Technical Reference

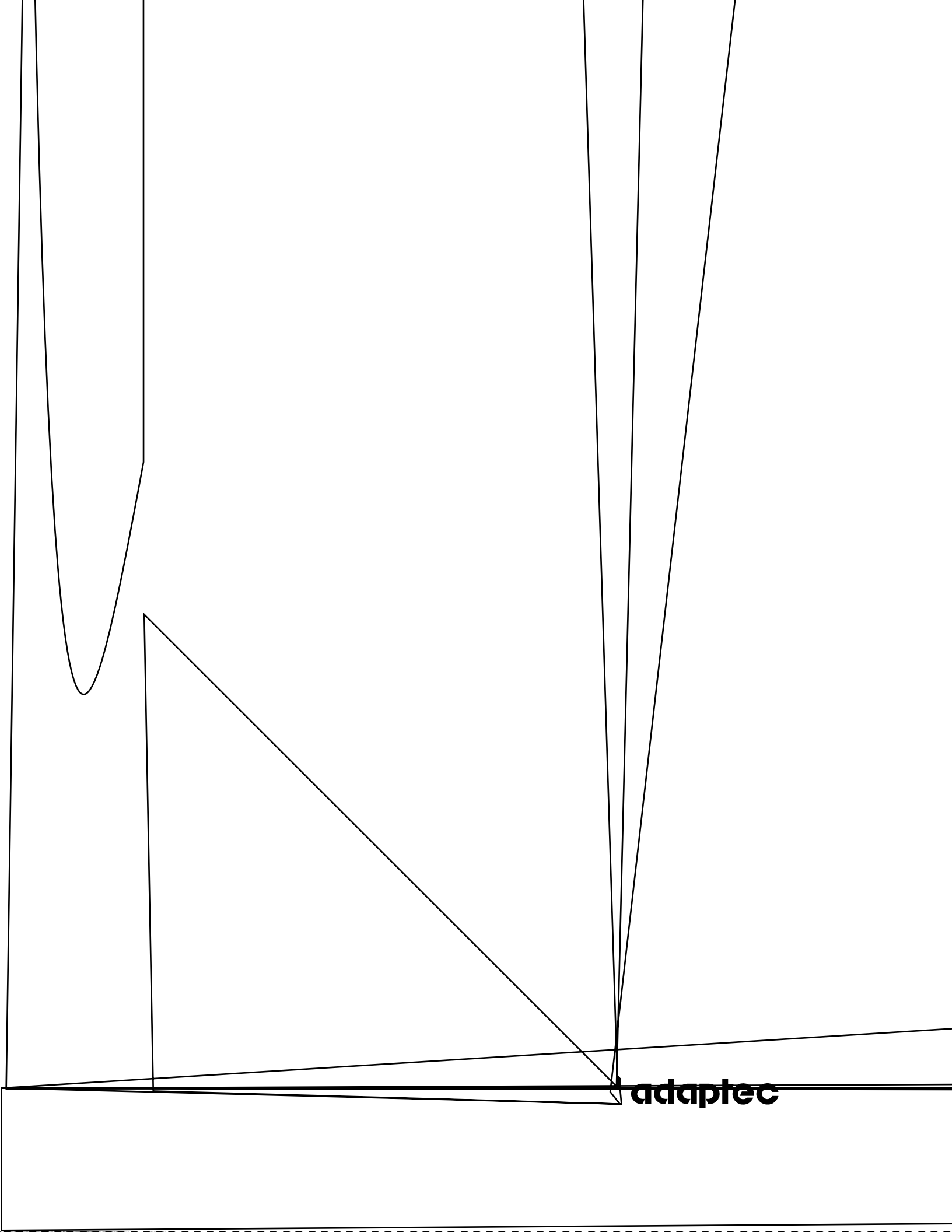
APA-1460 SlimSCSI

PCMCIA-to-SCSI Host Adapter

adaptec®

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

Printed in Singapore
STOCK NO: 510671-00 Rev. A LL 08/94


adaptec

Copyright

Trademarks

Adaptec, the Adaptec logo, AHA, and PhaseEngine are registered trademarks and SlimSCSI and EZ-SCSI are trademarks of Adaptec, Inc.

IBM, OS/2, and AT are registered trademarks of International Business Machines Corporation.

Microsoft and MS-DOS are registered trademarks of Microsoft Corporation.

NetWare is a registered trademark of Novell, Inc.

Toshiba is a registered trademark of Toshiba Corporation.

UNIX is a registered trademark of Unix System Laboratories.

486 is a trademark of Intel Corporation.

Changes

The material in this document is for information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, Adaptec, Inc. assumes no liability resulting from errors or omissions in this document, or from the use of the information contained herein.

Adaptec reserves the right to make changes in the product design without reservation and without notification to its users.

Adaptec Technical Support

Adaptec products have been specifically developed for easy installation and use. We believe that our documents and the onscreen instructions and help are complete and clear enough to meet your needs. If you need more assistance, please contact us.

- The Adaptec Electronic Bulletin Board Service (BBS) provides information on software upgrades, new releases, technical advice, and other topics. The BBS is available 24 hours a day at 408-945-7727; 1200/2400/9600/14400 baud, 8 data bits, 1 stop bit, no parity.
- To contact the Adaptec Technical Support Hot Line, call 800-959-SCSI (7274) or 408-945-2550; M–F: 6:00 a.m. to 5:00 p.m., Pacific Time.

Interactive Fax Service

The Adaptec Interactive Fax Service provides the latest online information about Adaptec products and services. The Adaptec Interactive Fax Service is available 23 hours a day, 7 days a week, at 408-957-7150.

Ordering Software and Cables

To order Adaptec software and SCSI cables, call 800-442-SCSI (7274), M–F: 6:00 a.m. to 5:00 p.m., Pacific Time. If you are calling from outside the U.S. and Canada, the number is 408-957-SCSI (7274).

Literature Hotline

To request additional documentation for Adaptec products, call 800-934-2766, M–F: 5:00 a.m. to 6:00 p.m., Pacific Time.

FCC Compliance Statement

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 residential installations. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the 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 interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Move the equipment away from the receiver
- Plug the equipment into an outlet on a circuit different from that to which the receiver is powered
- If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions

CAUTION: Only equipment certified to comply with Class B (computer input/output devices, terminals, printers, etc.) should be attached to this equipment, and must have shielded interface cables.

Finally, any changes or modifications to the equipment by the user not expressly approved by the grantee or manufacturer could void the user's authority to operate such equipment.

Each host adapter is equipped with an FCC compliance label which shows only the FCC identification number. The full text of the associated label follows:

> This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Table of Contents

5 Functional Specification

Glossary

Index

▼▼▼▼▼ Preface

Inside This Document

This document describes the mechanical, electrical, and other functional characteristics of the APA-1460 PCMCIA-to-SCSI host adapter. This document is targeted primarily at two audiences: individuals who need a detailed technical reference for APA-1460 information; and software engineers who are writing code for the APA-1460 host adapter.

Chapter 1 Introduction
provides an overview of the APA-1460 PCMCIA-to-SCSI host adapter.

Chapter 2 Conformance to Industry Specifications
explains how the APA-1460 conforms to PCMCIA and SCSI standards.

Chapter 3 Product Specifications
lists electrical and mechanical specifications for the APA-1460.

Chapter 4 Connector Pinout
lists the signal names for the pins on the PCMCIA, SCSI, and Card / Cable connectors.

Chapter 5 Functional Specification
describes the two types of PCMCIA bus cycles to which the APA-1460 responds.

Conventions

The following typographic conventions are used in this document.

bold
Used for keystrokes (… press the **Enter** key …).

Helvetica
Used for operator entry that must be typed exactly as shown (… device=c:aspi2dos.sys …) and for messages on the screen (… Enter Password …).

Helvetica Italics
Used as a place holder for text you must determine and type in (… enter *nn* for number …). Also used for program and file names that appear in body text (… the *autoexec.bat* file …).

Italics
Used for emphasis (… is *only* supported …) and for document reference (… refer to Chapter 1, *Introduction*…).

SMALL CAPITALS
Used for register names, signal names, and commands

Hexadecimal Numbers
Are followed by an ‘h’, e.g., 330h.

End Mark
The ❒ symbol marks the end of the text for each chapter.

❒

1 Introduction

About This Chapter

Read this chapter to find out

- An overview of the APA-1460 PCMCIA-to-SCSI host adapter
- A list of related documents which provide additional information related to the APA-1460

▼▼▼▼▼ 1

Overview

The Adaptec APA-1460 PCMCIA-to-SCSI Host Adapter is a PCMCIA Type II add-in card which allows computers equipped with a PCMCIA Type II, Type III, or Toshiba® Type IV *socket* to connect to a wide range of SCSI devices, including CD-ROM, hard disk, and tape.

PCMCIA (Personal Computer Memory Card International Association) is a widely accepted industry standard for small form factor add-in cards. Such add-in cards generally fall into two categories:

- Memory add-in products including solid state and rotating media
- I/O add-in products, typically including fax-modems, network adapters, and SCSI host adapters

PCMCIA is especially popular with notebook and subnotebook computers because of its small, credit card size form factor and it is also supported on some desktop platforms.

SCSI is a well known and widely accepted peripheral interface bus standard. Most CD-ROMs and many high-performance, high-capacity hard disks and tape drives implement the SCSI standard as well as scanners, high-speed laser printers, and digital cameras.

The APA-1460 combines these two interface standards, permitting PCMCIA-equipped host computers to communicate with SCSI devices at data rates up to 2 MBytes/sec. The APA-1460 design addresses concerns present in the PCMCIA and SCSI worlds, many of which are listed below in *Features*.

The APA-1460 is comprised of two physical parts: the Type II PCMCIA card, containing the PCMCIA and SCSI electronics, and a custom SCSI cable. Reference to these two parts is made throughout the document as the Card and Cable, respectively; both terms are capitalized for clarity. It is understood that APA-1460 refers collectively to the Card and Cable.

Features

- PIO Mode data transfer, overlapping mode address 340h or 140h
- Power down Mode
- Updateable attribute memory
- Fast SCSI support
- Plug and Play support
- SCAM support (software support to be added later)
- Based on PCMCIA 2.1 Specification
- Conforms to the PCMCIA Specification, Release 2.1
- Light-weight, yet rugged packaging

- Fully compliant with SCSI-1 electrical specifications (software implements SCSI-2 commands)
- ASPI (Advanced SCSI Programming Interface) compatibility
- Hardware compatibility with a wide range of PCMCIA platforms (current software is compatible with x86 platforms)

Related Documents

In several cases, this document refers you to other related documents. Some of these documents are highly recommended, such as the *AIC-6360 Data Book*. You should have a working familiarity with PCMCIA and SCSI prior to reading this document.

The following documents provide additional detailed technical information related to the APA-1460.

- *Small Computer System Interface (SCSI-2) Specification*, ANSI X3.131-1994.
- *PCMCIA Specification*, Release 2.1
- *AIC-6360 Data Book*

❒

2 Conformance to Industry Specifications

About This Chapter

Read this chapter to find out

- Conformance requirements to PCMCIA standards
- Conformance requirements to SCSI standards

▼▼▼▼▼ 2

Conformance to industry specifications is an important requirement in today's marketplace, especially with PCMCIA and SCSI. Conformance helps to guarantee the widest range of compatibility for a product such as the APA-1460, with host computer platforms and devices.

Conformance to PCMCIA Standards

Electrically, mechanically, and functionally, the APA-1460 was designed in conformance with Release 2.1 of the PCMCIA Specification.

The PCMCIA electrical specifications are written to ensure that no damage occurs when a PCMCIA compatible card is plugged into a PCMCIA compatible computer (voltage and signal levels are correct, etc.) The electrical specifications also guarantee that cards may be safely plugged and unplugged from a computer while the power is on, which is referred to as hot swapping. The APA-1460 supports hot swapping.

The PCMCIA standard allows several physical form factors: Type I, Type II, Type III, and Toshiba Type IV with certain allowable variations, such as Type II Extended. The APA-1460 Card follows the form factor of a standard Type II card. When the APA-1460 Cable is plugged into the APA-1460 Card, the combination most closely resembles a Type II Extended product with regard to key physical dimensions.

Functionally, in addition to the I/O mapped SCSI registers (see the *AIC-6360 Data Book*), the APA-1460 also implements a PCMCIA *Attribute Memory Space*. Configuration information in the form of a CIS (Card Information Structure) is stored in this memory space. The CIS may be read by the PCMCIA host to automatically configure the APA-1460 using the information stored therein.

Conformance to SCSI Standards

The APA-1460 is fully compatible with the SCSI-1 electrical specification. In fact, the APA-1460 is based on the AIC-6360 SCSI protocol controller. Using this protocol controller, the APA-1460 supports asynchronous and synchronous SCSI data transfer rates up to 10 MBytes/sec. The APA-1460 hardware supports SCSI arbitration, and disconnect/reconnect features (though these features may or may not be taken advantage of by driver software).

To save power and reduce noise on the SCSI cable, the APA-1460 uses *active termination*. Active termination reduces terminator power consumption by nearly 100% in standby mode and reduces reflections on the SCSI cable.

Using the SCSI-1 electrical interface, the APA-1460 software can send SCSI-2 commands to those devices which require them. In this way, the APA-1460 is fully compatible with most SCSI-2 devices on the market. (Most SCSI-2 devices claim SCSI-2 compliance by virtue of their command set definition and are actually based on SCSI-1 electrical designs.)

ASPI compatibility is another key aspect of the APA-1460's compliance with industry standards for SCSI. ASPI is a software device driver model which allows a broad range of SCSI device driver and application programs to be written which are not dependent on the design of the SCSI host adapter.

ASPI support for the DOS and Windows operating systems is currently available for the APA-1460.

❒

3 Product Specifications

About This Chapter

Read this chapter to find out

- Electrical specifications for the APA-1460
- Mechanical specifications for the APA-1460

▼▼▼▼▼ 3

Electrical Specifications

PCMCIA

Electrical Specification:	PCMCIA Release 2.1
Transfer Rate:	2 MBytes / sec. (16-bit data path)
Data Path:	8- or 16-bit
Voltage Requirements:	+5 V dc
Power Consumption:	500 mW (est.)
I / O Addressing Requirements:	32 consecutive addresses, 1 of 2 ranges possible
Interrupt Channels:	1 of 4 options (9, 10, 11, 12)

SCSI

Electrical Specification:	ANSI X3.131-1986
Transfer Rate:	Up to10 MBytes / sec. synchronous mode (Fast SCSI)
Data Format:	8-bit with parity
Termination:	Active
Termination Power:	Not provided (causes excessive battery drain on host)
Cable wire:	32 wires with 5 individual bundles and impedance matched 80 ohm, high-performance cable

Mechanical Specifications

Form Factor:	APA-1460 Card, PCMCIA Type II with 32-wire SCSI Cable, optional high or low density SCSI connector

APA-1460 Card Dimensions

Length:	3.370 inches (85.60 mm)
Width:	2.126 inches (54 mm)
Height:	0.196 inches (5 mm)
PCMCIA Connector:	68-pin (2 row x 34 pin) female, keyed
Card / Cable Connector:	32-pin (1 row x 32 pin) female, keyed

APA-1460 Cable Dimensions

Length:	3 feet
SCSI Connector:	50-pin shielded male (Centronics-style), high or low density
Card / Cable Connector:	32-pin (1 row x 32 pin) male

Note: Detailed mechanical drawings of the Card and Cable are available.

Termination Power

No external termination power is provided in this design.

Internal Bus Pull-up Resistor

There are eight 100 K-ohm pull-up resistors in D0-D7 line, to ensure software compatibility. The *aspi2dos* initialization routine will check Port A and Port B status of the AIC-6360 chip in order to decide which host adapter or what options to choose (parity checking, Fast SCSI etc.). In this case, because there are no jumpers inside the APA-1460 Card, *aspi2dos* must get an FFh to recognize and configure this Card properly. The pull-up resistors ensure the FFh status.

Cable Specifications

You can connect up to seven external SCSI devices to the APA-1460. The APA-1460 comes with either a high-density or low-density 50-pin SCSI-2 compatible connector on the Cable. To connect more than one device, daisy-chain the additional devices to the first SCSI device.

Note: The APA-1460 supports only *single-ended* SCSI devices. *Differential* SCSI devices may be damaged if connected to the host adapter bus. Most SCSI devices currently produced are *single-ended* SCSI devices. Consult you SCSI device documentation.

When the SCSI bus contains a Fast SCSI host adapter, such as the APA-1460, and one or more Fast SCSI device, the total length of all SCSI cables connected to the SCSI bus, including the APA-1460 Cable, must not exceed 3 meters (9.8 feet) to ensure reliable operation. If no Fast SCSI devices are connected, the total length of all cables must not exceed 6 meters (19.7 feet). See your device documentation to determine if it is a Fast SCSI device.

Make sure your external SCSI cables are of high quality and adhere to the SCSI specification. The SCSI specification requires external device cables to be constructed of 50 wires in 25 twisted pairs (signal pairs), with a characteristic impedance of no less than 90 ohms (90 to 105 ohm recommended).

❒

4 Connector Pinout

About This Chapter

Read this chapter to find out

- The PCMCIA and SCSI connector pinouts
- The APA-1460 Card and Cable connector pinout

4

Connectors

PCMCIA 68-pin Bus Interface Connector

The following table gives the pinout for the PCMCIA 68-pin bus interface connector. Signals and pins specified as N/C are not connected on the APA-1460 Card. For these signals, the PCMCIA standard signal name follows in parenthesis, for reference only.

The PCMCIA 68-pin connector is keyed so that it is impossible to plug the Card in upside down or backwards.

Table 4-1. PCMCIA 68-pin Bus Interface Connector Pinout

Signal Name	Pin	Pin	Signal Name
GND	1	35	GND
D3	2	36	-CD1
D4	3	37	D11
D5	4	38	D12
D6	5	39	D13
D7	6	40	D14
-CE1	7	41	D15
A10	8	42	-CE2
-OE	9	43	N/C (RFSH)
A11	10	44	-IORD
A9	11	45	-IOWR
A8	12	46	N/C (A17)
A13	13	47	N/C (A18)
A14	14	48	N/C (A19)
-WE/PGM	15	49	N/C (A20)
-IREQ	16	50	N/C (A21)
Vcc	17	51	Vcc
N/C (Vpp1)	18	52	N/C (App2)
N/C (A16)	19	53	N/C (A22)
N/C (A15)	20	54	N/C (A23)
A12	21	55	N/C (A24)
A7	22	56	N/C (A25)
A6	23	57	N/C (RFU)
A5	24	58	RESET
A4	25	59	N/C (-WAIT)
A3	26	60	-INPACK
A2	27	61	-REG
A1	28	62	N/C (SPKR)
A0	29	63	N/C (STSCHG)
D0	30	64	D8
D1	31	65	D9
D2	32	66	D10
-IOIS16	33	67	-CD2
GND	34	68	GND

SCSI 50-pin Shielded Connector

The following table gives the pinout for the SCSI 50-pin shielded connector. This pinout is functionally identical to that shown in the SCSI Specification (see page -4, *Related Documents*). There are several GND signals which are not connected in the APA-1460 Cable. Also, pin 38, +TERMPWR, is not connected in the APA-1460 Cable, and thereby the APA-1460 does not provide termination power to the external device.

Table 4-2. SCSI 50-Pin Shielded Connector Pinout

Signal Name	Pin	Pin	Signal Name
GND	1	26	-DB0
GND	2	27	-DB1
GND	3	28	-DB2
GND	4	29	-DB3
GND	5	30	-DB4
GND	6	31	-DB5
GND	7	32	-DB6
GND	8	33	-DB7
GND	9	34	-DBP
N/C (GND)	10	35	N/C (GND)
N/C (GND)	11	36	N/C (GND)
N/C (GND)	12	37	N/C (GND)
N/C (GND)	13	38	N/C (GND)
N/C (GND)	14	39	N/C (GND)
N/C (GND)	15	40	N/C (GND)
GND	16	41	-ATN
N/C (GND)	17	42	N/C (GND)
GND	18	43	-BSY
GND	19	44	-ACK
GND	20	45	-RST
GND	21	46	-MSG
GND	22	47	-SEL
GND	23	48	-C/D
GND	24	49	-REQ
GND	25	50	-I/O

There is a drain wire in the APA-1460 Cable which electrically connects the metal shield of the SCSI 50-pin shielded connector, the aluminum-mylar foil cable shield, and the shield GND (see *APA-1460 Card and Cable Connector* on page 4-6).

APA-1460 Card and Cable Connector

The APA-1460 Card and Cable connector is the interface between the APA-1460 Card and APA-1460 Cable. There are actually two connectors, one female mounted on the APA-1460 Card and the mating male connector on the APA-1460 Cable. The signals themselves correspond to the SCSI signals of the same names as shown on page 4-5, *SCSI 50-pin Shielded Connector*. The logic for driving and receiving the SCSI bus signals is contained entirely in the APA-1460 Card. The APA-1460 Cable is a passive cable assembly.

The following table lists the APA-1460 Card and Cable connector pin assignments.

Table 4-3. APA-1460 Card and Cable Connector Pin Assignments

Signal Name	Pin	Pin	Signal Name
D0	1	17	DPAR
GND	2	18	GND
D1	3	19	Term Power (NC)
GND	4	20	Term Power (NC)
D2	5	21	ATN
GND	6	22	BSY
D3	7	23	RST
GND	8	24	GND
D4	9	25	MSG
GND	10	26	SEL
D5	11	27	CD
GND	12	28	IO
D6	13	29	GND
GND	14	30	REQ
D7	15	31	GND
GND	16	32	ACK

5 Functional Specification

About This Chapter

Read this chapter to find out

- PCMCIA attribute memory space
- APA-1460 Card Information Structure (CIS)
- APA-1460 registers and address mapping

▼▼▼▼▼ 5

Functional Specification

Functionally, the APA-1460 responds to two types of PCMCIA bus cycles, Attribute Memory Space read / write cycles (configuration) and I / O cycles (SCSI protocol controller access).

PCMCIA Attribute Memory Space

PCMCIA cards were originally memory add-in cards only. As such, certain PCMCIA terminology is geared toward memory devices (e.g., ROM / RAM). The Attribute Memory Space is a read / write address space, which in the PCMCIA Specification, may be as large as 64 MBytes. The APA-1460 only decodes the first 16 KBytes of this address space (address lines above A13 are ignored). The primary purpose of the Attribute Memory Space is to provide a separately addressable region on each PCMCIA add-in card which is dedicated to configuration functions. Both memory (typically read-only) and memory-mapped registers reside in this space.

The APA-1460 decoding of the Attribute Memory Space is shown in the table below:

Address Range	Function	Access
0 - 1FFFh	Attribute Memory ROM (CIS)	Read-only
2000 - 3FFFh	Configuration Option Register	Read/Write
4000h	Reserved	n/a

The Attribute Memory ROM (including the CIS) and the Configuration Option Register are discussed further in the following two sections.

APA-1460 CIS

There is an 8 KByte ROM on the APA-1460. Currently, only the first few hundred bytes of this ROM are actually used. This small amount of memory is all that is required to store the APA-1460 CIS as discussed in the next paragraph.

The PCMCIA Specification defines a *card metaformat*. This *metaformat* defines a set of structures to be read through the Attribute Memory Space which define certain configuration information pertinent to the add-in card. A master structure, which contains this set of structures, is the CIS. The key information stored in the APA-1460 CIS is listed below:

- Manufacturer: "Adaptec, Inc"
- Product: "APA-1460 SCSI Host Adapter"
- Version: "Version 0.01"
- Device Speed: 250 ns / cycle
- Configuration Register Base Address: 2000h
- I / O Space Description: 16-bit, 10 I / O address lines used, 2 ranges (actually, 8 ranges are possible, only 4 are defined)

- I/O Space Ranges: 340h, 140h
- Interrupt Channels: 9, 10, 11, 12 (level sensitive interrupts)

Other information may be added to the APA-1460 CIS in future revisions.

Configuration Option Register

The APA-1460 Configuration Option Register is an 8-bit wide write-only register into which the PCMCIA host computer writes a configuration value based on information read from the APA-1460 CIS.

Bit	7	6	5	4	3	2	1	0
Definition	SRESET	Resv'd	Resv'd	Resv'd	IOEN	Resv'd	Resv'd	Primary

Writing a 1 to SRESET forces the APA-1460 into a soft reset state and has the same effect as a PCMCIA bus reset. If it is necessary to reconfigure the APA-1460, SRESET should be strobed high. SRESET should be written as a 0 for normal operation.

The Resv'd bits are reserved and should be written as 0's.

IOEN should be written as a 1 to indicate that the state of Primary is valid.

Address Range	Primary
340h - 35Fh	1
140h - 15Fh	0

Refer to the *AIC-6360 Data Book* for further information regarding I/O address decoding.

APA-1460 Initialization

On power-up, PCMCIA cards do not respond to I/O cycles, only memory cycles (Attribute Memory Space cycles). It is necessary to write a value to the APA-1460 Configuration Option Register in order to enable I/O cycle access.

The trickier part of PCMCIA initialization is that the PCMCIA host controller chipset used by the PCMCIA host computer. As of this writing, there are roughly a dozen implementations, some of which are similar and some radically dissimilar.

The PCMCIA committee has defined Card and Socket Services in order to simplify the initialization and operation interface to the PCMCIA hardware. Refer to page -4, *Related Documents*, for further sources of information on this topic.

SCSI I/O Register Map

Once the APA-1460 has been properly initialized, it responds to a single I/O address range consisting of 32 registers. These registers map directly to the corresponding registers in the AIC-6360 SCSI protocol controller. For example, if the selected I/O address range is 340 - 35Fh, then I/O address 340h is AIC-6360 register 0, 341h is register 1, and so forth.

The AIC-6360 interrupt is available and is routed directly to the PCMCIA IREQ signal. An interrupt channel must be selected by configuring the PCMCIA host controller chipset.

See the *AIC-6360 Data Book* for more information on the AIC-6360.

Address Mapping

Attribute Memory - 0000h to 1FFFh, 8 KBytes (Read/Write)

Attribute memory is used for recording CIS (Card Information Structure) and is only partially decoded (when A13 is low). Read / write of repeated data occurs every other 8 KByte block.

Configuration Register - 2000h (Read/Write)

This register is also partially decoded (only when A13 is high). Read / write of the same register occurs every other 8 KByte block. Any read / write operation within the 8 KByte range gets the same data or changes this register.

Bit	7	6	5	4	3	2	1	0
	SRST	X[1]	X	X	IOEN	X	X	PRIMARY

SRST 1: software reset
0: regular operation[2]

IOEN 1: I/O ports are enabled
0: I/O ports are disabled[2]

PRIMARY 1: primary address (340h)
0: alternate address (140h)[2]

[1] In the PCMCIA Specification, this bit is defined as Lev1IREQ. In fact, this is the way the host notifies the card which interrupt protocol should be used for the host's acceptance. When it is set, the host recognizes the interrupt in Level Mode (interrupt must stay active till accepted). When it is reset, the host recognizes the interrupt in Pulsed Mode (accepted by signal transition). In this design, because the interrupt signal is fully controlled by the AIC-6360 internal register, we can choose either Level or Pulsed Mode interrupt through software. In the CIS, the default interrupt mode is set to level mode. Currently there is no internal function circuit attached to it.

[2] Reset condition

I/O Address - 340h to 35Fh or 140h to 15Fh

Overlapping Address Mode is used in the design for software compatibility with the current ASPI driver. Check the *AIC-6360 Data Book* for port definitions.

Special purpose port: Port B (35Bh or 15Bh) - write only

Bit	7	6	5	4	3	2	1	0
	X	TERM_EN	X	X	X	X	X	X

TERM_EN 1: active termination enabled
0: active termination disabled (power down)[1]

[1] Reset condition

Common Memory

Common Memory is not applicable for the APA-1460.

About the Updateable Attribute Memory

The total size of the Attribute Memory is 8 KBytes, ranging from 0000h to 1FFFh. Internally, an EEPROM is used to meet design requirements. During the Attribute Memory Read cycle, there is no difference from reading regular memory. During the write cycle, a special escape sequence must be followed to enable the write operation (see *ATMEL data sheets*).

Sample code to enable the chip write protection:

```
write_enable    proc
        push    es
        push    bx
        push    cx

        mov     ax, mapped_seg      :select the segment
        mov     es, ax
        mov     bx, 1555h           ; write AAh to 1555h
        mov     byte ptr es:[bx], 0aah

        mov     bx, 0aaah           ; write 55h to 0AAAh
        mov     byte ptr es:[bx], 55h

        mov     bx, 1555h           ; write A0h to 1555h
        mov     byte ptr es:[bx], 0a0h

        pop     cx
        pop     bx
        pop     es
        ret
write_enable    endp
```

Power Down Mode

In order to save host computer battery power, a special power down mode is incorporated into the design. There are two steps to power down the card, first set bit

Glossary

A

Adaptec EZ-SCSI™
A software program that automatically configures your computer to use the Adaptec SCSI host adapter and SCSI devices connected to it. Adaptec EZ-SCSI copies applications and device drivers to the computer's hard disk drive. In nearly every case, the computer and SCSI devices are configured correctly when the default values are accepted.

AIC-6360
Adaptec's SCSI protocol chip, which provides an interface between the ISA bus and the SCSI bus.

ASIC
Application Specific Integrated Circuit. An integrated circuit designed solely for a specific function (e.g., the AIC-3350 Plug and Play interface chip in AHA®-1530P/1532P host adapters).

ASPI Manager
A software module that provides an interface between ASPI modules, a host adapter(s), and the SCSI devices connected to the adapter. A single ASPI manager can handle multiple I/O requests from multiple ASPI modules. ASPI managers are written for a specific operating system—such as DOS, OS/2®, or NetWare®—and a specific family of host adapters.

ASPI Module
Device-level code specific to a particular kind of SCSI device that communicates with the ASPI manager. The EZ-SCSI ASPI modules are *aspidisk* and *aspicd*.

Asynchronous Data Transfer
A method of transferring data over the SCSI bus. In an asynchronous data transfer, bytes are sent in irregular intervals. Start and stop bits are used to signal the beginning and end of bytes. Asynchronous data transfer is slower than synchronous data transfer and is not affected by external timing constraints, such as cable length and circuit response time.

B

BIOS
Basic Input/Output System. Software coded into computer chips for various purposes. The BIOS on the motherboard of a computer is the special program used to boot and control the computer. Most Adaptec host adapters include an onboard BIOS that initializes the SCSI bus, runs bootup diagnostics, and performs other functions.

BIOS Address
The address in computer memory where the host adapter BIOS code is stored when you boot the computer.

Bus
A pathway for data in a computer. All computers have an expansion bus, which is designed to accept add-on (expansion) devices, such as modems, sound cards, and video adapters. Expansion devices use the bus to send data to and receive data f7Jı˝0gnedo˝[(gned(as)0(o)e(A)-

files and software programs. Like the audio CDs used in consumer CD players, the data on CD-ROM discs cannot be changed once it is encoded. A single CD-ROM can hold 600 MBytes or more of data.

CD-ROM Drive

A disk device used to retrieve data and software programs from CD-ROMs (compact disks) for use on computer systems. Some CD-ROM drives are installed internally in the computer case, others are used as external devices. Most CD-ROM drives can also play audio CDs.

Common Command Set

A de facto standard SCSI command set for communication with hard disk drives. The Common Command Set (CCS) is the basis for the SCSI-2 command set for all types of peripheral devices.

Conventional Memory

The first 640 KBytes of computer memory. DOS uses this memory area to run software applications.

D

Device Driver

A software program that enables a computer to communicate with peripheral devices, such as hard disk drives and CD-ROM drives. Each type of device needs a different driver. Device drivers are stored on a computer's hard disk and are typically loaded into memory at boot time.

Disconnect/Reconnect

Disconnect occurs when a target releases control of the SCSI bus, allowing the bus to go to the Bus Free phase. Reconnect occurs when a target selects an initiator to continue an operation after a disconnect. This features allows the device to use the SCSI bus while other devices prepare to transfer data or complete commands.

DOS

Disk Operating System. An operating system developed by Microsoft® Corporation for use with their x86 family of processors. DOS is used on most personal computers.

Driver

See Device Driver.

E

EEPROM

Electrically-Erasable Programmable Read Only Memory. An integrated circuit typically used to store configuration information. Some host adapters have an EEPROM that contains configuration information. The data stored in an EEPROM can be updated while it is instaa 125.(ed)30(i)-21()29(30(t)-21(he -21(c)-21(

ware to request the services of the host adapter in transferring information to and from peripheral devices attached to the host adapter.

Host Adapter
A printed circuit board or integrated circuit that installs in a standard microcomputer system and provides a SCSI bus connection so that SCSI devices can be connected to the microcomputer.

I

IBM® PC-AT® Compatible
Any computer that emulates exactly the IBM PC-AT and uses an ISA backplane bus.

Industry Standard Architecture
See ISA.

Initiator
A SCSI device that requests an operation to be performed by another SCSI device (the target). The initiator provides all the command information and parameters required to perform the operation, but the target carries out the details of the operation. The host adapter is usually called the initiator; other devices on the SCSI bus, such as disk drives, are called SCSI targets.

Interrupt Request Channel
See IRQ.

IRQ
Interrupt Request Channel. An electrical channel through which a hardware device can send a message to get the immediate attention of the computer's Central Processing Unit (CPU).

ISA
Industry Standard Architecture. The type of computer bus used in most computers. An ISA bus enables expansion devices such as network cards, video adapters, and modems to send data to and receive data from the computer's CPU and memory either 8 bits or 16 bits at a time. Expansion devices are plugged into sockets in the computer motherboard. ISA is sometimes called the *AT bus*, because it was first used in the IBM PC / AT.

K

KByte
Kilobyte. A measure of computer storage. One KByte equals 1024 bytes. (A byte is the amount of storage needed to hold one character.)

L

Logical Drive
A computer disk storage device that can be addressed as a specific drive letter, such as *C* or *D*. A single physical disk device, such as a hard disk drive, can be partitioned into two or more logical drives with different drive letters.

Logical Unit
A device that is addressed when an initiator (usually the host adapter) sends a Read or Write command to a target. For example, a tape drive is a target and the tape cartridge in the drive is the Logical Unit (LU). Most SCSI targets have only one LU; a single SCSI target can have up to eight LUs.

Logical Unit Number
An encoded 3-bit identifier for a logical unit.

LU
See Logical Unit.

LUN
See Logical Unit Number.

M

MByte
Megabyte. A measure of computer storage. One MByte equals 1,048,576 bytes. (A byte is the amount of storage needed to hold one character.)

O

Operating System
The software that controls the basic operation of the host computer. Examples are MS-DOS®, UNIX® and Netware.

OS
See Operating System.

P

PAL

Programmable Array Logic. Programmable logic elements used for decoding and control functions.

Parity Checking

A SCSI feature used to verify whether data has been transmitted correctly over the SCSI bus. A check bit is added to each byte of data to make the sum of all the 1 bits either odd or even, depending on the protocol. If the sum of the bits is even when it should be odd, or vice-versa, data has been corrupted and an error message appears.

PC-AT

A family of small computers sold by IBM, also called the Personal Computer-AT family of computers. The name is trademarked by IBM.

PCMCIA

Personal Computer Memory Card International Association. A widely accepted industry standard for small form factor add-in cards. Such add-in cards generally fall into two categories: memory add-in products and I/O add-in products.

Peripheral Device

Any optional input or output device, such as a printer or CD-ROM drive, that connects to a computer's CPU. For SCSI peripherals this connection is made via the SCSI bus.

PIO

See Programmed Input/Output.

Plug and Play

A hardware and software mechanism that provides an automatic way for the system to self configure and optimally allocate system resources such as memory, I/O ports, IRQ, and DMA channels between Plug and Play cards and other devices in the system.

Port Address

Or *I/O Port Address*. A window through which software programs send commands to the host adapter board.

Programmed Input/Output

A method of data transfer in which the host microprocessor transfers data to and from memory. PIO enables very fast data transfer rates, especially in single-tasking operating systems like DOS.

R

RAM

Random Access Memory. Memory of which any byte can be accessed directly in a single memory cycle. Information can be read from and written to the memory.

ROM

Read-Only Memory. Memory in which any byte can be read but not written.

S

SCSI

Small Computer Systems Interface. A bus interface standard that defines physical and electrical characteristics for hardware devices. (The original SCSI standard is sometimes called SCSI-1.) SCSI provides a standard interface that enables many different kinds of devices, such as disk drives, magneto-optical disks, CD-ROM drives, and tape drives to interface with the host computer.

SCSI-2

A computer bus interface standard that adds features to the SCSI-1 standard. Included among these features are 32-bit data transfer, command queuing, Fast SCSI, and support for a wider variety of peripheral devices.

SCSI Bus

One or more SCSI peripheral devices and a host adapter, connected by cables in a daisy-chain configuration. The bus may include both internal and external SCSI devices. In a computer with two or more host adapters, each adapter has its own separate SCSI bus.

SCSI Device

A device such as a host adapter, hard disk drive, or CD-ROM drive that conforms to the SCSI interface standard and is attached

to a SCSI bus cable. The device may be an initiator, a target, or capable of both types of operation.

SCSI ID

A unique identifier assigned to SCSI devices that enables them to communicate with a computer when they are attached to a host adapter via the SCSI bus. Each SCSI host adapter board has eight available SCSI IDs with the numbers 0 through 7 (or 0 through 15 for Wide SCSI adapters). Usually the host adapter itself is assigned SCSI ID 7, and hard disk devices are assigned to SCSI IDs 0 and 1.

SCSI Protocol Controller

A device that provides an input/output interface between an ISA expansion bus and a SCSI bus. Adaptec's AIC-6360 provide these functions on a single computer chip.

Small Computer Systems Interface

See SCSI.

Synchronous Data Transfer

A high-speed data transfer method in which data on the SCSI bus is clocked with fixed-length, fixed-frequency strobe pulses. The acknowledgments may be delayed several clock periods from the data requests. Synchronous data transfer can be used only for data transmission on the SCSI bus. It cannot be used for Command, Message, and Status transmission.

Synchronous Data Transfer Negotiation

The process in which the host adapter and the peripherals on the SCSI bus negotiate the data transfer frequency and the delay between requests and acknowledgments. This negotiation process is required for synchronous data transfer.

T

Target (or Target Device)

A SCSI device that performs an operation requested by an initiator. The initiator is usually the host adapter. The target may be a peripheral device such as a disk drive performing a data transfer for an initiator.

Termination

A physical requirement of the SCSI bus. The devices at the physical ends of the SCSI bus must have terminating resistors either installed or enabled; devices in the middle of the bus must have terminating resistors either removed or disabled. Proper termination allows electrical signals to be transmitted reliably on the SCSI bus.

W

Word

A 2-byte (16-bit) unit of data.

❒

Index

❒