

ASUS[®] PCI-SC896
2Ch. Ultra2 PCI SCSI Card

USER'S MANUAL

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ASUS Contact Information

ASUSTeK COMPUTER INC. (Asia-Pacific)

Marketing

Address: 150 Li-Te Road, Peitou, Taipei, Taiwan 112
Telephone: +886-2-2894-3447
Fax: +886-2-2894-3449
Email: info@asus.com.tw

Technical Support

MB/Other (tel): English: +886-2-2890-7121
Notebook (tel): English: +886-2-2890-7122
Server (tel): English: +886-2-2890-7123
Fax: +886-2-2895-9254
Email: tsd@asus.com.tw
Newsgroup: news2.asus.com.tw
WWW: www.asus.com.tw
FTP: ftp.asus.com.tw/pub/ASUS

ASUS COMPUTER INTERNATIONAL (America)

Marketing

Address: 6737 Mowry Avenue, Mowry Business Center, Building 2
Newark, CA 94560, USA
Fax: +1-510-608-4555
Email: info-usa@asus.com.tw

Technical Support

Fax: +1-510-608-4555
BBS: +1-510-739-3774
Email: tsd@asus.com
WWW: www.asus.com
FTP: ftp.asus.com/Pub/ASUS

ASUS COMPUTER GmbH (Europe)

Marketing

Address: Harkortstr. 25, 40880 Ratingen, BRD, Germany
Fax: +49-2102-4420-66
Email: sales@asuscom.de

Technical Support

Hotline: MB/Other: +49-2102-9599-0 Notebook: +49-2102-9599-10
Fax: +49-2102-9599-11
Online Support: www.asuscom.de/de/support
WWW: www.asuscom.de
FTP: ftp.asuscom.de/pub/ASUSCOM

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- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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 manufacturer's 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 harmful interference to radio or television 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:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the 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/TV technician for help.

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This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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1. Introduction

Preface

This is the primary reference and User's Manual for the ASUS PCI-SC896 Dual Channel PCI to Ultra2 SCSI Host Adapter. It contains a complete functional description for the PCI-SC896 and includes complete physical and electrical specifications for the PCI-SC896.

Organization

This document has the following chapters and appendixes:

- Chapter 1, **Using the PCI-SC896 Host Adapter**, defines the interfaces and characteristics of the SYM22910 Dual Channel PCI to Ultra2 SCSI Host Adapter Board.
- Chapter 2, **Installing the PCI-SC896 Host Adapter**, provides both quick and detailed installation instructions.
- Chapter 3, **Configuring the PCI-SC896 Host Adapter**, describes the SCSI BIOS Configuration Utility to configure adapter and device settings.
- Appendix, **Glossary of Terms and Abbreviations**, provides definitions of various terminology that is referenced throughout this user's guide.

1. Introduction

Conventions Used in This Manual

The following is a list of notational conventions used throughout this manual:

Notation Example Meaning and Use

courier typeface	<code>.nwk file</code>	Names of commands, files, signals, symbols, pins, parts, directories, modules, and macrocells are shown in Courier typeface.
bold typeface	fd1sp	In a command line, keywords are shown in bold, non-italic typeface. Enter them exactly as shown.
italics	<i>module</i>	In command lines and names italics indicate user vari-ables. Italicized text must be re-placed with appropriate user-specified items. Enter items of the type called for, using lower case.
italic underscore	<i><u>full pathname</u></i>	When an underscore appears in an italicized string, enter a user-supplied item of the type called for with no spaces.
Initial Capital letters	Undo Edit Apply	Names of menu commands, options, check buttons, text buttons, options buttons, text boxes, list boxes, etc., are shown in text with Initial Capital lettering to avoid mis-reading. These elements may appear on your screen in all lower case.
brackets	[version]	You may select one item enclosed within brackets, which are optional. Do not enter the brackets.
semicolon, and other punctuation		Use as shown in the text.

How to Get Updates

Software changes as products improve. The latest documentation and drivers are available for downloading from ASUS web site as listed in the ASUS Contact Information in the front of this manual.

1. Introduction

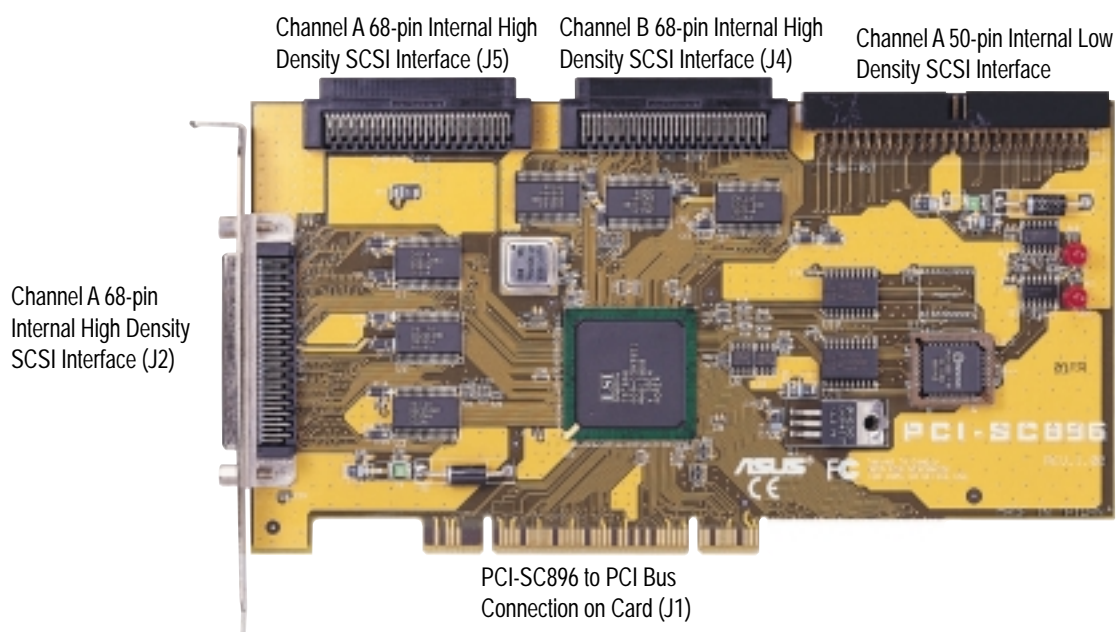
1. Introduction

This chapter describes how the ASUS PCI-SC896 Host Adapter interfaces to PCI computer systems and includes these topics:

- Section 1.1, “General Description”
- Section 1.2, “Features”
- Section 1.3, “Interface Descriptions”

1.1 General Description

ASUS PCI-SC896 Dual Channel PCI to Ultra2 SCSI host adapter board provides two SCSI-3, Ultra2 SCSI interfaces to PCI computer systems that require BIOS support on the add-in SCSI adapter. Installing this adapter in your PCI system allows connection of SCSI devices over a SCSI bus. The dual channel PCI-SC896 board provides 16-bit Low Voltage Differential (LVD) and Single-Ended (SE) SCSI solutions for your computer, using only one PCI slot. This board supports legacy Fast SCSI devices, Ultra SCSI devices, and the newest Ultra2 SCSI devices. ASUS SCSI Device Management System (SDMS™) software operates the board, but the design of the board does not prevent other software to be used with it. BIOS support for this host adapter is incorporated on the board in a 128K Flash device. This guide and the PCI SCSI Device Management System SDMS 4.0 User’s Guide contain product information and installation instructions to help you gain the full benefits of your PCI-SC896 Dual Channel PCI to Ultra2 SCSI host adapter for your computer system.



1. Introduction

1.2 Features

This section provides a high level overview of the PCI Interface, the SCSI Interface, and Board Characteristics for the PCI-SC896 Host Adapter board.

1.2.1 PCI Interface

- Full 32-bit or 64-bit (33 MHz) DMA bus master
- Zero wait-state bus master data bursts
- PCI Universal 3.3 V/5 V bus support

1.2.2 SCSI Interface

- Two separate SCSI channels
- 16-bit SE/LVD
- Automatically enabled termination
- One 68-pin high-density for channel A
- One 68-pin high-density for each internal channel A & B
- One 50-pin fast-SCSI connector for channel B
- Fast, Ultra, and Ultra2 data transfer capability
- SCSI TERMPWR source with autoresetting circuit breaker and TERMPWR shorted LED for each channel
- SCSI Plug and Play
- SCAM (SCSI Configured AutoMatically). See Chapter 3, Configuring the Host Adapter for further details about SCAM capability.
- Flash EEPROM for BIOS storage
- Serial NVRAM (Non Volatile Random Access Memory) on each channel for user configuration utility and SCAM information storage
- SCSI activity LED for each channel

1.2.3 Board Characteristics

- PCI board dimensions Approximately 9.5 x 4.0 inches
- Universal 32-bit PCI card edge connector
- ISA/EISA bracket

1. Introduction

1.3 Interface Descriptions

This section provides a more detailed explanation about the PCI Interface, the SCSI Interface, the SCSI Activity LED Interface, and Wide Ultra2 SCSI.

1.3.1 The PCI Interface

PCI is a high-speed standard local bus for interfacing a number of I/O components to a PC processor and memory subsystem. The PCI functionality for the PCI-SC896 is contained within the ASUS PCI-SC896 PCI-SCSI I/O Processor chip. The PCI-SC896 connects directly to the PCI bus and generates timing protocol in compliance with the PCI specification. The PCI interface operates as a 32-bit DMA bus master. The connection is made through the edge connector J1. The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.1 standard. The PCI-SC896 conforms to the PCI universal signaling environment for a 5 V or 3.3 V PCI bus.

1.3.2 The SCSI Interface

The SCSI functionality for the PCI-SC896 is contained within the ASUS PCI-SC896 PCI-SCSI I/O Processor chip. The PCI-SC896 connects directly to the two SCSI buses for SE or LVD SCSI applications and generates timing and protocol in compliance with the SCSI standard. Each SCSI interface operates at a burst transfer rate of up to 40 Mbyte per second for wide single-ended transfers, and up to 80 Mbyte per second for wide LVD SCSI transfers.

The SCSI interfaces on the PCI-SC896 operates as two 16-bit, synchronous or asynchronous, single-ended or LVD, and supports Ultra2 SCSI protocols and 16-bit arbitration. The PCI-SC896 board provides autosensing, dual mode SE/LVD SCSI termination. Termination is normally enabled. When a SCSI device is sensed to be connected to both internal and external connectors, termination for that channel is automatically disabled. The PCI-SC896 supplies SCSI bus TERMPWR (termination power) through a blocking diode and self-resetting 1.5 A short circuit protection device. An on-board LED lights up when TERMPWR is shorted and turns off. A 40 MHz oscillator is installed on the PCI-SC896 board to provide the clock frequency to the PCI-SC896 that is necessary to support Wide Ultra2 SCSI transfers of up to 80 Mbytes/s.

1. Introduction

1.3.4 Wide Ultra2 SCSI

The PCI-SC896 has full support for Wide Ultra2 SCSI. This interface is an extension of the SCSI-3 family of standards that expands the bandwidth of the SCSI bus to allow faster synchronous data transfers, up to 80 Mbytes/s. Wide Ultra2 SCSI provides a doubling of the data rate over the Ultra2 SCSI interface, while it increases cable lengths and allows a larger number of devices on the cable than Ultra2 SCSI interfaces. Special SCSI cables are specified for operation with Wide Ultra and Ultra2 SCSI devices, and you must consider the total number of devices and the length of your SCSI bus when setting up your system. See Chapter 2, Installing the PCI-SC896 Host Adapter for a detailed explanation of SCSI bus connections.

When you purchased the PCI-SC896 host adapter kit, the cable provided in the kit is matched for a Fast/Ultra/Ultra2 SE or LVD operation. This cable also has built-in LVD termination since most Ultra2 hard disk drives are not made with onboard LVD termination.

Standard Cables

STA Term	Maximum Bus Length (1)		Maximum Devices
	Single-Ended	LVD	
Wide Ultra SCSI	1.5M	(3)	8
Wide Ultra SCSI	3.0M	(3)	4
Wide Ultra2 SCSI	(2)	12	16

(1) This parameter may be exceeded in point to point and engineered applications.

(2) Single-ended and high-power differential are not defined at Ultra2 speeds.

(3) LVD was not defined in the original SCSI standards for this speed. If all devices on the bus support LVD, then 12-meter operation is possible at this speed. However, if any device on the bus is single-ended only, then the entire bus switches to single-ended mode, and the distances in the single-ended column apply.

2. Installation

2. Installing the PCI-SC896 Host Adapter

This chapter provides instructions on how to install the PCI-SC896 Host Adapter and includes these topics:

- Section 2.1, “Quick Installation Procedure”
- Section 2.2, “Detailed Installation Procedure”
- Section 2.3, “SCSI Bus Termination”
- Section 2.4, “Setting Interrupts”
- Section 2.5, “Completing Your Installation”

2.1 Quick Installation Procedure

This section provides quick setup instructions for the experienced computer user with prior host adapter installation and SCSI bus setup experience. If you prefer more detailed guidance in installing the PCI-SC896 host adapter, please follow the instructions in the section: Section 2.2, “Detailed Installation Procedure”. For safe and proper installation, check the user’s manual that was supplied with your computer and perform the following steps.

1. Ground yourself before removing this host adapter board. Remove the PCI-SC896 Dual Channel PCI to Ultra2 SCSI Host Adapter board from the packing and check that it is not damaged.
2. Remove the cabinet cover on your computer to access the PCI slots. Refer to the user’s manual for your computer.

CAUTION: Ground yourself by touching a metal surface before handling boards. Static charges on your body can damage electronic components. Handle plug-in boards by the edge; do not touch board components or gold connector contacts. The use of a static ground strap is recommended.

3. Locate the slots for PCI plug-in board installation. Refer to the user’s manual for your computer to confirm the location of the PCI slots. The PCI-SC896 requires a PCI slot that allows bus master operation.
4. Remove the blank panel on the back of the computer aligned with the PCI slot that you intend to use. Save the bracket screw.

2. Installation

5. Carefully insert the edge connector J1 of the host adapter into the PCI slot. Make sure the edge connector is properly engaged before pressing the board into place.

NOTE: You may notice that the components on a PCI host adapter face the opposite way from those on other non-PCI plug-in boards you have in your system. This is correct, and the board is keyed to go in only one way.

6. The bracket around the connector J2 should fit where the blank panel was removed. Secure it with the bracket screw before making the internal and external SCSI bus connections.
7. If you are connecting any internal SCSI devices, plug a 68-pin connector on the end of the internal SCSI ribbon cable into the connector J4 or J5. Make certain to match pin-1 on both connectors. Chain your internal devices on this cable.
8. Connect your computer's LED cable if desired. This LED cable drives the front panel LED found on most PC cabinets to indicate activity on the SCSI bus.
9. Replace the cabinet cover as described in the user's manual for your computer.
10. Make all external SCSI bus connections.

REMEMBER: The SCSI bus requires proper termination and no duplicate SCSI IDs.

11. Finally, refer to the PCI SCSI Device Management System SDMS 4.0 User's Guide (or the guide for the software that you will use) to load the driver software for your particular operating system.

2. Installation

2.2 Detailed Installation Procedure

This section provides step-by-step instructions for installing your PCI-SC896 host adapter and connecting it to your SCSI peripherals. If you are experienced in these tasks, you may prefer to use the preceding Section 2.1, “Quick Installation Procedure.” If you are not confident that you can perform the tasks as described here, ASUS suggests getting assistance.

2.2.1 Before You Start

Before you start, look through the task list below to get an overall idea of the steps to perform.

- Open your PC cabinet and select an open PCI slot
- Insert your host adapter
- Connect your SCSI peripherals
 - Internal
 - External
- Terminate the SCSI bus
- Set the peripheral SCSI IDs
- Make any configuration changes
- Close your PC cabinet
- Install your software

The SCSI host adapter acts on your computer’s behalf as the host to your suite of SCSI peripherals. Each chain of SCSI peripheral devices and their host adapter work together, and they are referred to as a SCSI bus. Each channel on your SCSI host adapter can act as host for up to 15 peripheral devices (depending on the SCSI bus speed), not including the adapter itself.

2. Installation

2.2.2 Inserting Your Host Adapter

For safe and proper installation, check the user's manual supplied with your computer and perform the following steps:

1. Ground yourself before removing this host adapter board. Remove the PCI-SC896 Dual Channel PCI to Ultra2 SCSI Host Adapter board from the packing and check that it is not damaged.
2. Switch off and unplug power cords for all components in your system.
3. Remove the cabinet cover on your computer to access the PCI slots. Refer to the user's manual for your computer to find out how this is done.

CAUTION: Ground yourself by touching a metal surface before removing the cabinet cover. Static charges on your body can damage electronic components. Handle plug-in boards by the edge; do not touch board components or gold connector contacts. The use of a static ground strap is recommended.

4. Locate the slots for PCI plug-in board installation. Refer to the user's manual for your computer to confirm the location of the PCI slots. The PCI-SC896 requires a PCI slot that allows bus master operation.
5. Remove the blank panel on the back of the computer aligned with the PCI slot that you intend to use. Save the bracket screw.
6. Carefully insert the edge connection J1 of the host adapter into the PCI slot. Make sure the edge connector is properly engaged before pressing the board into place.

NOTE: You may notice that the components on a PCI host adapter face the opposite way from those on other non-PCI adapter boards you have in your system. This is correct, and the board is keyed to go in only one way.

7. The bracket around the connector J2 should fit where you removed the blank panel. Secure it with the bracket screw before making the internal and external SCSI bus connections.

2. Installation

2.2.3 Connecting Your SCSI Peripherals

All internal SCSI bus connections to the PCI-SC896 host adapter are made with an unshielded, 68-conductor ribbon cable. One side of this cable is marked with a color to indicate the pin-1 side. The connectors on this cable are keyed to ensure proper pin-1 connection. Use Ultra/Ultra2 rated cables for these bus speeds.

All external SCSI bus connections to the PCI-SC896 host adapter are made with shielded, 68-conductor cables. The connectors on this cable are always keyed to ensure proper pin-1 connection. Some internal cables come with a SE/LVD on one end. This end should be furthest from the host adapter.

2.2.4 Making Internal SCSI Bus Connections

This section provides step-by-step instructions about making internal SCSI bus connections:

1. To connect an internal SCSI device, plug the 68-pin connector on one end of a wide internal SCSI ribbon cable into the connection J4 or J5.
2. Plug the 68-pin connector on the other end of the internal SCSI ribbon cable into the SCSI connector on the internal SCSI device. Pin-1 must match on all connections.
3. To plug in additional internal SCSI devices, use an internal SCSI ribbon cable with the required number of connectors attached along its length. Make sure to match pin-1 on all connections.
4. Most PC cabinets are designed with a front panel LED, which may already be connected to an existing IDE controller. You may connect this LED cable to your SCSI host adapter. This connection causes the front panel LED to indicate activity on the SCSI bus.

An LED is also on the PCI-SC896 host adapter, which indicates activity on the SCSI bus. The Busy LED connector J6 is not keyed. The J6 connector is a 4-pin one row right angle header for both channel A and channel B. Some LED cables have only two wires. In this case, place the connector on one end of J6. If the LED does not light during SCSI bus activity from this host adapter, you may have to rotate the LED cable 180° on J6.

2. Installation

2.2.5 Making External SCSI Bus Connections

This section provides step-by-step instructions about making external SCSI bus connections:

1. If you need to connect external SCSI devices to the PCI-SC896 host adapter, plug the 68-pin high-density connector on one end of a shielded external high density cable into the host adapter connector J2.
2. Plug the 68-pin connector on the other end of the shielded external SCSI cable into the SCSI connector on your external SCSI device.
3. If you need to connect more than one external SCSI device to your host adapter, chain them together with shielded external SCSI cables.

2.3 SCSI Bus Termination

The devices that make up the SCSI bus are connected serially (chained together) with SCSI cables. The first and last physical SCSI devices connected on the ends of the SCSI bus must have a set of resistors called terminators. All other SCSI devices on the bus must have their terminators removed or disabled.

REMEMBER: The PCI-SC896 host adapter is also on the SCSI bus, and its termination is automatically enabled when it is connected to the end of the bus.

Low-voltage differential peripheral devices are normally terminated with external terminators, but are sometimes set with jumpers or with a switch on the peripheral. Refer to the peripheral manufacturer's instructions and to the user's manual for your computer for information on how to identify the terminator setting of each device and how to change it.

CAUTION: The auto-enable/disable sensing feature on the PCI-SC896 may enable termination erroneously if it is directly cabled to another SCSI device or host adapter using the same sensing method. The PCI-SC896 senses SCSI devices by detecting the ground signal on conductor 50 of a 68-conductor SCSI cable.

When connecting another host adapter to a connector, termination must be disabled on the board that is not at the end of the bus through software control.

2. Installation

The PCI-SC896 automatically controls SCSI bus termination for three different bus configurations, depending on the use of connectors. The three bus configurations are:

- Only for internal SCSI connections,
- Only for external SCSI connections, and
- Connections to both internal and external SCSI connectors.

2.3.1 Internal SCSI Connections

If only internal SCSI device connections on your host adapter have been made, then terminate the last internal device on the SCSI bus. You must disable the termination on all other devices. Termination on the PCI-SC896 host adapter is automatically enabled in this case.

2.3.2 External SCSI Connections

If only external SCSI device connections to your host adapter have been made, then terminate the last external device on the SCSI bus. You must disable the termination on all other devices. Termination on your host adapter is automatically enabled in this case.

2.3.3 Internal and External SCSI Connections

If internal and external SCSI devices are connected to your host adapter, then terminate the last internal and external devices on the SCSI bus. You must disable the termination on all other devices. Termination on your host adapter is automatically disabled in this case.

NOTE: If an internal connection to another PCI-SC896 host adapter has been made, or any connection to a device that uses the same sensing method for automatic termination as your PCI-SC896, you must override the termination for that channel through software control.

2. Installation

2.3.4 Setting SCSI IDs

You must set each SCSI device and the host adapter to a separate SCSI ID, 0 through 15 for a 16-bit SCSI. SCSI ID 7 is the preset host adapter setting, giving it the highest priority on the SCSI bus. If you plan to boot your computer from a hard disk drive on the SCSI bus, that drive should have SCSI ID 0, or the lowest SCSI ID on the bus. Chapter 3, Configuring the Host Adapter explains how to set your host adapter ID using the ASUS SCSI Configuration Utility. The peripheral device SCSI IDs are usually set with jumpers or with a switch on the peripheral. Refer to the peripheral manufacturer's instructions and to the user's manual for your computer to determine the ID of each device and how to change it. You must have no duplication of SCSI IDs on a SCSI bus.

NOTE: As SCAM support is OFF by default for the PCI-SC896, you may choose to turn this ON to assist in assigning SCSI IDs.

Determine the SCSI ID of each device on the SCSI bus. Note any duplications. Make any necessary changes to the SCSI IDs and record the IDs for future reference. The following table is provided as a place to keep this record.

SCSI ID Record

SCSI ID	SCSI Device Channel A	SCSI Device Channel B
15		
14		
13		
12		
11		
10		
09		
08		
07		
06		
05		
04		
03		
02		
01		
00		

2.4 Setting Interrupts

Normally, you do not change the default interrupt routing for the PCI-SC896, since performance is usually increased by having two separate interrupts.

2. Installation

3. Configuring the Host Adapter

This chapter discusses how to change configuration settings and includes these topics:

- Section 3.1, “When to Configure the PCI-SC896 Host Adapter”
- Section 3.2, “Starting the SCSI BIOS Configuration Utility”
- Section 3.3, “Exiting the SCSI BIOS Configuration Utility”

3.1 When to Configure the PCI-SC896

In most cases you should not need to change the default configuration of your host adapter. You may decide to alter these default values if there is a conflict between device settings, or if you need to optimize system performance.

The following tables list the configuration settings you can change. The global settings effect your host adapter and all SCSI devices which are connected to it. The device settings effect only individual SCSI devices.

Global Default Settings

Settings for the Host Adapter & All Devices	Default Settings
SCAM Support	Off
Parity Checking	Enabled
Host Adapter SCSI ID	7
Scan Order	Low to High (0-Max)

3. Configuring

Device Default Settings

Settings for Individual SCSI Devices	Default Settings
Synchronous Transfer Rate (MB/Sec)	40 or 80
Data Width	16
Disconnect	On
Read/Write I/O Time-Out (secs)	10
Scan for Devices at Boot Time	Yes
Scan for SCSI LUNs	Yes
Queue Tags	Enabled

3.2 Starting the SCSI BIOS Utility

If you have SCSI BIOS version 4.0, and it includes the ASUS SCSI BIOS Configuration Utility, you can change the default configuration of your SCSI host adapters. You may decide to alter these default values if there is a conflict between device settings or if you need to optimize system performance.

You can see the version number of your SCSI BIOS in a banner displayed on your computer monitor during boot. If the utility is available, the following message also appears on your monitor:

```
Press Ctrl-C to start ASUS Configuration Utility...
```

This message remains on your screen for about five seconds, giving you time to start the utility. If you decide to press “Ctrl-C,” the message changes to:

```
Please wait, invoking ASUS Configuration Utility...
```

After a brief pause, your computer monitor displays the Main Menu of the ASUS SCSI BIOS Configuration Utility. As NVRAM (Non Volatile Random Access Memory) is available on the PCI-SC896 SCSI device, changes can be made and stored using this menu driven utility.

IMPORTANT: This utility is a powerful tool. If, while using it, you somehow disable all of your controllers, pressing Ctrl-A (or Ctrl-E on version 4.04 or later) after memory initialization during reboot allows you to re-enable and reconfigure.

3. Configuring

Not all devices detected by the Configuration utility can be controlled by the BIOS. Devices such as tape drives and scanners require that a device driver specific to that peripheral be loaded. This device driver is provided by the devices manufacturer.

3.2.1 Configuration Utility Main Menu

When you start the ASUS SCSI BIOS Configuration Utility, the Main Menu appears. This menu displays a list of up to four ASUS PCI to SCSI host adapters in your system and information about each of them. The PCI-SC896 host adapter appears on the menu as two PCI-SC896 entries; one for each channel. To select an adapter, use only the arrow keys and enter key. Then, you can view and/or change the current settings for that adapter and the SCSI devices attached to it. You can select an adapter only if Current Status is “On”. Changes are possible since NVRAM is present on this host adapter.

Below the list of host adapters on the Main Menu display, you see eight options. They are described in detail below. If these settings are altered, the system reboots upon exit from the configuration utility using the Quit option.

3.2.1.1 Change Adapter Status

The change adapter status allows you to activate or deactivate a host adapter and all SCSI devices attached to it. When this option is used to make a change, the change takes place after a reboot that is automatic upon exit from the utility. To change an adapter’s status, select it and press Enter. Then press the Escape (Esc) key to exit from this menu.

3.2.1.2 Adapter Boot Order

The adapter boot order allows you to set the order in which host adapters will boot when you have more than one ASUS host adapter in your system. When this option is selected, the Boot Order menu appears:

To change an adapter’s boot order, select it and press Enter. You are then prompted to enter the new boot sequence number. To remove an adapter’s boot order, press Enter again rather than entering a new sequence number. While the maximum capacity is 32 adapters, only 0 through 3 can be assigned a boot order. If an invalid number is entered, an error message appears. When the adapters are ordered as desired, press the Escape (Esc) key to exit from this menu.

3. Configuring

3.2.1.3 Additional Adapter Configuration

The additional adapter configuration allows you to configure an adapter that is not assigned a boot order. When this option is selected, the Adapter Configuration menu appears:

Highlight the adapter to be configured and press Enter. The message “Resetting Adapter, Please wait” appears, and then the system scans for devices. Finally, the Utilities Menu appears and lists the available options, which are described below.

3.2.1.4 Display Mode

Display mode determines how much information about your host adapters and SCSI devices appear on your computer monitor during boot. For more complete information, choose the verbose setting. For a faster boot, choose the terse setting.

3.2.1.5 Mono/Color

Mono/color allows you to choose between a monochrome or color display for the SCSI BIOS Configuration utility. You might need to choose the mono setting to get a more readable screen on a monochrome monitor.

3.2.1.6 Language

If enabled, the Language option allows you to select from five languages for the configuration utility: English, German, French, Italian, and Spanish. Call for support if you have any additional questions.

3.2.1.7 Help

The Help option allows you to bring up a help screen with information about the Main Menu.

3.2.1.8 Quit

The Quit option allows you to exit from the SCSI BIOS Configuration utility when on the Main Menu.

3.2.1.9 Esc

Pressing the Esc key allows exit from all the screens except the Main Menu.

3. Configuring

3.2.2 Utilities Menu

When you select a host adapter on the Main menu, the Utilities menu appears. Choose Adapter Setup to view and change the selected adapter settings. Choose Device Selections to view and change settings for the devices attached to the selected adapter. You are returned to this menu after making changes to the configuration of any host adapter or connected SCSI device. Before you exit this menu, you are prompted to save or cancel any changes.

3.2.2.1 Adapter Setup Menu

When you select Adapter Setup, the Adapter Setup menu appears:

The settings in this menu are global settings that affect the selected host adapter and all SCSI devices attached to it.

SCAM Support – The ASUS BIOS version 4.0 and above supports the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support by default is off in versions 4.11.00 and later for the PCI-SC896 device. You may choose to turn this on. Note that if this BIOS is flashed onto a board with existing settings, then these settings will not be changed to reflect the new BIOS defaults. Go into the Configuration Utility to change settings.

Parity – The ASUS PCI to SCSI host adapters always generate parity, but some older SCSI devices do not. Therefore, you are offered the option of disabling parity checking.

NOTE: When disabling parity checking, it is also necessary to disable disconnects for all devices, as parity checking for the reselection phase is not disabled. If a device does not generate parity, and it disconnects, the I/O never completes because the reselection never completes.

Host SCSI ID – In general, it is suggested that you do not change your host adapter ID from the default value of 7, as this gives it the highest priority on the SCSI bus.

Scan Order – This option allows you to tell the SCSI BIOS and device drivers to scan the SCSI bus from low to high (0 to max) SCSI ID, or from high to low (max to 0) SCSI ID. If you have more than one device on the SCSI bus, changing the scan order changes the order in which drive letters are assigned by the system. Drive order may be reassigned differently in systems supporting the BIOS Boot Specification (BBS). See the PCI SCSI Device Management System SDMS 4.0 User's Guide, Chapter 2 "SCSI BIOS" for additional information regarding BBS.

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NOTE: This scan order option may conflict with operating systems that automatically assign a drive order.

Removable Media Support – This option defines the removable media support for a specific drive. When this option is selected, a window appears with three choices:

- None
- Boot Drive Only
- With Media Installed

None – indicates there is no removable media support whether the drive is selected in BBS as being first, or first in scan order in non-BBS.

Boot Drive Only – provides removable media support for a removable hard drive if it is first in the scan order.

With Media Installed – provides removable media support wherever the drive(s) actually resides. One of these choices can be selected by highlighting it and pressing Enter.

CHS Mapping – This option defines the cylinder head sector (CHS) values that will be mapped onto a disk without pre-existing partitioning information. SCSI Plug and Play Mapping is the default value. To support interchange with noncompatible systems, there is another option that can be selected by choosing CHS Mapping and then cursoring to “Alternate CHS Mapping”.

NOTE: Neither of these options will have any affect after the disk has been partitioned with the FDISK command. To remove partitioning, two options are available:

- Reformat the disk using the Format Device option. See the section “Section 3.2.3, “Device Selections Menu”” below.
- Use the FDISK /MBR command at the C:\ prompt, where MBR represents master boot record.

IMPORTANT: Reformatting the disk or using FDISK /MBR erases all partitioning and data that exists. Be careful when using either the Format utility or the FDISK /MBR command that you target the correct disk. After clearing the partitions and data, it is necessary to reboot and clear memory or the old partitioning data will be reused, thus nullifying the previous operation.

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3.2.3 Device Selections Menu

When you select the Device Selections option, the corresponding menu appears. The settings in this menu affect individual SCSI devices attached to the selected host adapter. Changes made from this menu do not cause the system to reboot upon exit from the SCSI BIOS Configuration Utility. To change a value, select the required device by using the arrow keys and press Enter. A new menu appears providing the options and utilities available. For example, you could cursor to Sync Rate to change the Sync Rate value of the chosen device.

Sync Rate (Mbytes/s) – The value set with this option defines the maximum data transfer rate the host adapter attempts to negotiate. The host adapter and a SCSI device must agree to a rate they can both handle.

Width (bits) – The value set with this option defines the maximum SCSI data width the host adapter attempts to negotiate. The host adapter and a SCSI device must agree to a width they can both handle. Only host adapters that can do 16-bit data transfers have this option enabled.

Disconnect – SCSI devices have the ability to disconnect from the initiator during an I/O transfer. This disconnect frees the SCSI Bus to allow other I/O processes. This option tells the host adapter whether or not to allow a device to disconnect. Some devices run faster with disconnects enabled (mostly newer devices), while some run faster with disconnects disabled (mostly older devices).

Read/Write I/O Time-out (seconds) – This option sets the amount of time the host adapter waits for a read, write, or seek command to complete before trying the I/O transfer again. Since this provides a safeguard allowing the system to recover if an I/O operation fails, it is recommended that you always set the time-out to a value greater than zero.

NOTE: If the time-out is set to zero, then the I/O will never time-out.

Scan for Device at Boot Time – When there is a device you do not want to be available to the system, set this option to “No” for that device. Also, on a bus with only a few devices attached, you can speed up boot time by changing this setting to “No” for all unused SCSI IDs.

Scan for SCSI Logical Units (LUNs) – You can set this option to “No” if you have problems with a device that responds to all LUNs whether they are occupied or not. For example, if there is a SCSI device with multiple LUNs but you do not want all of those LUNs to be available to the system, then set this option to “No.” This will limit the scan to LUN0 only.

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Queue Tags – This option allows you to enable or disable the issuing of queue tags during I/O requests when your device driver can do this.

Format Device – If enabled, this option allows you to low-level format a magnetic disk drive. Low-level formatting will completely and irreversibly erase all data on the drive. Note that this utility will only format 512 byte sectors. For other sector sizes, do not use this utility.

Verify – This option allows you to read all the sectors on a disk looking for errors. When selected, this option displays the following message:

```
“Verify all sectors on the device  
Press ESC to abort  
Else press any key to continue”
```

Help – This option brings up a help screen with information about the current menu.

Restore Default Setup – This option resets all device selections back to their optimal settings. Select this option to restore all manufacturing defaults for the specified adapter. Note that all user customized options will be lost upon saving after restoring default setup.

Exit this menu – This option allows you to leave the current menu screen and return to the previous screen.

3.3 Exiting the SCSI BIOS Utility

Since some changes only take effect after your system reboots, it is important that you exit this configuration utility properly. Return to the Main Menu and exit by using the Quit option.

IMPORTANT: If you reboot the system without properly exiting the utility, some changes may not take effect.

4. Appendix

4. Glossary of Terms and Abbreviations

Address - A specific location in memory, designated either numerically or by a symbolic name.

Asynchronous Data Transfer - A method of transmission which does not require a common clock, but separates fields of data by stop and start bits. It is slower than synchronous data transfer.

BIOS - Basic Input/Output System. Software that provides basic read/write capability. Usually kept as firmware (ROM based). The system BIOS on the mainboard of a computer is used to boot and control the system. The SCSI BIOS on your host adapter acts as an extension of the system BIOS.

Bit - A binary digit. The smallest unit of information a computer uses. The value of a bit (0 or 1) represents a two-way choice, such as on or off, true or false, and so on.

Bus - A collection of unbroken signal lines across which information is transmitted from one part of a computer system to another. Connections to the bus are made via taps on the lines.

Bus Mastering - A high-performance way to transfer data. The host adapter controls the transfer of data directly to and from system memory without bothering the computer's microprocessor. This is the fastest way for multitasking operating systems to transfer data.

Byte - A unit of information consisting of eight bits.

Chain - A topology in which every processor is connected to two others, except for two end processors that are connected to only one other.

CISPR - A special international committee on radio interference (Committee, International and Special, for Protection in Radio). B-2 Glossary of Terms and Abbreviations

Configuration - Refers to the way a computer is set up; the combined hardware components (computer, monitor, keyboard, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.

CPU - Central Processing Unit. The "brain" of the computer that performs the actual computations. The term Micro Processor Unit (MPU) is also used.

DMA - Direct Memory Access. A method of moving data from a storage device directly to RAM, without using the CPU's resources.

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DMA Bus Master - A feature that allows a peripheral to control the flow of data to and from system memory by blocks, as opposed to PIO (Programmed I/O) where the processor is in control and the flow is by byte.

Device Driver - A program that allows a microprocessor (through the operating system) to direct the operation of a peripheral device.

Differential - A hardware configuration for connecting SCSI devices. It uses a pair of lines for each signal transfer (as opposed to single-ended SCSI which references each SCSI signal to a common ground).

Dword - A double word is a group of 4 consecutive bytes or characters that are stored, addressed, transmitted, and operated on as a unit. The lower two address bits of the least significant byte must equal zero in order to be dword aligned.

EEPROM - Electronically-Erasable Programmable Read Only Memory. A memory chip typically used to store configuration information. See NVRAM.

EISA - Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.

External SCSI Device - A SCSI device installed outside the computer cabinet. These devices are connected in a continuous chain using specific types of shielded cables.

Fast SCSI - A standard for SCSI data transfers. It allows a transfer rate of up to 10 Mbytes/s over an 8-bit SCSI bus and up to 20 Mbytes/s over a 16-bit SCSI bus.

FCC - Federal Communications Commission.

File - A named collection of information stored on a disk.

Firmware - Software that is permanently stored in ROM. Therefore, it can be accessed during boot time.

Hard Disk - A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.

Host - The computer system in which a SCSI host adapter is installed. It uses the SCSI host adapter to transfer information to and from devices attached to the SCSI bus.

Host Adapter - A circuit board or integrated circuit that provides a SCSI bus connection to the computer system.

Internal SCSI Device - A SCSI device installed inside the computer cabinet. These devices are connected in a continuous chain using an unshielded ribbon cable.

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IRQ - Interrupt Request Channel. A path through which a device can get the immediate attention of the computer's CPU. The PCI bus assigns an IRQ path for each SCSI host adapter.

ISA - Industry Standard Architecture. A type of computer bus used in most PC's. It allows devices to send and receive data up to 16-bits at a time.

Kbyte - Kilobyte. A measure of computer storage equal to 1024 bytes.

Local Bus - A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA busses. PCI is a local bus standard.

Logical Unit - A subdivision, either logical or physical, of a SCSI device (actually the place for the device on the SCSI bus). Most devices have only one logical unit, but up to eight are allowed for each of the eight possible devices on a SCSI bus.

LUN - Logical Unit Number. An identifier, zero to seven, for a logical unit.

LVD - Low-Voltage Differential. LVD is a robust design methodology that improves power consumption, data integrity, cable lengths and support for multiple devices, while providing a migration path for increased I/O performance.

Mbyte - Megabyte. A measure of computer storage equal to 1024 kilobytes.

Main Memory - The part of a computer's memory which is directly accessible by the CPU (usually synonymous with RAM).

Motherboard (Mainboard) - A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits, and other components that make a computer work. It also has expansion slots for host adapters and other expansion boards.

Multi-tasking - The executing of more than one command at the same time. This allows programs to operate in parallel.

Multi-threading - The simultaneous accessing of data by more than one SCSI device. This increases the data throughput.

NVRAM - Non Volatile Random Access Memory. Actually an EEPROM (Electrically-Erasable Programmable Read Only Memory chip) used to store configuration information. See EEPROM.

Operating System - A program that organizes the internal activities of the computer and its peripheral devices. An operating system performs basic tasks such as moving data to and from devices, and managing information in memory. It also provides the user interface.

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Parity Checking - A way to verify the accuracy of data transmitted over the SCSI bus. One bit in the transfer is used to make the sum of all the 1 bits either odd or even (for odd or even parity). If the sum is not correct, an error message appears.

PCI - Peripheral Component Interconnect. A local bus specification that allows connection of peripherals directly to computer memory. It bypasses the slower ISA and EISA busses.

Peripheral Devices - A piece of hardware (such as a video monitor, disk drive, printer, or CD-ROM) used with a computer and under the computer's control. SCSI peripherals are controlled through a SCSI host adapter.

Pin-1 Orientation - The alignment of pin-1 on a SCSI cable connector and the pin-1 position on the SCSI connector into which it is inserted. External SCSI cables are always keyed to insure proper alignment, but internal SCSI ribbon cables are sometimes not.

PIO - Programmed Input/Output. A way the CPU can transfer data to and from memory via the computer's I/O ports. PIO is usually faster than DMA, but requires CPU time.

Port Address - Also Port Number. The address through which commands are sent to a host adapter board. This address is assigned by the PCI bus.

Port Number - See Port Address.

Queue Tags - A way to keep track of multiple commands that allows for increased throughput on the SCSI bus.

RAM - Random Access Memory. The computer's primary working memory in which program instructions and data are stored and are accessible to the CPU. Information can be written to and read from RAM. The contents of RAM are lost when the computer is turned off.

RISC Core - ASUS SCSI chips contain a RISC (Reduced Instruction Set Computer) processor, programmed through microcode scripts.

ROM - Read Only Memory. Memory from which information can be read but not changed. The contents of ROM are not erased when the computer is turned off.

SCAM - SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs via software when SCAM compliant SCSI devices are attached.

SCSI - Small Computer System Interface. A specification for a high performance peripheral bus and command set. The original standard is referred to as SCSI-1.

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SCSI-2 - The current SCSI specification which adds features the original SCSI-1 standard.

SCSI-3 - The next SCSI specification, which adds features to the SCSI-2 standard. Although this version is still in development, parts of the SCSI-3 standard are already in use.

SCSI Bus - A host adapter and one or more SCSI peripherals connected by cables in a linear chain configuration. The host adapter may exist anywhere on the chain, allowing connection of both internal and external SCSI devices. A system may have more than one SCSI bus by using multiple host adapters.

SCSI Device - Any device that conforms to the SCSI standard and is attached to the SCSI bus by a SCSI cable. This includes SCSI host adapters and SCSI peripherals.

SCSI ID - A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The host adapter usually gets ID 7 giving it priority to control the bus.

SDMS - SCSI Device Management System. An ASUS software product that manages SCSI system I/O.

STA - SCSI Trade Association. A group of companies that cooperate to promote SCSI parallel interface technology as a viable mainstream I/O interconnect for commercial computing.

Single-Ended SCSI - A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground. This is the most common method (as opposed to differential SCSI which uses a separate ground for each signal).

Synchronous Data Transfer - One of the ways data is transferred over the SCSI bus. Transfers are clocked with fixed-frequency pulses. This is faster than asynchronous data transfer. Synchronous data transfers are negotiated between the SCSI host adapter and each SCSI device.

System BIOS - Controls the low level POST (Power On Self Test), and basic operation of the CPU and computer system.

Termination - The electrical connection required at each end of the SCSI bus, composed of a set of resistors. It improves the integrity of bus signals.

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Ultra SCSI - A standard for SCSI data transfers. It allows a transfer rate of up to 20 Mbytes/s over an 8-bit SCSI bus and up to 40 Mbytes/s over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term “Ultra SCSI” over the term “Fast-20”.

Ultra2 SCSI - A standard for SCSI data transfers. It allows a transfer rate of up to 40 Mbytes/s over an 8-bit SCSI bus, and up to 80 Mbytes/s over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term “Ultra2 SCSI” over the older term “Fast-40”.

VCCI - Voluntary Control Council for Interference.

VHDCI - Very High Density Cable Interconnect. A trapezoidal shielded connector that has a 0.8 mm pitch.

Wide SCSI - A SCSI-2 feature allowing 16 or 32-bit transfers on the SCSI bus. This dramatically increases the transfer rate over the standard 8-bit SCSI bus.

Wide Ultra SCSI - The STA term for SCSI bus width 16 bits, SCSI bus speed maximum data rate 40 Mbytes/s.

Wide Ultra2 SCSI - The STA term for SCSI bus width 16 bits, SCSI bus speed maximum data rate 80 Mbytes/s.

Word A two byte (or 16-bit) unit of information.