

# Installation Guide

## AHA-2930B



### PCI-to-Fast SCSI Host Adapter with SCSISelect

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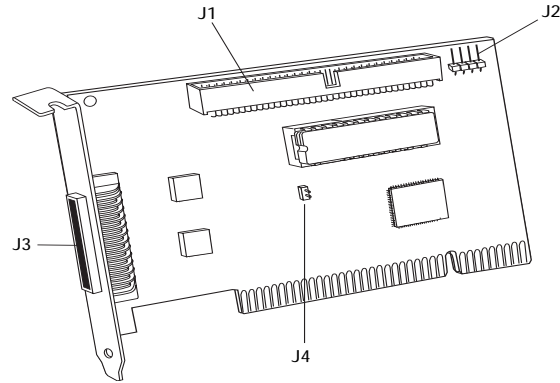
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# Introduction

The AHA<sup>®</sup>-2930B host adapter provides a powerful multitasking interface between your computer's PCI bus and SCSI devices (disk drives, CD-ROM drives, scanners, tape drives, removable-media drives, etc.). You can connect up to seven 8-bit SCSI devices to your host adapter. The following figure shows the major components of the AHA-2930B host adapter.



Label	Description
J1	50-pin 8-bit internal SCSI connector
J2	External LED connector
J3	50-pin 8-bit high-density external SCSI connector
J4	PC/Mac auto detection jumper (ON for Macintosh; OFF for PC/AUTOMATIC)

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# Installation

## *Installing the Host Adapter*



**WARNING:** Before beginning the installation,

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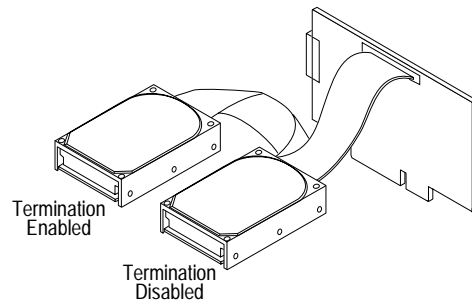
**Step 6:** Make sure that all SCSI devices have unique SCSI ID's from 0 to 6. (Refer to your device documentation for SCSI ID settings and instructions on manually changing the default settings.)

If you are installing external SCSI devices only, replace the computer chassis cover and skip to *Installing External SCSI Devices* on page 4.

## Installing Internal SCSI Devices

**Step 1:** Install or enable terminators on the internal SCSI device that you plan to connect to the *end* of the internal cable. Then remove or disable terminators on all other internal devices.

On most internal SCSI devices, you control termination by setting a jumper or a switch, or by physically removing or installing a resistor module(s). Refer to the device's documentation to determine how to enable or disable termination on your particular device.



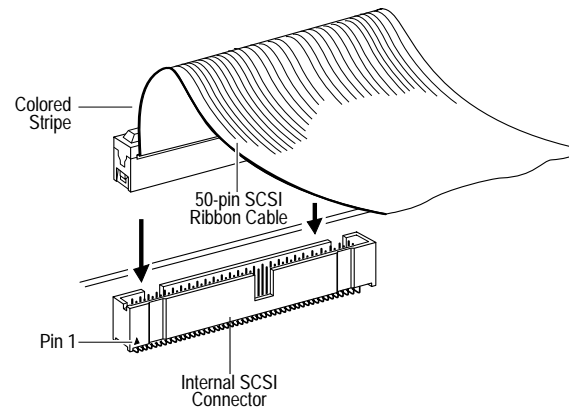
**Step 2:** Install and mount each internal SCSI device inside your computer. (Refer to your computer and device documentation for instructions.)

If you purchased your AHA-2930B as part of an Adaptec kit, the kit includes one 50-pin internal SCSI cable that allows you to connect up to two internal SCSI devices.

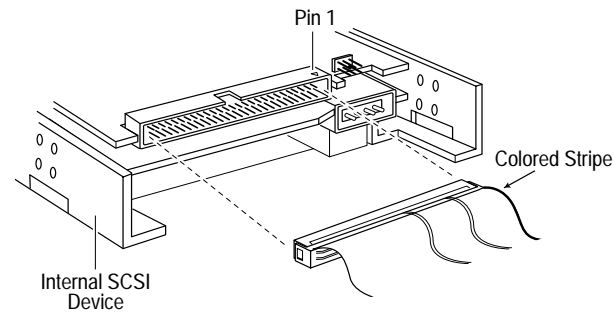
**Step 3:** Plug one end of your 50-pin internal SCSI cable into the host adapter's internal SCSI connector. To connect more than two internal devices, use a SCSI cable with enough connectors to accommodate all of your devices.

Make sure that the colored stripe on one side of the cable is aligned with pin-1 of the host adapter's connector.

Pin-1 of the connector is usually designated by a small triangle (▲), or a "1" on the connector.



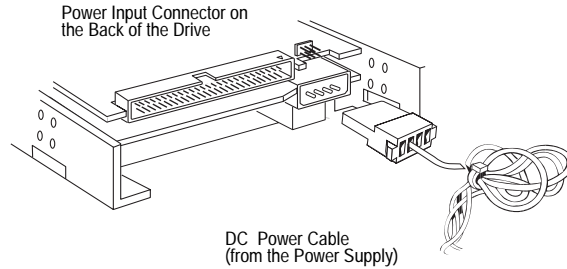
**Step 4:** Plug the other end of the 50-pin internal SCSI cable into one of the connectors on the last internal SCSI device in the chain. (This device must be terminated.) Make sure the colored stripe on the side of the cable is aligned with pin-1 of the SCSI device's connector.



**Step 5:** Plug the remaining cable connectors into any remaining internal devices. (These devices must *not* be terminated.)

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**Step 6:** Connect a DC power cable from your computer's power supply to the power connector on the SCSI device.



**Step 7:** Replace the computer chassis cover.

## Installing External SCSI Devices

**Step 1:** Plug one end of a 50-pin high-density external SCSI cable into the host adapter's external SCSI connector. Plug the other end of the external SCSI cable into one of the connectors on the external SCSI device. If you are installing only one external device, enable the device termination or attach a terminating plug to the device.

**Step 2:** To connect additional external SCSI devices, daisy-chain each device to the previous device until all devices are connected to each other. (The device at the end of the chain must have a terminating plug or have the on-board terminator enabled.) You need a 50-pin high-density external SCSI cable to connect external devices to the host adapter.

**Step 3:** Reconnect the power cables to the computer and external SCSI devices. Then turn ON the power to the external devices and the computer.

If you plan to boot your computer from a SCSI device attached to the host adapter such as a hard disk drive, run the *SCSISelect* utility, as described in *Using SCSISelect (PC)* on page 8, and set the Boot Target ID to correspond to the SCSI ID of the boot device.

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## ***Installing Software for the PC***

Under MS-DOS 5.0 and above, the AHA-2930B host adapter can support up to seven other SCSI devices without additional software. (Earlier versions of DOS support up to two hard disk drives.) You need to install additional software to support other kinds of SCSI devices such as tape drives, CD-ROM drives, and scanners.

- If Adaptec EZ-SCSI<sup>®</sup> was included with your AHA-2930B, you should install it now. Adaptec EZ-SCSI provides software driver support for your host adapter and SCSI devices in computers running under DOS, Windows<sup>®</sup>, Windows 95<sup>®</sup>, and Windows NT<sup>™</sup>.
- The Adaptec<sup>®</sup> 7800 Family Manager Set provides software driver support for the NetWare, OS/2, and UNIX platforms.
- If you purchased your host adapter from a third-party vendor, you can use the drivers they provide. (Refer to the third-party documentation for installation instructions and troubleshooting information.)

## ***Installing Software for the Macintosh***

Power Macintosh users with Mac OS (system 7.5.2 or greater) can install the *Board Control* software that allows you to change host adapter settings without opening the computer case. This software is included on the *Board Control* diskette. Copy the *Board Control* software to the System folder/Apple Menu Items folder on your local hard disk drive. See *Using Board Control (Macintosh)* on page 7.

**Congratulations!** You have completed the installation of your host adapter. For additional information on configuring your host adapter, see *Helpful Hints* on page 6.

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# Helpful Hints

This section contains useful information on configuring and using your host adapter.

## Configuring SCSI Devices

Your host adapter can transfer data on the SCSI bus at a maximum negotiated transfer rate of 10 MBytes/sec. For reliable data transfers, the following requirements should be met:

- Internal and external cables should be terminated with *active* terminators, either provided by the SCSI device at the end of the cable or by a separate terminator plug. The terminator on the AHA-2930B is an active terminator.
- For all SCSI devices connected to the host adapter, make sure you use high-quality SCSI cables to ensure reliable data transfer. Select cables labeled "SCSI II" to ensure cable compliance to the SCSI specification. Note that cables with a 25-pin DB25 connector may *not* meet SCSI II standards. However, if you must use this cable, restrict the external cabling to a minimum length (always leave parity checking enabled to verify reliable data transfers).

When one or more Fast SCSI devices are connected to the host adapter, the combined length of all cables (internal and external) should not exceed 3 meters (9.8 feet) to ensure reliable operation when transferring data at 10 MBytes/sec.

- Your host adapter can support the SCSI Configured AutoMatically (SCAM) protocol, which automatically assigns SCSI IDs dynamically and resolves SCSI ID conflicts at bootup. To enable or disable SCAM support, see *Additional Options: Boot Device Options* on page 10.

If your system includes SCSI disk drives or other devices that support SCAM and SCAM is enabled, you do not need to manually assign SCSI IDs to these devices. Most SCSI devices currently in use, however, do *not* support SCAM, and you must set their SCSI IDs manually.

## Configuring Disk Drives

- Every hard disk must be low-level formatted, partitioned, and logically formatted before you can use it to store data. Most SCSI hard disks are physically formatted at the factory and do not need to be formatted again.

If you connected a new hard disk drive to your host adapter, you must partition and logically format the drive. For DOS and Windows (3.x and 95) use the DOS Fdisk and Format commands (see your computer and DOS documentation). For other operating systems, see your operating system documentation.

- If you are booting from a SCSI hard disk drive, make sure the Hard Disk (or Drives) setting in your computer's CMOS setup program is set to **None** or **No Drives Installed**, as required for SCSI hard disk drives. (See your computer documentation.)

If the motherboard has an embedded SCSI controller, disable the embedded controller after you install the AHA-2930B.

- If you installed both SCSI and non-SCSI (e.g., IDE) disk drives, the non-SCSI disk drive is always the boot device

## Installing Multiple Adapters

- You can install multiple SCSI host adapters if unused I/O ports and BIOS addresses are available.
- Each host adapter you install forms a separate SCSI bus with a different set of SCSI devices.

SCSI IDs can be reused as long as the ID is assigned to a device on a different host adapter (for example, each host adapter can have a device with SCSI ID 0).

- If you have two or more SCSI host adapters, enable the BIOS only on the host adapter you have selected as a boot device. Disable the BIOS on the other host adapter(s).

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## Using Board Control (Macintosh)

The *Board Control* utility allows you to change host adapter settings without opening the computer case when using the AHA-2930B in a Macintosh.

### Starting the Board Control Utility

To start the *Board Control* utility, select **Board Control** from the Apple Menu Items folder. The *Board Control* main dialog box appears.

### Using Menu Options

*Board Control* uses menus to list selectable options. To select an option, use the ↑ and ↓ keys to move the cursor to the option, then press **Enter**.

### Exiting Board Control

To exit Board Control, select **Close** from the File menu.

### Using the Board Control Utilities

The *Board Control* default settings are appropriate for most PCI systems (see the table of settings below). Run *Board Control* only to change default settings.

SCSI Bus Interface Definitions	Default Value
Select a SCSI bus	Host Adapter ID
Select Initiator ID	7
Parity Options	Parity on
Termination Options	Automatic
Additional Options	Default Value
Select a SCSI ID	SCSI ID 0
Synchronous Transfer Rate	10 MBytes/sec
SCSI Disconnection	Yes

### Definitions of Board Control Settings

This section defines the AHA-2930B default settings. After you change a setting, press **Set**. To revert to a previous setting, press **Revert**.

#### SCSI Bus Interface Definitions

The following settings are most likely to require modification.

- **Select a SCSI Bus**—The SCSI Bus window displays the host adapters connected the SCSI bus. This option allows you to select an adapter to configure.

- **Select Initiator**—This option sets the Initiator ID of the host adapter. To give the host adapter the highest priority on the SCSI bus, we recommend that you do not change the default setting of Initiator ID 7.
- **Parity Options**—This option determines whether the host adapter verifies the accuracy of data transferred on the SCSI bus. The default setting is *Parity on*. If any SCSI device connected to the host adapter does *not* support parity, turn off Parity Options on the host adapter and all SCSI devices. To determine if a device supports parity, read the device documentation.
- **Termination Options**—This option sets the host adapter termination. You can set it to *Automatic*, *Enabled*, or *Disabled*. We recommend that you leave this option at its default setting of *Automatic*. When set to *Automatic*, the host adapter does the following:
  - If the host adapter detects that cables are connected to either its internal or external SCSI connector, it enables its terminators (the host adapter is at the end of the SCSI bus).
  - If the host adapter detects that a cable is connected to both its internal and external SCSI connector, it disables its terminators (the host adapter lies between the ends of the SCSI bus).

#### Additional Options

*Board Control* lets you change the synchronous transfer rate and SCSI disconnection for a device. To use these options, select **Target Options** from the Special menu.

- **Select a SCSI ID**—The Select a SCSI ID window displays all devices connected to the AHA-2930B. You must first select a SCSI ID before you can change the Synchronous Transfer Rate or SCSI Disconnection settings. After you change a setting, press **Set**. When you are finished changing settings, press **Done**. To revert to the previous settings, press **Revert**.
- **Synchronous Transfer Rate**—This option sets the synchronous data transfer rate supported by the host adapter. The host adapter supports rates up to 10.0 MBytes/second.
- **SCSI Disconnection**—This option lets a SCSI device temporarily disconnect from the SCSI bus and allows the host adapter to perform other operations while the SCSI device is disconnected. The default setting is *enable*. Leave *SCSI Disconnection* set to *enable* if two or more SCSI devices are connected to the host adapter.

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## Using SCSISelect (PC)

The SCSISelect configuration utility allows you to change host adapter settings without opening the computer case when using the AHA-2930B in a PC. SCSISelect also has SCSI disk utilities that allow you to perform a low-level format or to verify the disk media of your SCSI hard disk drives.

### Starting the SCSISelect Utility

If the host adapter BIOS is enabled, you can start SCSISelect by pressing **Ctrl-A** when the following prompt appears briefly at boot time:

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

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

### Using SCSISelect Menus

SCSISelect uses menus to list selectable options. To select an option, use the **↑** and **↓** keys to move the cursor to the option, then press **Enter**.

When you select an option, another menu may appear. Return to the previous menu at any time by pressing **Esc**. To restore the original SCSISelect default values, press **F6**. To toggle the display between color and monochrome modes, press **F5** (this feature may not work on some monitors).

### Exiting SCSISelect

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

### Using the SCSI Disk Utilities

To access the SCSI disk utilities, select the **SCSI Disk Utilities** option from the menu that appears when you start SCSISelect.

Once the option is selected, SCSISelect immediately scans the SCSI bus and displays a list of all SCSI IDs and the devices assigned to each ID. When you select a specific ID and device, a menu appears, displaying the Format Disk and Verify Disk Media options.

- **Format Disk**—This utility allows you to perform a low-level format on a hard disk drive. Most SCSI disk devices are preformatted at the factory and do not need to be formatted again.

The Adaptec Format Disk utility is compatible with the vast majority of SCSI disk drives.



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

- **Verify Disk Media**—This utility allows you to scan the media of a hard disk drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them. If you select yes, those blocks are no longer used. You can press **Esc** at any time to abort the utility
- **Default Settings**—The AHA-2930B has default settings appropriate for most PCI systems (see the table below). Run SCSISelect only to change these settings.

SCSI Bus Interface Definitions	Default Value
Host Adapter SCSI ID	7
SCSI Parity Checking	Enabled
Host Adapter SCSI Termination	Automatic
Additional Options: SCSI Device Configuration	Default Value
Initiate Sync Negotiation	Yes
Maximum Sync Transfer Rate	10 MBytes/sec
Enable Disconnection	Yes
Send Start Unit Command	No
BIOS Multiple LUN Support	No
Additional Options: Boot Device Options	Default Value
Boot SCSI ID	0
Boot LUN Number	0
Additional Options: Advanced Configuration Options	Default Value
Plug and Play SCAM Support	Disabled
Host Adapter BIOS	Enabled
Support Removable Disks under BIOS as Fixed Disks	Boot Only
Extended BIOS Translation for DOS Drives > 1 GByte	Enabled
Display <Ctrl><A> Message During BIOS Initialization	Enabled
BIOS Support for Bootable CD-ROM	Disabled
BIOS Support for Int 13 Extensions	Enabled

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## Definitions of SCSISelect Settings

This section defines the default settings for the host adapter.

### Settings for Host Adapter and All SCSI Devices

The following settings are most likely to require modification.

- **Host Adapter SCSI ID**— This option sets the SCSI ID of the host adapter.

To give the host adapter the highest priority on the SCSI bus, we recommend that you leave the host adapter at its default setting of SCSI ID 7.

- **SCSI Parity Checking**—This option determines whether the host adapter verifies the accuracy of data transferred on the SCSI bus. The default setting is *Enabled*.

If any SCSI device connected to the host adapter does *not* support SCSI parity, disable SCSI Parity Checking on the host adapter and all SCSI devices. To determine if a device supports SCSI parity, read the device documentation.

- **Host Adapter SCSI Termination**—This option sets termination on the host adapter. You can set it to *Automatic*, *Enabled*, or *Disabled*. We recommend that you leave this option set to its default setting of *Automatic*. When set to *Automatic*, the host adapter does the following:
  - If the host adapter detects that cables are connected to either its internal or external SCSI connector, it enables its terminators (the host adapter is at the end of the SCSI bus).
  - If the host adapter detects that a cable is connected to both its internal and external SCSI connectors, it disables its terminators (the host adapter lies between the ends of the SCSI bus).

### Additional Options: SCSI Device Configuration

SCSI device settings allow you to configure parameters for each device on the SCSI bus. To configure a specific device, you must identify the SCSI ID assigned to that device. To determine the SCSI ID of a device, see *Using the SCSI Disk Utilities* on page 8.

- **Initiate Sync Negotiation** — This option determines whether synchronous data transfer negotiation between the host adapter and a device is initiated by the host adapter.

The default setting is *Yes (Enabled)*. Set **Initiate Sync Negotiation** to *No* for devices that do not support Sync Negotiation.

- **Maximum Sync Transfer Rate** — This option sets the maximum synchronous data transfer rate that the host adapter supports. The host adapter supports transfer rates of up to 10.0 MBytes/sec. If **Initiate Sync Negotiation** is set to *No*, then the maximum synchronous transfer rate is the maximum rate that the host adapter accepts from the device during negotiation.

- **Enable Disconnection** — This option lets a SCSI device temporarily disconnect from the SCSI bus. This allows the host adapter to perform other operations while the SCSI device is disconnected. The default setting is *Yes*. Set **Enable Disconnection** to *Yes* if two or more SCSI devices are connected to the host adapter.

- **Send Start Unit Command** — This option determines whether the Start Unit SCSI Command is sent to the device at bootup (most devices do not require this). The default setting is *No*.

- **BIOS Multiple LUN Support**—This option determines whether booting from a SCSI device that has multiple LUNs is supported. The default setting is *No (Disabled)*. Enable this option if your boot device has multiple LUNs.

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### **Additional Options: Boot Device Options**

Boot device options allow you to specify the device from which to boot your computer.

- **Boot SCSI ID**—This option specifies the SCSI ID of the boot device and must correspond to the ID of the boot device. The default setting is SCSI ID *0*.
- **Boot LUN Number**—This option allows you to specify which LUN to boot from on your boot device if the device has multiple LUNs (Logical Unit Numbers) and Multiple LUN Support is enabled. The default setting is LUN *0*.

### **Additional Options: Advanced Configuration Options**

Do not change the advanced configuration options unless absolutely necessary.

- **Plug and Play SCAM Support** — This option allows the host adapter to automatically assign SCSI IDs to SCSI devices that support the SCAM protocol. The default setting is *Disabled*. Most non-SCAM devices tolerate the SCAM protocol, so you can enable this option even if you have a non-SCAM device.
- **Host Adapter BIOS** — This option enables or disables the host adapter BIOS. The default setting is *Enabled*. Several *SCSISelect* options are not valid unless the host adapter BIOS is enabled.

Make sure that the BIOS is enabled if you want to boot from a SCSI disk drive connected to the host adapter. Disable the BIOS if device drivers control the devices on the SCSI bus and do not require BIOS functionality.

- **Support Removable Disks Under BIOS as Fixed Disks** — This option controls which removable-media drives are supported by the host adapter BIOS. 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.



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**Caution:** If a removable-media SCSI device is controlled by the host adapter BIOS, wait until the drive is powered OFF to remove the media; otherwise you may lose data! If you need to be able to remove the media while the drive is on, install a removable-media device driver and set

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- **Display <Ctrl-A> Message During BIOS Initialization** — This option determines whether the Press <Ctrl> <A> for SCSISelect (TM) Utility! message appears on your screen during system bootup. The default setting is *Enabled*. If this setting is disabled, you can still start SCSISelect by pressing <Ctrl><A> after the host adapter BIOS banner appears.
- **BIOS Support for Bootable CD-ROM** — This option determines whether the host adapter BIOS provides support for booting from a CD-ROM drive. The default setting is *Disabled*.
- **BIOS Support for Int 13 Extensions** — This option determines whether the host adapter BIOS supports disks with more than 1024 cylinders. The default setting is *Enabled*.

## Troubleshooting Checklist

If you have any problems during the installation, check the following items first:

- Have you installed the host adapter in a PCI Rev 2.0 compliant computer?
- Are all SCSI devices powered?
- Are all SCSI bus cables and power cables properly connected? Is pin 1 oriented correctly?
- Does the host adapter and each device on the SCSI bus have a unique SCSI ID?
- Did you install your host adapter in a bus master PCI slot? Refer to your computer's documentation for instructions or try another slot.
- Are all devices on the SCSI bus terminated properly?
- Does the total SCSI cable length exceed the 3-meter limit when the maximum sync transfer rate is set to 10 MBytes/sec?
- Does your system CMOS setup require you to enable PCI bus parameters? If so, refer to your computer's documentation for instructions. Check that IRQ channel assignment, board, and BIOS settings have been made.

Some configuration options apply to a specific PCI bus slot, so if you change these options be sure you are applying them to the slot in which the host adapter is installed.

Check your computer documentation to verify which slot corresponds to which number.

- If there is an Interrupt Type or Interrupt Line option in the Setup program, be sure to select **Int-A** or **Interrupt Type = A**. Depending on your system design, you may also be required to change a motherboard jumper setting.
- If there is a Triggering Interrupt option, be sure to select **Level**.
- If there is an option to enable or disable bus mastering for the PCI slots, be sure to select **Enabled**.
- If there is an option to enable or disable individual PCI slots, be sure the slot in which you install the host adapter is **Enabled**.

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- If your computer has a combination of ISA (or EISA) boards and PCI boards, you may need to mark the IRQs used by ISA/EISA boards as *Used* so the system BIOS will not try to assign these IRQs to other PCI boards.
- In some systems the BIOS reserves a set of available IRQs for PCI boards, and you have to assign these IRQs manually.
- If SCAM is enabled, are your SCSI devices SCAM-capable or SCAM-tolerant? Devices that are not SCAM-tolerant may not be detected by the BIOS. ASPI drivers should not have any problems.

## Common Problems and Solutions

- **Boot From SCSI Disk Fails**—If you are booting from a SCSI hard disk drive, make sure the **Drives** setting in your computer's Setup program that corresponds to the drive is set to **None** or **No Drives Installed**, as required for SCSI hard disk drives.
- **Changed Values Not Loaded**—If you changed any values on the host adapter in a Setup program or on a SCSI device, did you turn the power off and on to ensure that the new values are loaded?
- **Computer Will Not Boot from a SCSI Disk Drive**—If you have a combination of SCSI and non-SCSI disk drives, then the non-SCSI disk drive is always the boot device. If the system has *only* SCSI disk drives, do the following:
  - 1 Make sure the drive type in your computer's CMOS setup is set to **No Drives Installed**.
  - 2 Make sure the boot hard disk SCSI ID corresponds to the Boot SCSI ID setting under *SCSISelect* settings (see page 8). The SCSI ID is normally set with jumpers or switches on the drive.
  - 3 If this does not solve the problem, back up all data on the SCSI hard disk and perform a low-level format with the *SCSISelect* Format Disk option. See the MS-DOS documentation for instructions on partitioning the disk after formatting.
- **Host adapter not displayed by *Board Control* (Macintosh)**—If the host adapter was not installed correctly, you cannot display it using *Board Control*. If it is not displayed, do the following:
  - 1 Be sure that jumper J4 is removed.
  - 2 Make sure that the host adapter is firmly seated in the PCI slot.
  - 3 Restart your computer and relaunch *Board Control*.
- **Format/Verify Disk Device Utility Startup Fails**—If you tried to use the Format/Verify utility on a disk device and got an Unexpected SCSI Command Failure pop-up box with error information, the utility probably encountered a problem with the disk device or the media and therefore cannot run.

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You can probably determine from the Sense Key information (e.g., 06h - Unit Attention) both the cause of the problem and its solution. Listed below are some of the more common Sense Key values and their meanings:

02h - Not ready—The media is not ready to format. Be sure that media is inserted in the drive and that the media is spun up.

03h - Medium error—The disk media may be defective. If it is a removable-media drive, try using a different disk media. If it is a hard disk drive, the disk may be physically damaged. Try verifying and formatting the drive with *SCSISelect*.

04h - Hardware error—The disk drive may be defective. Consult the hardware documentation and contact the manufacturer.

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

- **BIOS Initialization Fails**—If the host adapter BIOS is enabled but fails to initialize, the system may display one of the following error messages followed by a BIOS Installation Failure message.

- Device connected, but not ready. The host adapter received no answer when it requested data from an installed SCSI device. Run the *SCSISelect* utility and enable the Send Start Unit Command for the device.

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 switched ON.

- Start unit request failed. The BIOS was unable to send a Start Unit Command to the device.

Run the *SCSISelect* utility and disable the Send Start Unit Command for the device.

- Time-out failure during... An unexpected time-out occurred. Check the SCSI bus termination. Then disconnect the SCSI peripheral cables from the host adapter and start the computer. If the computer successfully restarts, check the SCSI bus termination and cable connections. One of the devices on the SCSI bus may be defective. Reconnect one device at a time to isolate the problem.

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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 matériel brouilleur du Canada.

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