. Locate the channel's SCSI ID and set Send Start Unit Command to **yes**.
2. Exit SCSI*Select* and request data from the drive again.
3. If the message still appears, follow the drive manufacturer's instructions to make sure the drive is set to spin up when the power is ON.

**Start unit request failed.**

The BIOS was unable to send a Start Unit command to the device. Run SCSI*Select* and disable Send Start Unit Command for the device.



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**Time-out failure during SCSI Inquiry command!**
or
**Time-out failure during SCSI Test Unit Ready command!**
or
**Time-out failure during Start Unit command!**
An unexpected time-out occurred. Check SCSI bus termination. Try disconnecting the SCSI peripheral cables from the channel and then starting the computer. If the computer starts successfully, check SCSI bus termination and cable connections. One of the devices on the SCSI bus could be defective.

**Host adapter configuration error.**
The motherboard BIOS did not assign an IRQ to the host adapter. Run the CMOS *Setup* program and check the IRQ assignments.

# Disk Drive Configuration Problems

This section describes situations that may occur if your computer has multiple disk drives, e.g. both SCSI and standard disk drives[1].

Standard hard disk drives can be set to *installed* or *not installed* with the *Setup* program supplied with the host computer. The *Setup* program specifies how many standard hard disks the computer recognizes, regardless of whether they are physically installed. SCSI drives are not controlled through the *Setup* program.

If both SCSI and non-SCSI disk drives are installed, then the non-SCSI disk drive is *always* the boot device.

## Booting the Computer from a SCSI Drive

- Check that both standard hard disks are mapped out of the computer using the *Setup* program; that is, set the *Setup* program to **No Drives Installed**.
- If you connect SCSI drives to both Channel A and Channel B and you want to boot from a drive on Channel B, use the Boot Channel feature of SCSI*Select* to select the Channel B drives to be scanned first. Otherwise, the host adapter BIOS will try to boot from the first drive it finds on Channel A. (The BIOS

[1] *Standard disk drive* means a disk drive attached to the computer through a standard ISA / EISA, non-SCSI disk controller—for example, an IDE drive.



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always scans Channel A first.) See *Boot Device Options* on page 3-10 for more information.

- Check that there are no SCSI ID conflicts. Refer to the disk drive manual to learn how to set the drive's SCSI ID. You can use SCSI*Select* to determine the SCSI IDs of devices on the SCSI bus, as described on page 3-18.
- Be sure that SCSI Parity Checking is consistently enabled or disabled on all devices on the SCSI bus. See *SCSI Parity Checking* on page 3-8.
- Always turn the computer's power OFF and ON after changing any values on a channel, in a *Setup* program, or on a SCSI device. This ensures that the new initial values are loaded.
- Check that the SCSI bus is properly terminated. See *Terminating the SCSI Bus* on page 2-11.
- Check that the intended boot disk has been formatted and has an active DOS partition. If the disk has not been formatted, run the *Format Disk* utility included in SCSI*Select*. See *SCSI Disk Utilities* on page 3-18.
- Check cable connections and pin-1 orientation.

## Using a Standard Drive as C and a SCSI Drive as D

- Use the *Setup* program to map the second standard hard disk (if one exists) out of the configuration.
- Be sure that SCSI Parity Checking is consistently enabled or disabled on all devices on the SCSI bus.
- Verify that the channel and the SCSI devices are properly configured and installed.
- Always turn the computer's power OFF and ON after changing any values on a channel, in a *Setup* program, or on a SCSI device. This ensures that the new initial values are loaded.
- Check that the SCSI bus is properly terminated.
- Check that the disk is formatted and has a DOS partition. If the disk has not been formatted, run the *Format Disk* utility included in SCSI*Select*. See *SCSI Disk Utilities* on page 3-18.
- Check cable connections and pin-1 orientation.



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## Using SCSI Drives as C and D

- Make sure your computer's CMOS *Setup* program is set to **No Drives Installed**.
- The drive with the lowest SCSI ID is automatically used for boot-up. Refer to the disk drive manual to learn how to set the drive's SCSI ID. You can also use SCSI*Select* to specify the boot-up drive; see page 3-18.
- Always turn the computer's power OFF and ON after changing any values on a channel, in a *Setup* program, or on a SCSI device. This ensures that the new initial values are loaded.
- Make sure SCSI Parity Checking is consistently enabled or disabled on all devices on the SCSI bus.
- Verify that the channel and the SCSI devices are properly configured and installed.
- Check that the SCSI bus is properly terminated.
- Check that the disk is formatted and has a DOS partition. If the disk has not been formatted, run the *Format Disk* utility included in SCSI*Select*. See *SCSI Disk Utilities* on page 3-18.

## Computer Hangs, or Channel Cannot Find the Drives

- Check SCSI parity for consistency
- Check for correct SCSI termination on each device.
- Check cable length and integrity. Check pin-1 orientation.
- If the host adapter LED stays on when the computer hangs, the host adapter might be interfering with your computer's operation. Is the adapter installed in a PCI slot that does not support bus mastering? See your computer documentation.



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# Other Problems and Solutions

**The screen is difficult to read when I run SCSI*Select*.**
Press **F5** to toggle the display between color and monochrome modes. This may make it easier for you to read the screen.

**When I tried to use the format/verify utility on a disk device, I got an Unexpected SCSI Command Failure pop-up box with a lot of error information. What does this mean?**
This probably means that the utility found a problem with the disk device or the medium, so it can't run. The following data appear:

- SCSI Target ID of the device
- SCSI CDB Sent (e.g., 2F 00 00 00 00 00 00 08 00 00)
- Host Adapter Status (e.g., 11h - Selection Timeout)
- Target Status (e.g., 00h - Good Status)
- Sense Key (e.g., 06h - Unit Attention)
- Additional Sense Code
- Additional Sense Code Qualifier

You can probably determine from the Sense Key information both the cause of the problem and its solution. Here are some of the more common Sense Key values and their meanings:

- 02h - Not ready
  The medium is not ready to format. Check that medium is inserted in the drive and spun up.
- 03h - Medium error
  The disk medium may be defective. If it is a removable-media drive, try using a different disk. If it is a hard disk drive, the disk may be physically damaged. Verify and format the medium with SCSI*Select*.
- 04h - Hardware error
  The disk drive may be defective. Read the hardware documentation and contact the manufacturer.
- 05h - Illegal request
  The Adaptec formatting utility does not support a low-level format of this device. The device may already be low-level formatted by the manufacturer.



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- 06h - Unit attention
  The removable medium may be write-protected. Disable write protection and run the utility again.

The Additional Sense Code field provides more information about the error. Check your hardware manual for explanations.

**My computer locks up when I press Esc to exit SCSI*Select*.**

If this happens, turn your computer OFF and then ON to reboot. Any settings you changed before you tried to exit the program were recorded in the EEPROM and are not lost.

**One of the SCSI devices on my computer doesn't allow me to disable termination. How can I attach it to the SCSI bus?**

You might be able to attach this device on the end of the SCSI bus so you do not need to disable termination on it. If this is not possible, contact the manufacturer about other possible solutions.

**I connected my computer's LED cable to the host adapter. Now the light stays on all the time and my computer hangs.**

The red LED on the AHA-3940U / 3940UW / 3940UWD normally lights up when there is activity on the SCSI bus. If the light stays on when there is no activity on the bus, it may mean that the internal SCSI cables are reversed. Turn OFF the computer and check the pin-1 orientation of the internal SCSI cable connectors. See *Connecting Internal SCSI Devices* on page 2-6.





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# A

# Multiple Computer Configuration

Normally your AHA-3940U / 3940UW / 3940UWD SCSI bus configuration includes one host adapter installed in one computer, with one or more internal and / or external SCSI devices attached to each channel on the host adapter. However, two computers can share SCSI devices without changing the cable configuration every time one of the computers needs access to the devices.

To allow computers to share SCSI devices, install a jumper shunt on the J3 (for Channel B) or J6 (for Channel A) termination jumper of your AHA-3940U / 3940UW / 3940UWD host adapter. Then connect the AHA-3940U / 3940UW / 3940UWD channel, the SCSI peripherals, and the host adapter in the second computer. Figure A-1 shows this arrangement.

**Caution:** Boot up only one computer at a time, so that initial negotiations with the devices are not interrupted.

The host adapter in each computer acts as a terminator at its end of the SCSI bus. There are certain restrictions to this arrangement, as explained below.

## Restrictions and Requirements

- You must install a jumper shunt on the J3 (for Channel B) or J6 (for Channel A) termination jumper of the host adapter during installation.



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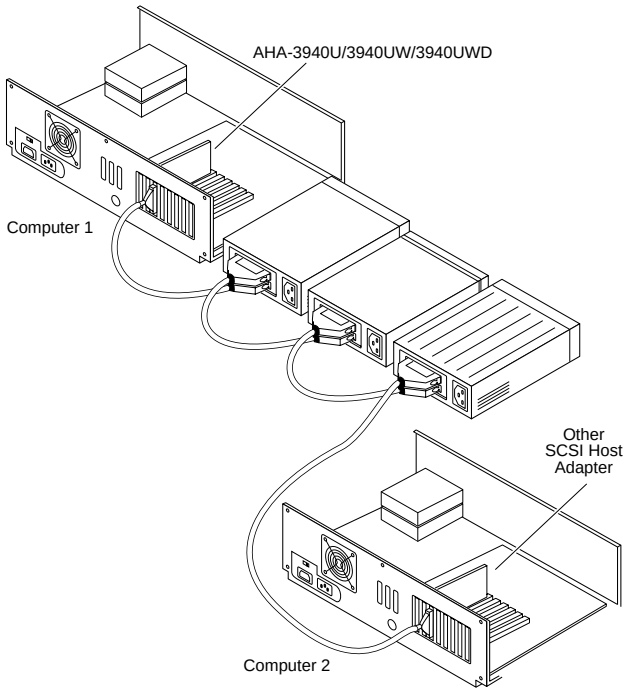



Figure A-1. SCSI Devices Shared by Two Computers

- Only *external* SCSI peripherals can be attached to the bus between the two host adapters. Devices cannot be shared if you have CD-ROM or internal SCSI drives, for example, in either computer.
- The Adaptec host adapter in the second computer does not have to be an AHA-3940U / 3940UW / 3940UWD, but it must be capable of active termination when it is turned off. Most Adaptec host adapters can be actively terminated; check the host adapter documentation.
- You must assign different SCSI IDs to the AHA-3940U / 3940UW / 3940UWD channel and the host adapter in the second computer. IDs 6 and 7 are preferable, since they have the highest priority on the SCSI bus.

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# ▼▼▼▼B

# Optimizing Performance

Read this appendix to find out how to optimize your computer's performance and take full advantage of the AHA-3940U / 3940UW / 3940UWD advanced design features.

## Enabling Synchronous Negotiation

*Synchronous negotiation* is a SCSI feature that allows the SCSI channel and its attached SCSI peripheral devices to negotiate for the transfer of data in synchronous mode on the SCSI bus. Synchronous data transfer is faster than asynchronous data transfer.

The SCSI*Select* Initiate Sync Negotiation option is *Enabled* by default for each device on the SCSI bus. You should normally leave this option enabled because most SCSI devices support it and because it allows for faster data transfer; however, a few SCSI devices (e.g., some CD-ROM drives) do not support synchronous negotiation and may malfunction if they receive a request for it. If any such device is installed on your computer, you should disable Initiate Sync Negotiation for that device. See *Initiate Sync Negotiation* on page 3-12.



**Note:** Even when synchronous negotiation is disabled on the channel, the channel still switches to synchronous mode if it receives a request for synchronous data transfer from a SCSI device on the bus.



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## Enabling Wide Negotiation

Wide Negotiation is enabled (set to *yes*) by default on the AHA-3940U / 3940UW / 3940UWD. For each 16-bit SCSI device connected to the host adapter, Wide Negotiation should normally be enabled to allow for 16-bit data transfer instead of 8-bit. See *SCSI Device Configuration* on page 3-11.



**Note:** Even when Wide Negotiation is disabled on the host adapter, the host adapter will still switch to Wide Negotiation if it receives a request for it from the SCSI device.

## Disabling the Channel BIOS

Disabling the channel BIOS saves you 16 KBytes of memory address space and can also shorten boot-up time by as much as 60 seconds. *Reset SCSI Bus at IC Initialization* on page 3-15 explains how to change the Channel BIOS option in SCSI*Select*.

You should disable the channel BIOS if the peripherals on the SCSI bus (for example, CD-ROM drives) are controlled by device drivers and do not need the BIOS.

## Enabling SCSI Parity Checking

SCSI Parity Checking, which is *Enabled* by default, verifies the accuracy of data transfer on the SCSI channel. To use this option, make sure that parity checking is enabled on each SCSI device and on the SCSI channel. *SCSI Parity Checking* on page 3-8 explains how to change this setting in SCSI*Select*. Read the device documentation to learn how to enable parity checking on SCSI devices.

You should disable SCSI Parity Checking on the channel only if any of your SCSI devices does not support it.

## Setting Enable Disconnection

In the DOS environment you can increase performance slightly if you set Enable Disconnection to **no** when there is only one device on the SCSI bus. You should set this option to **yes**, however, if you have more devices on the SCSI bus. See *Enable Disconnection* on page 3-13 to learn more about this option.



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## Enabling Send Start Unit Command

This option, which is supported by some SCSI devices, reduces the load on your computer's power supply by allowing the channel to turn on disk devices and other peripherals one-at-a-time when the computer boots. Otherwise, all peripherals turn ON at the same time.

Send Start Unit Command is *Disabled* (set to *no*) by default. Check your hardware documentation before you enable (set to *yes*) this option, to make sure your devices support it. Then change the switch or jumper settings on the device to enable the option. See *Send Start Unit Command* on page 3-14 for more information about this option.

Try enabling Send Start Unit Command for one peripheral at a time, rebooting each time to make sure each SCSI device works properly. (Some older disk devices do not support this option and may malfunction if they receive the command.)

The Send Start Unit Command has no effect if the channel BIOS is disabled.

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# C

# Disk Drives Over 1 GByte

## Extended Translation (Using MS-DOS 5.0)

Adaptec host adapters have always supported the full range of disk drive capacities under all major operating systems. As disk drives have recently grown beyond 1 GByte in formatted capacity, they have run up against the DOS 1024-cylinder limit.

To continue its support for all SCSI disk drive capacities under DOS, Adaptec has included an extended translation scheme for AHA-3940U / 3940UW / 3940UWD host adapters. This feature supports disk drives as large as 8 GBytes under DOS. *Extended BIOS Translation for DOS Drives > 1 GByte* on page 3-17 explains how to change the setting of this option in the SCSI*Select* utility.

## The DOS 1 GByte Limit

All current versions of DOS are limited to 1024 cylinders per drive. The standard translation scheme for SCSI host adapters, using 64 heads and 32 sectors, provides a maximum accessible capacity of 1 GByte.

To eliminate the 1 GByte limit, Adaptec's extended translation feature uses 255 heads and 63 sectors, extending the disk drive capacity limit under DOS to 8 GBytes.



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**Caution:** Be sure to *back up* your disk drive before you change the translation method on a disk drive. All data is erased when you change from one translation scheme to another.

## When Not to Use Extended Translation

- NetWare and the newer versions of UNIX do not share the 1024 cylinder limit of DOS and do not require extended translation to support large disk drives.
- Drives are sometimes formatted with two or more partitions for different operating systems. Use standard translation when the sum of the DOS partitions is less than 1 GByte. Partitions for UNIX and NetWare can be larger than 1 GByte when using standard translation.

**Note:** UNIX is understood to be SCO v3.2.4 (or later), SCO UnixWare all versions, and SCO Open Server.

## Installing or Repartitioning Disks

To install a new disk, or to repartition an existing disk, use the *fdisk* DOS utility as you normally would. The cylinder size increases to 8 MBytes when you enable extended translation. The size of the partition you request must therefore be a multiple of 8 MBytes. If you request a partition size that is not a multiple of 8 MBytes, *fdisk* rounds up to the nearest whole multiple of 8 MBytes.

## Extended Translation With SCSI Drives Smaller Than 1 Gbyte

Drives handled by the BIOS use extended translation if their formatted capacity is greater than 1 GByte. Drives smaller than 1 GByte of formatted capacity use standard translation regardless of whether extended translation is enabled.

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