ATTO Technology, Inc.

ATTO ExpressPCI
Single-Channel Ultra2/WIDE UL2S
Dual-Channel Ultra2/WIDE UL2D
User's Manual

Rev. B 4/00 Document Control Number: PRMA –0170-000MD

TABLE OF CONTENTS

CHAPTER 1: WELCOME

Congratulations on your purchase of ATTO ExpressPCI Ultra2 SCSI adapter. The ATTO ExpressPCI SCSI adapter, featuring Advanced Data Streaming (ADS™) technology, represents a significant leap in performance technology for Macintosh® and PC users. The ATTO ExpressPCI adapter offers you the flexibility of using it with either your Macintosh or PC!

This chapter is an overview of the ATTO ExpressPCI Ultra2 SCSI host adapter and installation process. To ensure your ATTO ExpressPCI Ultra2 SCSI adapter operates at peak performance, read this manual before attempting installation. The short time spent reading these instructions will help you install your ATTO ExpressPCI Ultra2 SCSI adapter correctly and with minimal effort.

Unpacking

The ATTO ExpressPCI Ultra2 package contains the following items:

- ATTO ExpressPCI Ultra2 SCSI Adapter
- ATTO ExpressPro-Tools CD
- Warranty and Registration Card

If any items are missing, please contact ATTO Technical Support.

What is ATTO ExpressPCI?

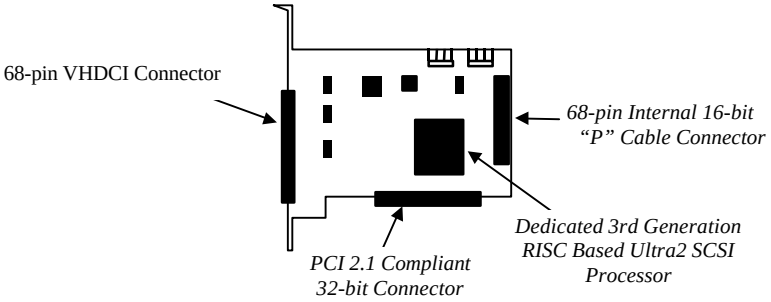
ATTO Technology is proud to present the ATTO ExpressPCI SCSI adapter featuring Advanced Data Streaming (ADS™) technology for your PCI based computer. In addition to this new technology, ATTO ExpressPCI Ultra2 is compatible with Macintosh and PC based computers. This explosive combination will allow you to achieve the ultimate in power and performance. Compatible with all popular SCSI devices, ATTO ExpressPCI will dramatically increase the performance of your disk-intensive applications such as digital video, prepress, multimedia and real-time environments.

The ATTO ExpressPCI family of Ultra2 SCSI adapters consists of *two* different models:

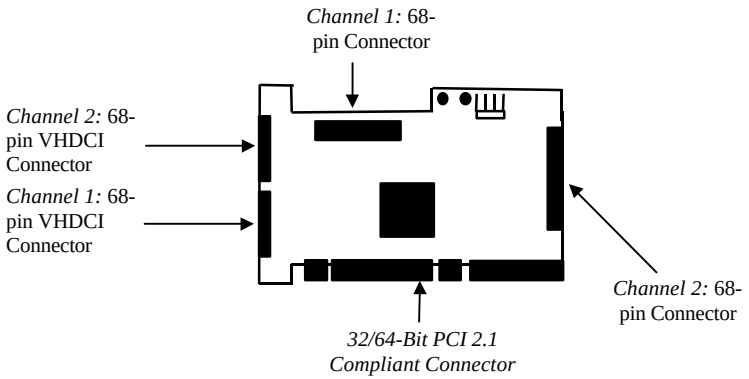
- Single Channel Low Voltage Differential/Single-Ended - ExpressPCI UL2S
- Dual Channel Low Voltage Differential/Single-Ended - ExpressPCI UL2D

ATTO ExpressPCI Ultra2 adapters unleash the power of Ultra2 SCSI by eliminating SCSI management overhead and increasing SCSI transfer rates, while providing an easy performance upgrade path for your existing SCSI-1, SCSI-2 and SCSI-3 drives. Bus Master capabilities allow ATTO ExpressPCI SCSI host adapters to transfer data directly between the computer's RAM and the SCSI bus without using the CPU. This frees all the CPU's processing power for running demanding applications.

The ATTO ExpressPCI UL2S adapter



The ATTO ExpressPCI UL2D adapter



Plug and Play

The ATTO ExpressPCI Ultra2 SCSI adapter's plug and play technology eliminates configuration worries. No need to even set termination! Insert the ATTO ExpressPCI Ultra2 SCSI adapter into your PCI based computer and you are ready to work!

However, should you need to alter the host adapter's configuration, your ATTO ExpressPCI Ultra2 SCSI adapter comes with the state-of-the-art ExpressPro-Tools utilities to configure ATTO ExpressPCI Ultra2 SCSI adapters with ease.

SCSI Manager 4.3 Compatible

Macintosh eliminates connectivity hassles with the full support of the Asynchronous I/O capabilities of SCSI Manager. This means you can attach any device to your ATTO ExpressPCI Ultra2 SCSI adapter that has a SCSI Manager 4.3 compatible driver. This support allows you to leverage your current equipment investment.

Installation Requirements

To successfully install and use your ATTO ExpressPCI Ultra2 SCSI adapter you need:

- A Mac® OS or PC compatible computer with an available PCI expansion slot.
- Your complete ATTO ExpressPCI package.
- SCSI devices conforming to the SCSI-1, SCSI-2, SCSI-3 or Ultra2 standard.

About This Manual

This user's manual combines why and how things are done, to make installing your ATTO ExpressPCI Ultra2 SCSI adapter quick and easy.

This manual is written with the assumption the user has:

- A working knowledge of the Macintosh® and/or PC operating system(s).
- A working knowledge of SCSI driver/termination technology.

CHAPTER 2: GETTING A FAST START

If you have experience installing PCI SCSI adapters, the procedures in this chapter are adequate to install an ATTO ExpressPCI Ultra2 SCSI adapter. However, if you have no experience installing PCI SCSI adapters, first review Chapter 3, *Cabling and Termination.* This chapter explains how to prepare hardware before installing the ATTO ExpressPCI Ultra2 SCSI adapter. Once you have read Chapter 3, proceed to Chapter 4, *Hardware Installation.* This chapter explains how to actually install the ATTO ExpressPCI Ultra2 SCSI adapter.

WARNING
Backup your system data as a general precaution whenever changing or installing hardware.

ATTO ExpressPCI Quick Installation For Macintosh

1. Install your ATTO ExpressPCI Ultra2 SCSI adapter in a PCI expansion slot. For questions concerning installation of an expansion card in your system, consult your computer's documentation. Most installations will use the ATTO ExpressPCI SCSI adapter with no additional setup.

2. Physically install the SCSI devices using unique SCSI IDs and proper termination.

3. Install the ExpressPro-Tools utilities software.

4. If necessary, use ExpressPro-Tools to create standard partitions for any new drives.

ATTO ExpressPCI Quick Installation For PC

1. Decide which device interconnect cables and terminators you will use (Internal/External/or both).

2. Set the termination for each of your SCSI devices.

☞ **Note:** Only the devices at each end of the SCSI bus are terminated. Please remember, depending upon device configuration, the ATTO ExpressPCI host adapter could be one of the devices at the **end** of your SCSI bus.

3. Assign a unique SCSI ID # for each of your SCSI devices.

☞ **Note:** The ATTO ExpressPCI host adapter occupies SCSI ID # 7. Use IDs 0-6 and 8-15 for your devices.

4. Install the ATTO ExpressPCI host adapter card in a PCI expansion slot. Most installations require no additional setup.

5. Physically install the SCSI devices.

6. Connect device cabling.

7. If alternate settings are required/requested, configure the ATTO ExpressPCI host adapter using the ATTO ExpressPCI Utilities (included on the ExpressPro-Tools CD).

CHAPTER 3: CABLING AND TERMINATION

ATTO ExpressPCI Ultra2 SCSI host adapters are designed to operate with either low voltage differential or single-ended devices. When connected to single-ended devices, ATTO ExpressPCI Ultra2 negotiates to Ultra/WIDE transfer rates of 40 Mbytes/sec. per channel. When connected to Ultra2/WIDE devices, ATTO ExpressPCI Ultra2 negotiates to Ultra2/WIDE transfer rates of 80 Mbytes/sec. per channel.

To determine your ATTO ExpressPCI Ultra2 SCSI host adapter model, check the label located on the serial number end of the product box. The model you have will be printed on the barcode label. After determining whether you are using a single channel or dual channel model, the next step in the cabling and termination process is to identify whether SCSI devices will be installed internally or externally. This determines which cables are used and how to connect your SCSI device terminators.

Cabling for the ATTO ExpressPCI UL2S & UL2D SCSI Adapters

The ATTO ExpressPCI UL2S has one industry standard 68-pin “P” (16-bit) VHDCI (Very High Density Cabled Interconnect) cable connector for external device connections and one 68-pin “P” (16-bit) cable connector for internal device connections. The ATTO ExpressPCI UL2D has two industry standard 68-pin “P” (16-bit) VHDCI cable connectors.

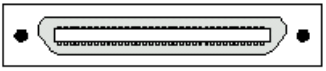
By definition, the Ultra2 SCSI specification limits the total bus cable length to 12 meters or approximately 38 feet (this is a combined figure of both internal and external cable lengths). Try to keep cable lengths as short as possible to ensure higher signal quality and performance.

If using a combination of Wide 16-bit devices and Narrow 8-bit devices on the same connector, Wide devices must be connected first (closest to the connector), followed by the Narrow devices. Please refer to the documentation for your SCSI devices to determine if device is Wide or Narrow, and if it is an UltraSCSI or Ultra2 SCSI device.

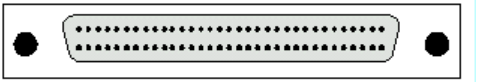
Cable Types

With all varieties of SCSI, be sure to use high quality SCSI-3 rated, well-insulated SCSI cables to ensure error free communications. The following illustrations depict the types of internal and external cable connectors you may come across.

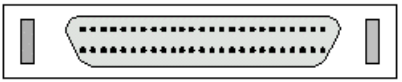
External Connectors



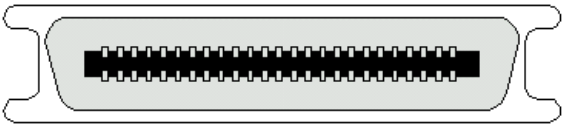
68-Pin VHDCI Connector



68-Pin “P” Connector

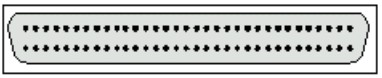


50-Pin Connector

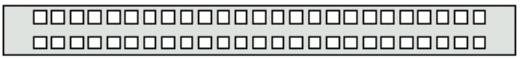


50-pin Centronics

Internal Connectors



High Density 68-Pin Male Internal



Standard 50-Pin Female Internal

Termination

The SCSI bus is a chain of SCSI devices. The devices at both ends of any SCSI chain must be terminated for the SCSI bus to function correctly. A SCSI device chain can be configured in three different ways: internal, external and an internal/external SCSI device chain..

Remember an ATTO ExpressPCI Ultra2 SCSI adapter is also a SCSI device and may require termination depending upon the configuration. Be sure to use the correct terminator. Single-ended, low voltage differential and differential SCSI buses use different types of terminators that should not be mixed.

Terminating the Single-Ended ATTO ExpressPCI UL2S and UL2D

Your ATTO ExpressPCI Ultra2 SCSI host adapter incorporates advanced termination circuitry that allows it to automatically configure its own termination.

CHAPTER 4: HARDWARE INSTALLATION

This chapter walks through the process of installing an ATTO ExpressPCI SCSI host adapter and attaching your SCSI devices to it. Please note to get the best performance from your ATTO ExpressPCI host adapters, use Ultra2/WIDE SCSI devices with the ATTO ExpressPCI Ultra2 host adapters.

Before Installing your ATTO ExpressPCI SCSI Adapter

1. Plan your SCSI device connections.

If connecting both internal and external devices to the ATTO ExpressPCI SCSI adapter, be sure to obtain the appropriate cabling to connect devices. *Cables, adapters and terminators are available through ATTO.*

2. Set SCSI device termination.

Devices at both ends of the SCSI chain must be terminated. Refer to Chapter 3, *Cabling & Termination* and your device documentation to determine SCSI device termination. Devices in the middle of the chain, including the ATTO ExpressPCI SCSI adapter, must have termination removed or disabled.

When using both internal and external devices attached to the ATTO ExpressPCI Ultra2 SCSI host adapter, it will select proper termination for itself.

3. Set SCSI IDs.

Each device on the SCSI bus requires a unique SCSI ID. If installing a single device, make sure you do not assign it the same SCSI ID as your ATTO ExpressPCI SCSI adapter. The default setting for your ATTO ExpressPCI SCSI adapter is ID **7.** It is recommended this setting not be changed. In the event you need to change this setting, refer to the *Reconfiguring the ATTO ExpressPCI SCSI Bus* section of the ExpressPro-Tools user's manual.

Please refer to your SCSI device documentation to determine the current SCSI ID and how to change it. Wide (16-bit) SCSI devices can be assigned IDs **0-6** and **8 -15**, while Narrow (8-bit) SCSI devices can only be assigned IDs ranging from **0-6**.

Hardware Installation

The ATTO ExpressPCI SCSI adapter installs easily into your system. Review system documentation to select an appropriate slot to install your SCSI adapter.

The combined power consumption of your expansion cards must not exceed the limits specified for your system. If you have more than one expansion card installed, check the information that came with your cards to make sure that their power consumption is within the limits specified in your system documentation.

Please follow these easy procedures to install the ATTO ExpressPCI SCSI adapter:

> ☞ **Note:** Before removing the ATTO ExpressPCI SCSI adapter from its box, follow the installation procedure listed below to prevent damaging your ATTO ExpressPCI SCSI adapter or your system.

1. Backup any data on the disk(s) that will be attached to the ATTO ExpressPCI SCSI adapter. This should always be done as a precaution before adding new hardware to your system.
2. Make sure your system and all peripherals are shut down before installing the ATTO ExpressPCI SCSI adapter. After turning off the computer, leave the power cable plugged into a grounded outlet to discharge static electricity.
3. Remove the cover from your computer. (Consult computer manual for instructions).
4. Identify the PCI slot for installing the SCSI adapter.
5. Carefully install the SCSI adapter in the slot. Make sure it is securely installed. If it is not fully secured into the slot, it will not appear on the bus.
6. Replace cover on the computer.

Your computer is now ready to connect any devices to the ATTO ExpressPCI SCSI adapter. To connect your SCSI devices, refer to the peripherals' documentation to correctly install/configure devices.

If it is necessary to alter the settings for the ATTO ExpressPCI SCSI adapter, refer to the ATTO ExpressPro-Tools manual for complete details.

CHAPTER 5: TROUBLESHOOTING

Try the following suggestions to troubleshoot the ATTO ExpressPCI SCSI adapter.

- Check all cable connections to each device. Verify that all cables are in proper working condition.

- Compare the termination of your system to the description in the *Termination* section of Chapter 3.

- Verify that all of the devices attached to the ATTO ExpressPCI SCSI adapter have unique SCSI IDs. Remember the ATTO ExpressPCI SCSI adapter has a SCSI ID of **7** by default.

- If the same device shows up at several different SCSI IDs, either its SCSI ID is set the same as the ATTO ExpressPCI's SCSI ID, or the cable is defective.

- Check to see if external SCSI devices are all plugged into an AC outlet and turned on prior to powering-up your PC.

- If a device does not appear: Verify that cables and termination are set properly. If this doesn't rectify the problem, try lengthening the SCSI Reset Delay. (Refer to ExpressPro-Tools user's manual).

- PC Users should be sure to check computer's CMOS setup and verify the PCI slots are configured correctly. Procedures vary greatly, refer to the manual supplied with your system or call your computer supplier for configuration assistance.

APPENDIX A: RADIO & TELEVISION INTERFERENCE

The equipment described in this manual generates and uses radio frequency energy. If the ATTO ExpressPCI SCSI adapter is not installed and used properly; that is, in strict accordance with the manufacturer's instructions, it may cause interference with radio and television reception.

ATTO ExpressPCI UL2S Model

ATTO ExpressPCI

EPCI-UL2S

Tested To Comply
With FCC Standards

FOR HOME OR OFFICE USE

ATTO ExpressPCI UL2D Model

WARNING!

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide a reasonable protection against such interference when operating in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

If this equipment does cause interference to radio and television reception, verify by turning the equipment off and on, try to correct the interference by one or more of the following:

- Move the receiving antenna.
- Relocate the computer with respect to the receiver, or move the computer away from the receiver.
- Plug the computer into a different outlet so the computer and receiver are on different branch circuits.
- If necessary, consult your dealer, ATTO Technical Support, or an experienced radio/television technician for additional suggestions.

The booklet *How to Identify and Resolve Radio/TV Interference Problems* prepared by the Federal Communications Commission is a helpful guide. It is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Declaration of Conformity

This applies to the ATTO ExpressPCI Single-Ended and Differential versions. These devices have been tested in the basic operating configuration and found to be compliant with the following European Union standards:

Application of Council Directive: 89/336/EEC

Standard(s) to which conformity is declared: EN55022, EN50082-1

This Declaration is only valid when this product is used in conjunction with other CE approved devices and when the whole system is tested to the applicable CE standards and found to be compliant.

The equipment described in this manual generates and uses radio frequency energy. If the ATTO ExpressPCI SCSI adapter is not installed and used properly, that is, in strict accordance with the manufacturer's instruction, it may cause interference with radio and television reception.

Canadian Standards

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

Cet appareil numerique de la classe B respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

APPENDIX B: SPECIFICATIONS

General

- Operates on Macintosh® and PC Computers
- Automatic Termination
- Advanced Data Streaming (ADS™) Technology
- RAID-Ready
- Embedded RISC I/O Processor
- SCSI-3 Connectors:
  UL2D: EXT (2) 68 VHDCI
  INT (2) 68 Wide
  UL2S: EXT (1) 68 VHDCI
  INT (1) 68 Wide
- Flash ROM BIOS for Easy Field Upgrades
- PCI 2.1 Compliant
- Low Power Requirements
- Plug and Play
- Includes Mac® OS and PC Utility Software

SCSI Bus

Adapter Interface.....Special Bus Management Hardware for Video, Fileservers, & Real Time Environments

Maximum Host PCI Transfer Rate.....133 Mbytes/sec.

Maximum SCSI Transfer Rates:

Synchronous Data Rate:

UL2D:.....80 Mbytes/sec. Per Channel (Ultra2 mode)
40 Mbytes/sec. Per Channel (Ultra mode)

UL2S: .....80 Mbytes/sec. Per Channel (Ultra2 mode)
40 Mbytes/sec. Per Channel (Ultra mode)

Asynchronous Data Rate: .....12 Mbytes/sec. Per Channel (All models)

SCSI Interface .....SCSI-1, SCSI-2, SCSI-3, UltraSCSI, Ultra2 SCSI

Electrical Signals .....Single-Ended, Low Voltage Differential and Differential SCSI

Extensive Device Support.....UL2D: Up to 210 through LUNS (Wide and Narrow Devices)
UL2S: Up to 105

Advanced SCSI

- Large Command FIFO
- Supports Disconnect/Reconnect
- Asynchronous I/O Support
- Multiple Initiator Support
- SCSI-3 Tagged Command Queuing
- ASPI Compliant (For PC Users)
- SCSI Manager 4.3 Compatible (For Macintosh® Users)

Environmental and Physical Specifications

Operating Temperature.....0-50°C

Short Card Formfactor:

Humidity.....10-90% Non-condensing

Length.....4.920" (UL2S)

6.521" (UL2D)

Height.....4.200" (UL2S)

4.200" (UL2D)

Power Requirements .....0.75 typical / 1.25 max. Amps @ + 5.0 VDC, 0.05 Amps @ +12.0 VDC

MTBF.....150,000 Hours

MTTR.....< 15 Minutes

Operating Environments

- Windows 95, Windows NT
- MS-DOS, Windows 3.x
- Mac® OS 7.5.2 or Greater

APPENDIX C: SCSI DEVICE & CABLING LIMITATIONS

Due to the electrical noise incurred with high-speed data transfer rates, SCSI has cabling and device limitations. Table C-1 explains the maximum number of devices you may use relative to your cable distance. For example, take the single-ended distance in an UltraSCSI environment (Cells 3 & 4 in the single-ended bus length column). Look at the corresponding cells in the maximum devices column to determine the maximum number of devices you may connect at the specific distance. In an UltraSCSI environment, using a single-ended bus length of 3 meters, you can only connect 4 devices. Using a single-ended bus length of 1.5 meters, you can connect up to 8 devices.

SCSI Type	Single-Ended Bus Length	Differential	LVD	Maximum Devices
Fast SCSI	3 Meters	25 Meters	12 Meters	8
Fast/WIDE SCSI	3 Meters	25 Meters	12 Meters	16
UltraSCSI	1.5 Meters	25 Meters	12 Meters	8
UltraSCSI	3 Meters	N/A	N/A	4
Ultra/WIDE SCSI	N/A	25 Meters	12 Meters	16
Ultra/WIDE SCSI	1.5 Meters	N/A	N/A	8
Ultra/WIDE SCSI	3 Meters	N/A	N/A	4
Ultra2 SCSI	N/A	N/A	12 Meters	8
Ultra2/WIDE SCSI	N/A	N/A	12 Meters	16

Table C-1: UltraSCSI Cabling and Device Limitations

Table C-1 lists the maximum number of devices you may connect at specific cable distances using differential and single-ended SCSI in various SCSI environments. In an UltraSCSI workgroup environment with a 7-drive tower, you are limited to 1.5 meters between the host and tower (this distance includes the cabling in the tower). For example, if the 7-drive tower requires 1 meter of cabling to connect all of its drives, the distance from the tower to the host would be .5 meters. Adding an ATTO SCSI Sidekick to this configuration would increase the distance between the host and tower to 2 meters.

Ultra2 SCSI is less sensitive to SCSI bus noise and offers you the ability to connect a full load of devices up to 12 meters. Use table C-1 to assist you when attempting to configure your workgroup. If you have any questions or issues occur with your configuration, please call an ATTO technical support representative.

Appendix D: ATTO's Product Line

SCSI Solutions

SCSI Host Adapters
- ATTO ExpressPCI Family
- ATTO SiliconExpress IV Family

SCSI Expansion Units
- ATTO SCSI Expander

SCSI Conversion Units
- ATTO SCSI Sidekick

SCSI Workgroup Solutions
- ATTO AccelNet Ultra
- ATTO AccelWare

SCSI Solid-State Caching
- ATTO SiliconCache™ II

SCSI Solid-State Drives
- ATTO SiliconDisk II

RAID Software
- ATTO ExpressRAID

Fibre Channel Solutions

Fibre Channel Host Adapters
- ATTO ExpressPCI FC Family

Fibre Channel Hub
- ATTO AccelNet FC

Fibre Channel Bridge & Converter
- ATTO FibreBridge™

RAID Software
- ATTO ExpressRAID

HOW TO CONTACT ATTO TECHNOLOGY, INC.

You may receive customer service, sales information and technical support by phone Monday through Friday, Eastern Standard Time 8:00 a.m. to 7:00 p.m., or by fax and web site 24-hours a day.

ATTO Technology, Inc.
155 CrossPoint Parkway
Amherst, New York 14068
(716) 691-1999 • voice
(716) 691-9353 • fax
http://www.attotech.com

ATTO Technology can also be reached via e-mail at the following addresses:

Sales Support: sls@attotech.com

Technical Support: techsupp@attotech.com