1 Getting Started

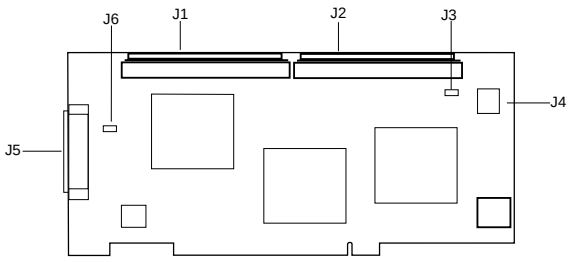
This *Installation Guide* tells you how to install and configure AHA®-3940U / 3940UW / 3940UWD PCI-to-UltraSCSI host adapters. These host adapters have two SCSI channels which operate like *two independent host adapters.* AHA-3940U / 3940UW / 3940UWD host adapters are designed for computers with PCI slots. PCI is a local bus interface that enables high-speed data transfer. *The computer in which you install the host adapter must be PCI 2.0 or PCI 2.1-compliant, and the motherboard BIOS must support PCI-to-PCI Bridges (PPB).* If you're not sure whether the motherboard BIOS supports PCI-to-PCI Bridges, ask the motherboard or computer manufacturer.

The AHA-3940U supports up to seven 8-bit SCSI devices on each 8-bit SCSI channel. The AHA-3940UW / 3940UWD supports up to fifteen 16-bit or 8-bit SCSI devices on each 16-bit Wide SCSI channel; up to seven of these can be 8-bit devices. Installation procedures are the same for all three host adapter models.

2 Board Layout

The following diagrams and table show the major AHA-3940U, AHA-3940UW, and AHA-3940UWD components.

AHA-3940U



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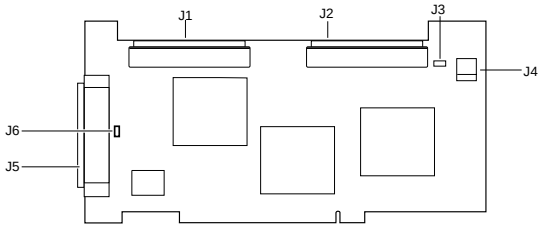
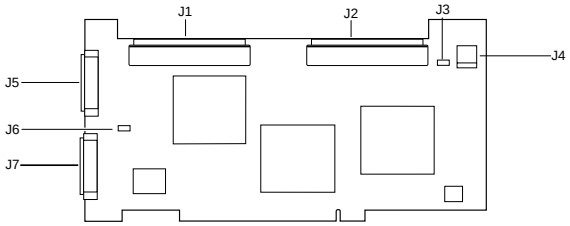
AHA-3940UW



AHA-3940UWD



Location	Description
J1	Internal SCSI connector, Channel A[1]
J2	Internal SCSI connector, Channel B[1]
J3	Multiple computer termination jumper, Channel B[2]
J4	External LED connector
J5	AHA-3940U/3940UW: External SCSI connector, Channel A[3] AHA-3940UWD: External SCSI connector, Channel B[4]
J6	Multiple computer termination jumper, Channel A[2]
J7	AHA-3940UWD only: External SCSI connector, Channel A

1 This is a 68-pin connector on the AHA-3940UW/3940UWD and a 50-pin connector on the AHA-3940U.

2 See *Termination in Multiple Computer Configurations* on page 6.

3 50-pin connector on the AHA-3940U, and 68-pin connector on the AHA-3940UW/3940UWD.

4 68-pin connector, very high density

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3 Default Setting

AHA-3940U / 3940UW / 3940UWD host adapters operate correctly with their factory default settings in most computers with PCI slots. The following table lists the settings and their default values. You can change these settings with the SCSI*Select* utility. (See *Configuring the Host Adapter* on page 8.)

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)
Advanced Host Adapter Settings	**Default Setting**
Plug and Play SCAM Support	Disabled
Channel BIOS	Enabled
Support Removable Disks under BIOS as Fixed Disks[4]	Boot Only
Extended BIOS Translation for DOS Drives > 1 GByte[4]	Enabled
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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4 Installing the Host Adapter

Inserting the Host Adapter in a PCI Slot

WARNING: Turn OFF and disconnect the power to your computer and attached devices before you remove the chassis cover.

1. Remove the cover from the computer case.
2. Locate an unused PCI expansion slot that supports bus mastering. Make sure this slot is not obstructed by other system hardware.

   PCI bus slots are usually 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. That is, it may have an ISA or EISA connector *and* a PCI connector, but only one kind of board can be inserted in the slot at any one time.
3. Remove the corresponding expansion slot cover from the computer chassis and save the screw.
4. Hold the host adapter directly over the bus master 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.
5. Attach the host adapter bracket to the computer chassis with the screw from the expansion slot cover that you removed.

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

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5 Connecting SCSI Devices

Caution: AHA-3940U / 3940UW / 3940UWD host adapters support only *single-ended* SCSI devices. Do *not* connect *differential* SCSI devices, because they may damage the host adapter. Read the SCSI device documentation if you are not sure whether the device is single-ended or differential.

Connecting Cables

SCSI devices are cabled together in a single, connected series called the *SCSI bus*. SCSI cables must run sequentially from one device to the next, with no branching.

1 Lay out the cables and find the pin-1 element of each cable and device connector.

   On *internal* cables, pin 1 is usually marked with a contrasting color on one edge of the ribbon cable, and a small triangle or number *1* marks pin 1 on the SCSI connector. *External* cables can only be plugged in one way, so pin-1 orientation is automatic.

2 Attach the SCSI cable(s) to the host adapter and the device(s), using the internal and / or external connector(s). Be sure to maintain correct pin-1 orientation throughout the bus for each channel. If you are connecting 8-bit SCSI devices to either channel of an AHA-3940UW or AHA-3940UWD, you will need 68-pin-to-50-pin converters. Refer to the User's Guide for detailed information.

   On the AHA-3940U / 3940UW host adapters, SCSI Channel A has one external and one internal connector. These are labeled J5 and J1, respectively, in the diagrams on pages 1 and 2. SCSI Channel B has an internal connector only (J2).

   The AHA-3940UWD host adapter has two external connectors (J7 and J5) and two internal connectors (J1 and J2) — one of each type of connector for each channel.

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When any UltraSCSI devices are connected to the host adapter and configured to run at *Ultra*SCSI speed, the total length of all cables on the same channel (internal and external) must not exceed 3 meters (9.8 feet) to ensure reliable operation. When no UltraSCSI devices are connected, the total length of all cables must not exceed 6 meters (19.7 feet). See your device's documentation to determine whether it is an UltraSCSI device.

Terminating the SCSI Bus

The last physical SCSI device on each end of the SCSI bus must be terminated. Termination must be disabled on all other devices in the middle of the SCSI bus. You may need to change the termination setting on some devices in your computer system.

Terminating the Host Adapter

Host adapter termination is controlled by the SCSI*Select* utility. The default setting is *Automatic*, which works like this:

- For Channel A on the AHA-3940U / 3940UW, and both channels on the AHA-3940UWD, if the host adapter detects that a device is connected to its internal and external connectors, it disables its terminators. Otherwise, the terminators are enabled.
- For Channel B on the AHA-3940U / 3940UW, *Automatic* mode is the same as *Enable* mode.

If you need to change host adapter termination, complete the physical installation, then run SCSI*Select* as described in *Configuring the Host Adapter* on page 8.

Termination in Multiple Computer Configurations

If you are setting up your SCSI bus so that SCSI devices are shared by host adapters in two different computers, you can enable your host adapter to provide termination power even when one computer is powered OFF. To do this, place a jumper shunt on jumper J6 if the second computer is connected to SCSI Channel A or on jumper J3 if the second computer is connected to SCSI Channel B.

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This feature works only when one computer is turned off, and the other computer connected to the same SCSI bus accesses the disk drives and other SCSI devices on the bus.

Setting SCSI IDs

You must assign a *different* SCSI ID to each device on the SCSI bus connected to the AHA-3940U / 3940UW / 3940UWD host adapter. See your SCSI device documentation to learn how to determine the ID and change it.

- ID 7 is the default SCSI ID for the host adapter on both SCSI Channels A and B. You can change the ID(s) in SCSI*Select*, if necessary. See *Configuring the Host Adapter* on page 8.
- SCSI devices connected to an AHA-3940U can have IDs from 0 to 7. SCSI devices connected to an AHA-3940UW or AHA-3940UWD can have IDs from 0 to 15. (The host adapter itself uses one SCSI ID on each channel.)
- The SCSI IDs on one SCSI channel do not interfere with the IDs on another SCSI channel.
- If you have two host adapters connected to the same SCSI bus, be sure to assign them different SCSI IDs, preferably IDs 7 and 6.

6 Completing the Installation

1. Put the chassis cover back on the computer, following the directions in the documentation.
2. Be sure all power switches are OFF, then reconnect power cables to your computer.
3. Turn ON the power for the computer and the peripheral device(s).
4. If your system CMOS *Setup* requires you to enable PCI bus parameters, do so now. Refer to your computer documentation.

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Note: The PCI bus is supposed to automatically assign Interrupt channels (IRQs) and port addresses. But because PCI is currently combined with other bus architectures such as ISA and EISA, you may need to edit the PCI bus parameters in your CMOS *Setup*.

When the computer boots, the host adapter BIOS sign-on message appears on the screen. This message includes a list of installed SCSI devices and information about the BIOS. In most cases your computer, host adapter, and SCSI devices are ready to use, and you do not need to run SCSI*Select*.

7 Configuring the Host Adapter

Your AHA-3940U / 3940UW / 3940UWD host adapter includes the built-in SCSI*Select* configuration utility. SCSI*Select* lets you change host adapter settings, such as SCSI Parity Checking and Host Adapter SCSI ID, without opening your computer or flipping switches.

To run SCSI*Select*, press **Ctrl-A** immediately when the SCSI*Select* message appears on the screen at the time your computer boots.

Use the arrow (↑↓) and **Enter** keys to make selections in the SCSI*Select* Options menu. Press **Esc** at any time to return to the previous menu. You can press **F6** to restore the *original* default settings. To abandon changes you made in the Configure / View Host Adapter Settings menu, press **Esc** and select **No** when asked if you want to save the changes.

The first SCSI*Select* screen asks you to choose SCSI Channel A or Channel B. You can only configure one SCSI channel at a time. If you have multiple host adapters, the screen displays a list of SCSI channels for all installed host adapters.

Configure/View Host Adapter Settings

The Configuration screen displays the basic options for *each* SCSI channel: Host Adapter SCSI ID, SCSI Parity Checking, Host Adapter SCSI Termination,

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Boot Device Options, SCSI Device Configuration, and Advanced Configuration Options. Highlight an option and press **Enter** to see a list of possible values.

Select **SCSI Device Configuration** to see a menu of the following options for each device on the SCSI bus: Initiate Sync Negotiation, Maximum Sync Transfer Rate, Enable Disconnection, Send Start Unit Command, and Initiate Wide Negotiation (AHA-3940UW/3940UWD only). These settings apply to individual SCSI devices.

Select **Advanced Configuration Options** for a menu that includes these advanced options: Channel BIOS (Configuration Utility Reserves BIOS Space), Support Removable Disks as Fixed Disks, and Extended BIOS Translation for DOS Drives > 1 GByte.

SCSI Disk Utilities

When you select **SCSI Disk Utilities** from the Options menu, a list of installed SCSI devices appears. When you select a device the Utilities menu appears, giving you the following two choices:

- Format Disk—runs the Adaptec SCSI low-level format utility. Most SCSI devices are preformatted and do not need to be formatted again.
- Verify Disk Media—scans the selected device's media for defects. If bad blocks are found, you are prompted to reassign them; if you select **Yes**, those blocks are no longer used.

8 Operating System Software

Your host adapter is supported by the following operatingsystems: DOS, Windows 3.x, Windows 95, Windows NT, Novell NetWare, OS/2, Unix, and UnixWare.

Under MS-DOS 5.0 or later, you can install up to eight hard disk drives (SCSI or non-SCSI) in your computer without using additional software. Older versions of DOS support up to two hard disk drives.

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You can make the host adapter treat removable-media drives as hard disk drives. To do this, run the SCSI*Select* utility, select **Advanced Configuration Options**, and set the **Support Removable Disks Under BIOS as Fixed Disks** option to **All Disks**.

Caution: If you use this setting, you *cannot* remove media while your computer is ON.

You need additional software if you want to do the following (contact Adaptec for additional drivers):

- Use devices other than hard disk drives, such as SCSI tape drives, CD-ROM drives, scanners, etc.
- Remove and insert CD-ROM discs and other removable media while your computer is running
- Support more than eight hard disk drives under MS-DOS 5.0 or later

Adaptec EZ-SCSI® Software

Adaptec EZ-SCSI software for DOS, Windows® 3.x, Windows 95®, and Windows NT™ is included in the kitted version. Use the menu-driven software to install drivers and configure your DOS/Windows operating system automatically.

Other Operating Environments

AHA-3940U/3940UW/3940UWD host adapters support Novell NetWare, OS/2, SCO Unix, and SCO UnixWare operating systems. The Adaptec 7800 Family Manager Set is included in the kitted version so that you can install the appropriate driver for your system. Refer to the Adaptec *7800 Family Manager Set User's Guide* (included) for detailed information.

9 Troubleshooting Checklist

If you have a problem during installation, check these items first:

- Is your computer PCI 2.0 or PCI 2.1-compliant, and does the motherboard BIOS support PCI-to-PCI Bridges (PPB)? If not, contact your computer manufacturer for a BIOS upgrade.

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- Are all SCSI devices powered?
- Are all SCSI bus cables and power cables properly connected?
- Does the host adapter and each device on each SCSI bus channel have a unique SCSI ID?
- Are all devices on the SCSI bus terminated properly?
- Does your system CMOS *Setup* require you to enable PCI bus parameters? If so, see your computer documentation. Confirm the IRQ channel assignment.
- Is the host adapter installed in a PCI slot that supports bus mastering? Refer to your computer documentation or move the host adapter to a different PCI slot.

Computer Will Not Boot from a SCSI Disk Drive

If both SCSI and non-SCSI disk drives are installed in your computer, the non-SCSI drive is always the boot device. If the computer has only SCSI disk drives, check the following:

1. Make sure your computer's CMOS *Setup* is set to **No Drives Installed**.
2. Make sure the boot partition of the boot hard disk is active. (The SCSI ID is usually set with jumpers or switches on the drive.)
3. Partition the disk. See the *Operating System usre's guide* for instructions.

If this does not solve the problem, there are more suggestions in chapter 5 of the *User's Guide*. As a last resort, you can *back up all data* on the SCSI hard disk and perform a low-level format with the SCSI*Select* Format Disk option.

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10 Adaptec Technical Support and Services

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

Electronic Support

Technical information, including product literature, answers to commonly asked questions, information on software upgrades and other topics is available electronically through the following:

- Adaptec World Wide Web (WWW) site at http://www.adaptec.com.
- File Transfer Protocol (FTP) server at ftp.adaptec.com.
- CompuServe Adaptec Forum at GO ADAPTEC.
- Adaptec USA Bulletin Board Service (BBS) at 408-945-7727; supports up to 28,800 bps (bits per second), 8 data bits, 1 stop bit, no parity. No product literature is available on the Adaptec BBS.
- Interactive Fax System at 408-957-7150.

Technical and Product Support

- For technical support and information about many of Adaptec's electronic support services, call 800-959-7274 or 408-945-2550, 24 hours a day, 7 days a week.
- To use the Adaptec Interactive Support System, call 800-959-7274 or 408-945-2550, 24 hours a day, 7 days a week The system prompts you with questions regarding your problem and then provides step-by-step troubleshooting instructions.
- To speak with a product support representative, call 408-934-7274, M–F, 6:00 A.M. to 5:00 P.M., Pacific Time. After hours, on weekends, and on holidays, product support is also available for a fee at 800-416-8066.

Sales and Ordering Information

- For sales information, call 800-959-7274 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 800-442-7274 or 408-957-7274, M–F, 6:00 A.M. to 5:00 P.M., Pacific Time.
- To request additional documentation for Adaptec products, call 800-934-2766 or 510-732-3829, M–F, 6:00 A.M. to 5:00 P.M., Pacific Time.

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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.

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.

Adaptec, Inc.
691 South Milpitas Blvd.
Milpitas, CA 95035

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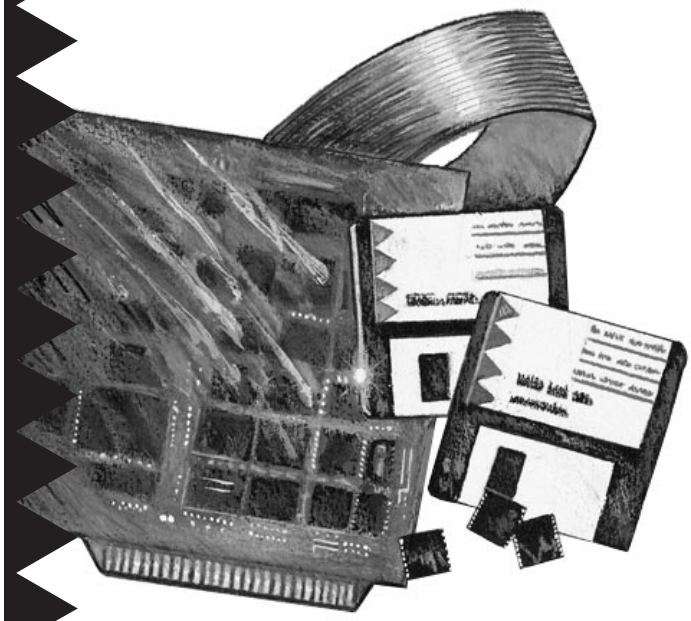

AHA-3940U / 3940UW / 3940UWD

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

adaptec®

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