ATTO Technology, Inc.

ATTO ExpressPCI
Single-Channel Ultra/WIDE PSC & PSCd
Dual-Channel Ultra/WIDE DC & DCd
User's Manual

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CHAPTER 1: WELCOME

Congratulations on your purchase of the ATTO ExpressPCI Ultra 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 Ultra SCSI adapter and installation process. To ensure your ATTO ExpressPCI Ultra 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 Ultra SCSI adapter correctly and with minimal effort.

Unpacking

The ATTO ExpressPCI package contains the following items:

- ATTO ExpressPCI SCSI adapter
- ATTO ExpressPro-Tools CD
- Warranty and Registration card

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

What is ATTO ExpressPCI?

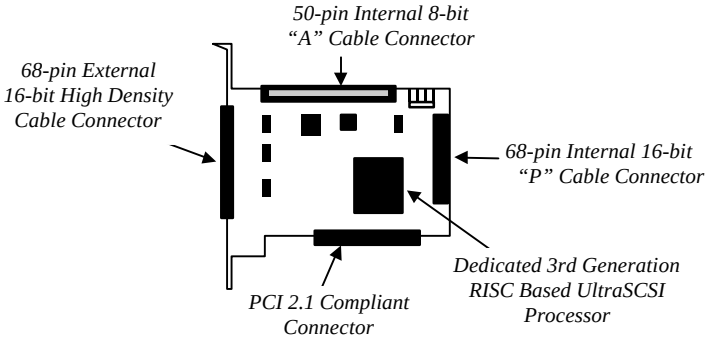
ATTO Technology is proud to present the ATTO ExpressPCI SCSI adapter featuring Advanced Data Streaming (ADS™) technology for your PCI based computer. In addition to this new technology, ATTO ExpressPCI is compatible with Macintosh® and PC based computers. This explosive combination will allow you to 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.

The ATTO ExpressPCI family of UltraSCSI SCSI adapters consists of *four* different models:

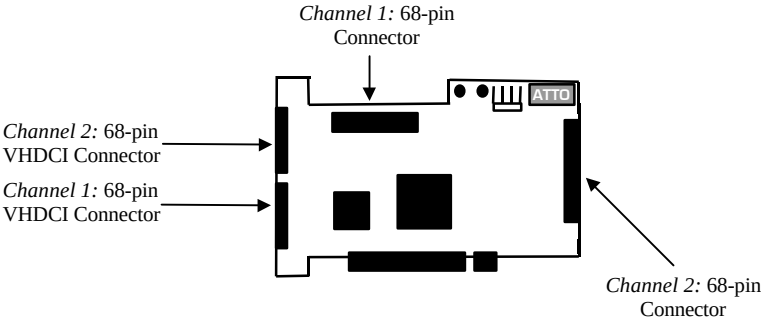
- Single-Channel Single-Ended UltraSCSI - ExpressPCI PSC
- Single-Channel Differential UltraSCSI - ExpressPCI PSCd
- Dual-Channel Single-Ended UltraSCSI - ExpressPCI DC
- Dual-Channel Differential UltraSCSI - ExpressPCI DCd

ATTO ExpressPCI Ultra adapters unleash the power of Ultra/WIDE SCSI-3 by eliminating SCSI management overhead and increasing SCSI transfer rates, while providing an easy performance upgrade path for your existing SCSI-1, SCSI-2 drives and SCSI-3 drives. BusMaster capabilities allow the ATTO ExpressPCI 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 PSC/PSCd SCSI adapter



The ATTO ExpressPCI DC/DCd SCSI adapter



Plug and Play

Start working fast! The ATTO ExpressPCI SCSI adapter's plug and play technology eliminates configuration worries. There's no need to even set termination for the Single-Ended adapters! Insert the ATTO ExpressPCI 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 adapter comes with the state-of-the-art ExpressPro-Tools utilities to enable you to configure your ATTO ExpressPCI adapter 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 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 SCSI adapter you need:

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

About This Manual

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

This manual is written with the assumption that you have:

✓ 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 for you to install an ATTO ExpressPCI 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 SCSI adapter. Once you have read Chapter 3, proceed to Chapter 4, *Hardware Installation.* This chapter explains how to actually install the ATTO ExpressPCI 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 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 SCSI host adapters are designed to operate with either Single-Ended or Differential devices. The ATTO ExpressPCI PSC and ATTO ExpressPCI DC utilize standard Single-Ended SCSI and requires the use of Single-Ended devices. The ATTO ExpressPCI PSCd and ATTO ExpressPCI DCd utilize Differential SCSI and require Differential devices and terminators.

To determine the model of ATTO ExpressPCI you own, check the label located on the serial number end of the product box. The model you have will printed on the barcode label. After determining whether you are using a single channel or dual channel, 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 Single-Ended ATTO ExpressPCI PSC & DC SCSI Adapters

The ATTO ExpressPCI PSC has one industry standard 68-pin "P" (16-bit) and one 50-pin "A" (8-bit) cable connector for internal device connections. The ATTO ExpressPCI PSC also has one 68-pin "P" (16-bit) external device connector. The ATTO ExpressPCI DC has two industry standard 68-pin "P" (16-bit) cable connectors for internal device connections and two 68-pin "P" (16-bit) VHDCI (Very High Density Cabled Interconnect) cable connectors for external device connections.

☞ **Note:** When installing SCSI devices on the ATTO ExpressPCI PSC/PSCd, you can use any two SCSI ports on your ATTO ExpressPCI SCSI adapter, but you **cannot** use all three. You may however, use all four channels on the ATTO ExpressPCI DC/DCd.

When using non-UltraSCSI devices, SCSI specification limits total bus cable length for Single-Ended SCSI to 3 meters (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.

Restrictions are imposed to deal with the electrical problems that arise at increased operating speeds. *(Refer to Appendix C for SCSI device and cabling limitations .*

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 you received with your SCSI devices to determine if your device is Wide or Narrow.

Cabling for Differential ATTO ExpressPCI PSCd & DCd SCSI Adapters

The ATTO ExpressPCI PSCd has one industry standard 68-pin “P” (16-bit) and one 50-pin “A” (8-bit) cable connector for internal device connections. The ATTO ExpressPCI PSCd also has one 68-pin “P” (16-bit) external device connector. ATTO ExpressPCI DCd has two industry standard 68-pin “P” (16-bit) cable connectors for internal device connections and two 68-pin “P” (16-bit) VHDCI (Very High Density Cabled Interconnect) cable connectors for external device connections.

☞ **Note:** When installing SCSI devices on the ATTO ExpressPCI PSC/PSCd, you can use any two SCSI ports on your ATTO ExpressPCI SCSI adapter, but you **cannot** use all three. You may however, use all four channels on the ATTO ExpressPCI DC/DCd.

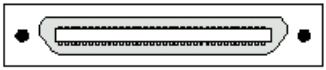
By definition the SCSI specification limits total Differential bus cable length to 25 meters (combined figure of both internal and external cable lengths). Try to keep cable lengths as short as possible to ensure higher signal quality and performance. When using Differential SCSI, the maximum cable length is the same for both UltraSCSI and standard Fast/Wide SCSI buses.

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 received with your SCSI devices to determine if your device is Wide or Narrow.

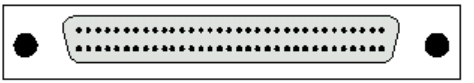
Cable Types

Single-Ended and Differential SCSI use the same cables. 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.

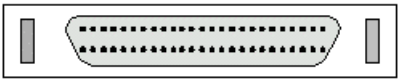
External Connectors



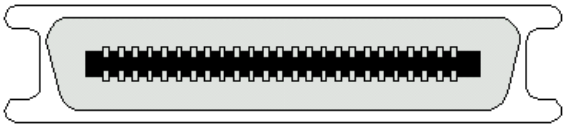
68-Pin VHDCI Connector



68-Pin “P” Connector

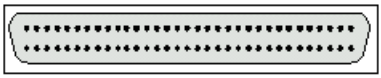


50-Pin Connector

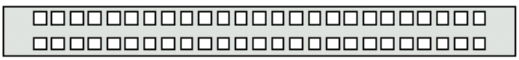


50-pin Centronics

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 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 PSC/DC

Your Single-Ended ATTO ExpressPCI SCSI adapter incorporates advanced termination circuitry allowing the ATTO ExpressPCI SCSI adapter to automatically configure its own termination. There are two LEDs on the top edge of the ATTO ExpressPCI PSC/DC that will provide feedback on its automatic termination setting.

LED 1 (Low Term)	LED 2 (High Term)	ATTO ExpressPCI-PSC Termination
On	On	All 16 data bits terminated
Off	Off	No termination
Off	On	Upper 8 bits terminated

Table 3.1 LED Indicators

In most cases, you will not need to manually adjust the termination of your ATTO ExpressPCI SCSI adapter. Two exceptions exist. If you have attached a narrow (8 bit) device to the external port AND a wide (16 bit) device to the internal port of your ATTO ExpressPCI PSC/DC, ***OR***, if you attached a narrow (8 bit) device to the internal WIDE (16 bit) connector and a WIDE (16 bit) device to the external port, the ATTO ExpressPCI PSC/DC will not properly terminate itself. In this case, your ATTO ExpressPCI PSC/DC must be manually terminated, using the termination option in ATTO ExpressPro-Tools. In this case, refer to the *ExpressPro-Tools Bus Configuration Utilities* section in the ExpressPro-Tools user's manual, and set the termination of your ATTO ExpressPCI PSC/DC to Upper. Please keep in mind that your ATTO ExpressPCI SCSI adapter only controls its own termination. You must terminate the last device of both the internal SCSI chain and the external SCSI chain.

Terminating the Differential ATTO ExpressPCI PSCd/DCd

ATTO ExpressPCI PSCd

Termination of the Differential ATTO ExpressPCI PSCd SCSI adapter is accomplished with the three DIP resistor packs RN1, RN2, and RN3 (refer to Figure 3.1).

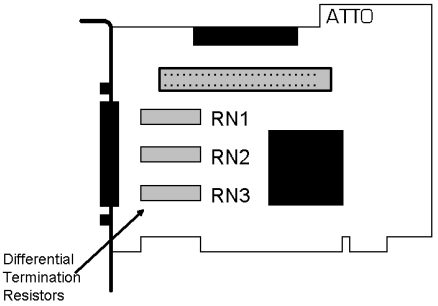


Figure 3.1 Illustrates the location of the three DIP resistor packs RN1, RN2, and RN3 on the Differential ATTO ExpressPCI PSCd SCSI adapter.

ATTO ExpressPCI DCd

Termination of the Differential ATTO ExpressPCI DCd SCSI adapter is accomplished with the six DIP resistor packs RN1, RN2, RN3, RN4, RN5, and RN6 (refer to Figure 3.2).

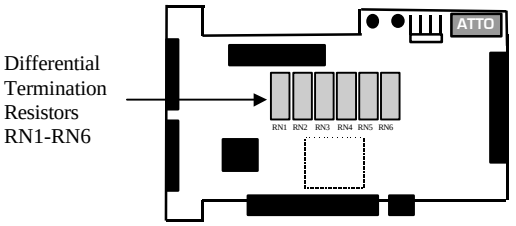


Figure 3.2 Illustrates the location of the six DIP resistor packs RN1, RN2, RN3, RN4, RN5 and RN6 on the Differential ATTO ExpressPCI DCd SCSI adapter.

To enable the proper termination for your Differential ATTO ExpressPCI SCSI adapter, determine the termination for your device configuration by referring to Table 3.2.

Internal Connection	External Connection	Termination Choice to Select
Wide Device	Wide Device	None
NOT USED	Wide Device	Full
Wide Device	NOT USED	Full
Narrow Device	NOT USED	Full
NOT USED	Narrow Device	Full
Narrow Device	Wide Device	Upper
Wide Device	Narrow Device	Upper
Narrow Device	Narrow Device	Upper

Table 3.2 Termination Selection Chart

Once you have determined your termination choice, refer to Table 3.3 or Table 3.4 to determine how to adjust your Differential termination DIP resistors.

	Full	Upper	None
RN1	Installed	Removed	Removed
RN2	Installed	Removed	Removed
RN3	Installed	Installed	Removed

Table 3.3 Termination Resistor Configuration for PSCd

	Full	Upper	None
RN1	Installed	Removed	Removed
RN2	Installed	Removed	Removed
RN3	Installed	Installed	Removed
RN4	Installed	Removed	Removed
RN5	Installed	Removed	Removed
RN6	Installed	Installed	Removed

Table 3.4 Termination Resistor Configuration for DCd

☞ **Note:** The default termination for each resistor is **Full**.

To lift the DIP from the socket, you must carefully pull the resistor DIPs using a chip puller.

CHAPTER 4: HARDWARE INSTALLATION

This chapter walks through the process of installing an ATTO ExpressPCI SCSI adapter and attaching your SCSI devices to it. Please note for the best performance from your ATTO ExpressPCI host adapters, use Ultra/WIDE devices with ATTO ExpressPCI PSC, PSCd, DC, DCd models. You may however use narrow devices with ATTO ExpressPCI. The ATTO ExpressPCI SCSI host adapters will negotiate to the narrow device performance level.

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 their termination removed or disabled.

When using both internal and external devices attached to the Single-Ended ATTO ExpressPCI SCSI adapter, the SCSI adapter will select proper termination for itself automatically in most cases (see *Terminating the Single-Ended ATTO ExpressPCI PSC/DC SCSI adapter* section in Chapter 3, for complete information).

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 your 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 simple procedures to install the ATTO ExpressPCI SCSI adapter:

☞ **Note:** Before removing the ATTO ExpressPCI SCSI adapter from its box, follow the installation procedures 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 the SCSI adapter is securely installed. If the card is not fully into 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

Troubleshooting the installation of any new piece of hardware can be frustrating. Try the following suggestions if you are having problems installing 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, its SCSI ID is probably 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 show: Verify 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 their computer's CMOS setup and verify the PCI slots are configured correctly. Procedures vary greatly, so please 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 Single-Ended PSC & DC Models

ATTO ExpressPCI EPCI-PSC, EPCI-DC

Tested To Comply
With FCC Standards

FOR HOME OR OFFICE USE

ATTO ExpressPCI Differential PSCd & DCd Models

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, which can be determined by turning the equipment off and on, you can try to correct the interference by one or more of the following measures:

- 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 Staff, 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

- Works on Macintosh® and PC Computers
- Automatic Termination
- Advanced Data Streaming (ADS™) Technology
- RAID-Ready
- Embedded RISC I/O Processor
- SCSI-3 Connectors:
  ATTO ExpressPCI PSC/PSCd: Fine Pitch 68-pin "P"
  ATTO ExpressPCI DC/DCd 68-pin VHDCI external connectors
- 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:

PSC/PSCd/DC/DCd: .....40 Mbytes/sec. Per Channel

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

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

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

Extensive Device Support.....Up to 105 Through LUNs (Wide and Narrow Devices)

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" (PSC/PSCd)
6.200" (DC/DCd)

Height.....4.200" (PSC/PSCd)
4.200" (DC/DCd)

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
- Mac® OS X Server

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 the tower (this distance includes the cabling for 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.

Please note that UltraSCSI is very sensitive to SCSI bus noise, cable distances, and the number of devices connected on the SCSI bus. Be cautious when working with UltraSCSI by carefully connecting your devices. 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, BBS and web site 24-hours a day.

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