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MODEL
PCI-IDO-XX SERIES

USER MANUAL

FILE: MPCI-IDO-xx.A1I

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WARNING!!

ALWAYS CONNECT AND DISCONNECT YOUR FIELD CABLING WITH THE COMPUTER POWER OFF. ALWAYS TURN COMPUTER POWER OFF BEFORE INSTALLING A CARD. CONNECTING AND DISCONNECTING CABLES, OR INSTALLING CARDS INTO A SYSTEM WITH THE COMPUTER OR FIELD POWER ON MAY CAUSE DAMAGE TO THE I/O CARD AND WILL VOID ALL WARRANTIES, IMPLIED OR EXPRESSED.

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Table of Contents

Chapter 1: Introduction 5
Figure 1-1: Single Output Channel Schematic Diagram 6
Figure 1-2: Block Diagram 7
Chapter 2: Installation 8
Chapter 3: Option Selection 10
Figure 3-1: Option Selection Map 10
Chapter 4: Address Selection 11
Chapter 5: Programming 12
Chapter 6: Connector Pin Assignments 13
Table 6-1: Connector Pin Assignments 13

Chapter 1: Introduction

Features

- Individually-Isolated Digital Outputs for up to three 16-bit groups
- Output readback
- All solid-state design permits higher throughput than is possible with electromechanical relays
- Load voltages up to 60 VDC
- Outputs off at power turn-on and computer reset
- Output connectors via on-card ribbon-cable headers
- Lower cost per point than externally-racked solid-state relay modules

Description

This series of cards provide 16, 32, or 48 opto-isolated discrete outputs. Solid-state, P-Channel FET switches are used as the output elements and provide both greater reliability and much faster turn-on and turn-off time than is possible with electromechanical relays. User-supplied load voltages can be from 5V to 60VDC.

Output connections are via 50-wire ribbon cables that mate with headers on the card. A strain relief bar where the cables exit the card assures that the cables will not interfere with adjacent cards. Standard cables are six feet long but alternate lengths are available.

The card uses six bytes of I/O bus address, one byte for each of eight bits of output. The logic on the chip allows the application to read what was written to the latches. Diodes are included across the load for inductive-spike protection. There are 48-bit, 32-bit and 16-bit versions. The latter two models are depopulated versions of the 48-bit card.

Outputs

• Number of Channels:	16, 32, or 48
• Load Voltage Range:	5V to 60VDC (Voltage supplied by User)
• Load Current per Channel:	1A max. steady state, 2A pulse (Note: Current may be limited by the cable. Certain ribbon cables limit current to 0.5A.)
• Isolation:	On-Card Channel-to-channel and channel-to-computer (* see note)
• Switching Time:	Turn-On 50µs Turn-Off 5µs, inductive-spike protection via a diode
• Switch Resistance:	0.4Ω when saturated
• Switch Leakage Current:	100 to 300µA
• Power Required	+5 VDC @ 245mA (48 bits)

***Note on Isolation:** Opto-Isolators and connectors are rated for at least 500V, but isolation voltage breakdowns will vary and are affected by factors like cabling, spacing of pins, spacing between traces on the PCB, humidity, dust and other environmental factors. This is a safety issue so a careful approach is required. For CE certification, isolation was specified at 60V DC. The design intention was to eliminate the influence of common mode. Use proper wiring techniques to minimize voltage between channels and to ground. Tolerance of higher isolation voltage can be obtained on request by applying a conformal coating to the board.

Environmental

• Operating Temperature Range:	0°C to +70°C
• Storage Temperature Range:	-40°C to +150°C
• Humidity:	5% to 90% RH, non-condensing
• Board Dimensions:	6.875" (174.6mm) long

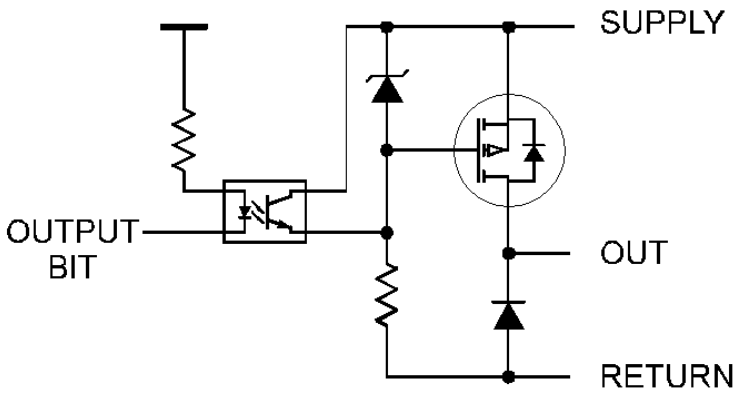


Figure 1-1: Single Output Channel Schematic Diagram

Each bit of the card is optically-isolated from the output driver which switches the supply voltage to the output pin. The negative connection is made on the return pin and each output is isolated from every other output.

When the opto-isolator is OFF the FET is activated by the Zener-diode-limited supply voltage. When the FET is activated, the full Supply voltage is available at the output pin. When the opto-isolator is ON, the FET deactivates and the output drops to the return line voltage level. Diodes are included across the load for inductive-spike protection.

Safety Note

These cards are used as switches for externally supplied power up to 60VDC and up to one Amp.

Each switch output can have a separate power supply or only one power supply can be used.

If the computer is turned OFF and an external power supply is ON, the switch outputs from that power supply will be ON.

To avoid damage or injury, you MUST turn OFF the external power PRIOR to shutting the computer down.

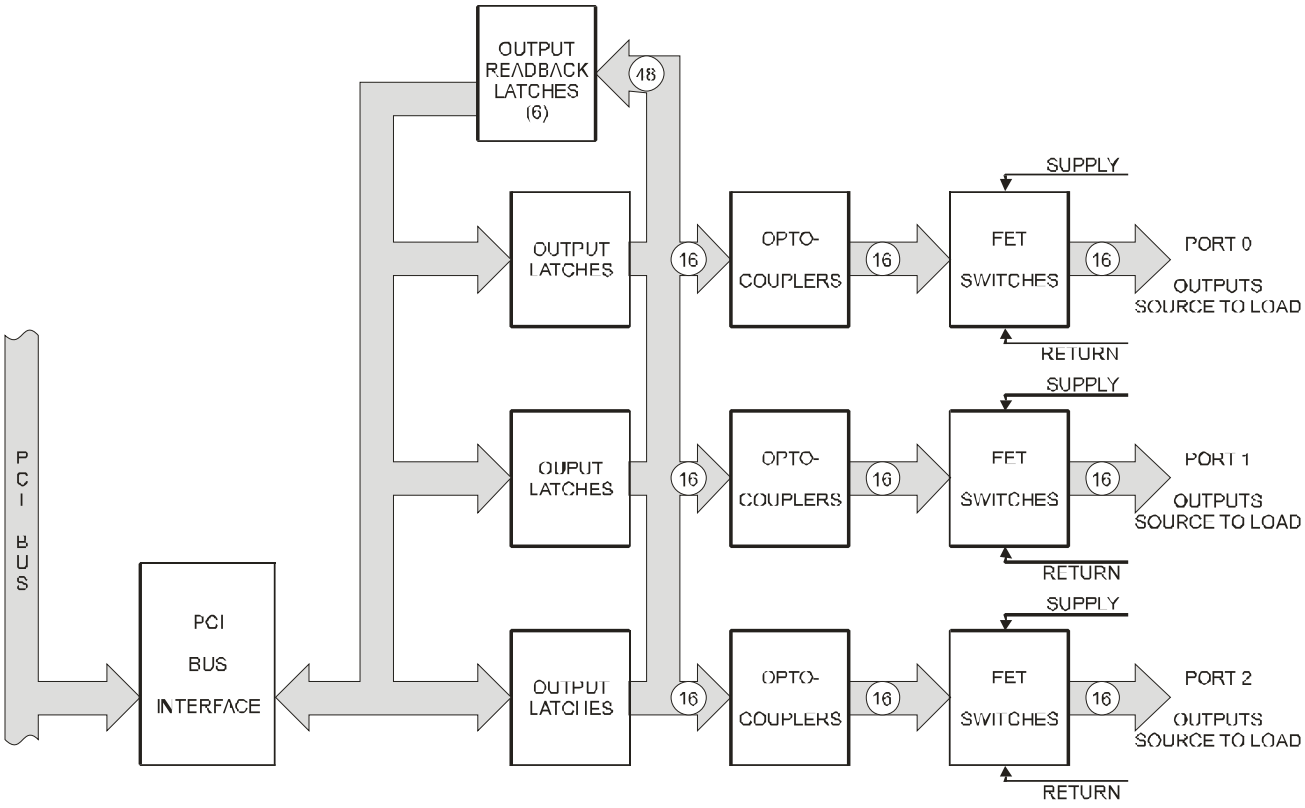


Figure 1-2: Block Diagram

Chapter 2: Installation

A printed Quick-Start Guide (QSG) is packed with the card for your convenience. If you've already performed the steps from the QSG, you may find this chapter to be redundant and may skip forward to begin developing your application.

The software provided with this card is on CD and must be installed onto your hard disk prior to use. To do this, perform the following steps as appropriate for your operating system.

CD Software Installation

The following instructions assume the CD-ROM drive is drive "D". Please substitute the appropriate drive letter for your system as necessary.

DOS

1. Place the CD into your CD-ROM drive.
2. Type D : Enter to change the active drive to the CD-ROM drive.
3. Type I N S T A L L Enter to run the install program.
4. Follow the on-screen prompts to install the software for this board.

WINDOWS

1. Place the CD into your CD-ROM drive.
2. The system should automatically run the install program. If the install program does not run promptly, click START | RUN and type D : I N S T A L L, click OK or press Enter.
3. Follow the on-screen prompts to install the software for this board.

LINUX

1. Please refer to linux.html on the CD-ROM for information on installing under linux.

Caution! * ESD A single static discharge can damage your card and cause premature failure! Please follow all reasonable precautions to prevent a static discharge such as grounding yourself by touching any grounded surface prior to touching the card.

Hardware Installation

1. Do not install card into the computer until the software has been fully installed.
2. Turn OFF computer power AND unplug AC power from the system.
3. Remove the computer cover.
4. Remove the two (2) nuts retaining the strain relief brackets from the card, set one bracket aside with the nuts.
5. Select an available location to install the card in an available 5V or 3.3V PCI expansion slot (you may need to remove a backplate first). DO not plug the card into the slot yet…..
6. With the card in your hand or on the bench, feed ribbon cable(s) through the selected computer backplate one at a time and plug onto the card header, starting closest to the mounting bracket. When all cables are installed, re-install the strain relief bracket and nuts, and tighten until snug. DO NOT OVERTIGHTEN!
7. Carefully plug the card into the slot and inspect for proper seating and fit. Make sure that the card mounting bracket is properly screwed into place and that there is a positive chassis ground.
8. Make connections from installed ribbon cables to the field equipment / wiring.
9. Check all connections and installations to ensure the system is ready to be turned on. **Do not turn on field power before turning on the computer as all outputs on the card will be ON.**
10. Replace the computer cover and turn ON the computer which should auto-detect the card (depending on the operating system) and automatically finish installing the drivers.
11. Run PCIfind.exe to complete installing the card into the registry (for Windows only) and to determine the assigned resources.
12. Run one of the provided sample programs that was copied to the newly created card directory (from the CD) to test and validate your installation.
13. Once the card has been initialized and you're sure the outputs are in a known state, external / field power may now be turned on if desired.

The base address assigned by BIOS or the operating system can change each time new hardware is installed into or removed from the computer. Please recheck PCIFind or Device Manager if the hardware configuration is changed. Software you write can automatically determine the base address of the card using a variety of methods depending on the operating system. In DOS, the PCI\SOURCE directory shows the BIOS calls used to determine the address and IRQ assigned to installed PCI devices. In Windows, the Windows sample programs demonstrate querying the registry entries (created by PCIFind and NTIOPCI.SYS during boot-up) to determine this same information.

Chapter 3: Option Selection

There are no user configurable options on this product.

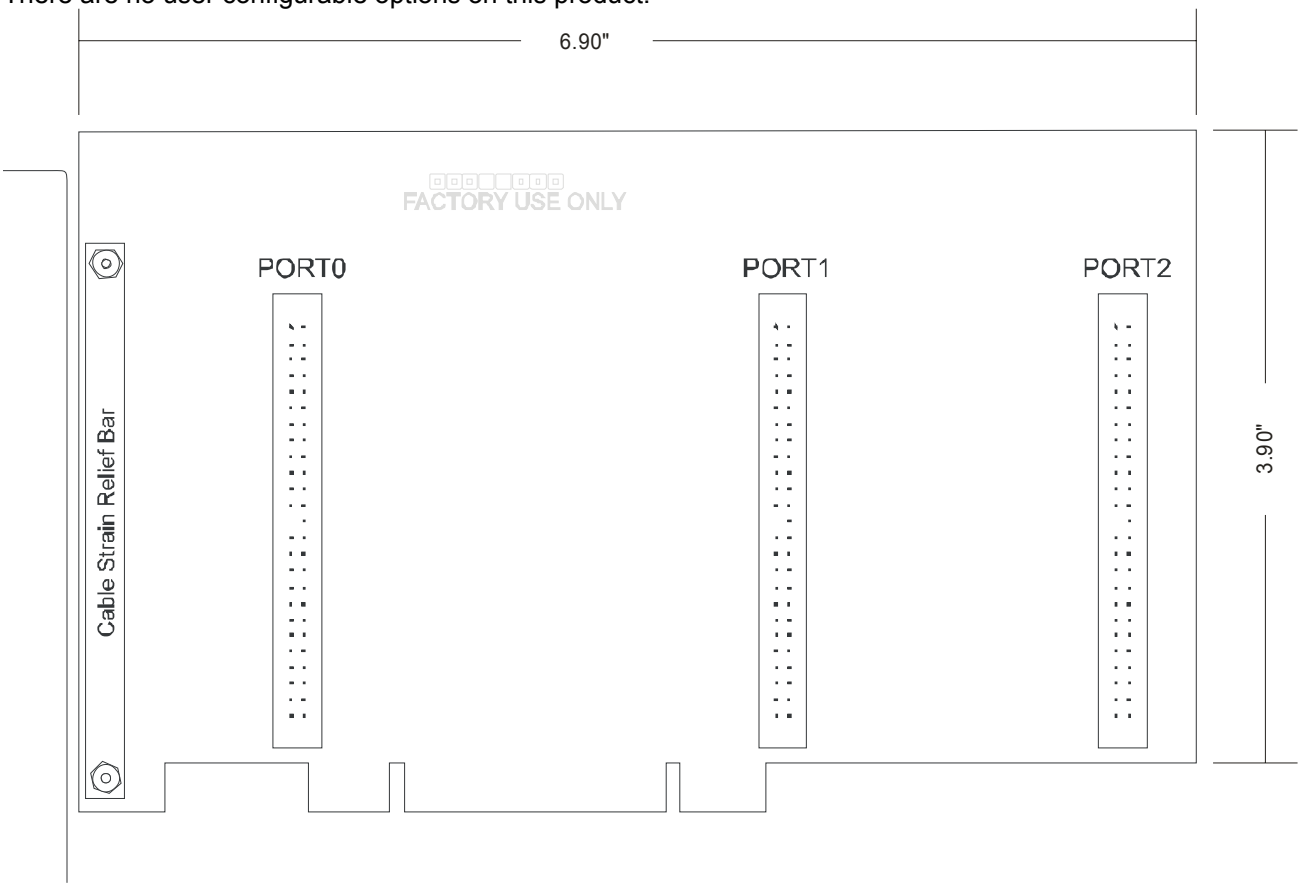


Figure 3-1: Option Selection Map

Chapter 4: Address Selection

This card uses I/O addresses offset from the base address assigned by the PCI bus. The address spaces are defined in the Programming section of this manual.

PCI architecture is Plug-and-Play. This means that the BIOS or Operating System determines the resources assigned to PCI cards rather than the user selecting these resources with switches or jumpers. As a result, you cannot set or change the card's base address or IRQ level. You can only determine what the system has assigned.

To determine the base address that has been assigned, run the PCIFind utility program. This utility will display a list of all the cards detected on the PCI bus, the addresses assigned to each function on each of the cards, and the respective IRQs.

Alternatively, Windows systems can be queried to determine which resources were assigned. In these operating systems, you can use either PCIFind, or the Device Manager utility from the System Properties applet of the control panel. The card is installed in the Data Acquisition class of the Device Manager list. Selecting the card, clicking Properties, and then selecting the Resources Tab will display a list of the resources allocated to the card.

The PCI bus supports 64K of I/O address space, so your card's addresses may be located anywhere in the 0000h to FFFFh range. The card occupies eight consecutive 8 bit registers in the I/O address space.

PCIFind uses the Vendor ID and Device ID to search for your card, then reads the base address and IRQ. If you want to determine the base address and IRQ without using PCIFind, use the following information:

The Vendor ID code is 494F (ASCII for "I/O")
The Device ID code for the card is 0520

An example of how to locate PCI card resources is provided in the PCI/SOURCE directory, under your installation directory. This code runs in DOS, and uses the PCI defined interrupt BIOS calls to query the PCI bus for card-specific information. You will need the Device ID and Vendor ID listed above to use this code.

Chapter 5: Programming

The base address is assigned by the computer system during installation and will fall on an eight-byte boundary. The cards read and write functions are as follows:

Address	Write	Read
Base Address +0	Port 0 Bits 0-7	Port 0 Bits 0-7
Base Address +1	Port 0 Bits 8-15	Port 0 Bits 8-15
Base Address +2	Port 1 Bits 0-7	Port 1 Bits 0-7
Base Address +3	Unused	Unused
Base Address +4	Port 1 Bits 8-15	Port 1 Bits 8-15
Base Address +5	Port 2 Bits 0-7	Port 2 Bits 0-7
Base Address +6	Port 2 Bits 8-15	Port 2 Bits 8-15
Base Address +7	Unused	Unused

Writing a byte to Port n address activates each output with a “1” at the bit location, deactivates each output with a “0” at the bit.

Reading a byte from Port n address displays a “1” for each output that is active, and displays a “0” for each output that is inactive.

Bit 7/15	Bit 6/14	Bit 5/13	Bit 4/12	Bit 3/11	Bit 2/10	Bit 1/9	Bit 0/8
D7	D6	D5	D4	D3	D2	D1	D0

Chapter 6: Connector Pin Assignments

Three identical 50-pin headers are provided on the product; one for each 16-bit output group. Port 0 is near the mounting bracket while Port 2 is at the far end of the card. Connector pin assignments are listed below.

Pin	Signal	Pin	Signal
1	Ground	2	Bit 0 Return
3	Bit 0 Out	4	Bit 0 Supply
5	Bit 1 Return	6	Bit 1 Out
7	Bit 1 Supply	8	Bit 2 Return
9	Bit 2 Out	10	Bit 2 Supply
11	Bit 3 Return	12	Bit 3 Out
13	Bit 3 Supply	14	Bit 4 Return
15	Bit 4 Out	16	Bit 4 Supply
17	Bit 5 Return	18	Bit 5 Out
19	Bit 5 Supply	20	Bit 6 Return
21	Bit 6 Out	22	Bit 6 Supply
23	Bit 7 Return	24	Bit 7 Out
25	Bit 7 Supply	26	Bit 8 Return
27	Bit 8 Out	28	Bit 8 Supply
29	Bit 9 Return	30	Bit 9 Out
31	Bit 9 Supply	32	Bit 10 Return
33	Bit 10 Out	34	Bit 10 Supply
35	Bit 11 Return	36	Bit 11 Out
37	Bit 11 Supply	38	Bit 12 Return
39	Bit 12 Out	40	Bit 12 Supply
41	Bit 13 Return	42	Bit 13 Out
43	Bit 13 Supply	44	Bit 14 Return
45	Bit 14 Out	46	Bit 14 Supply
47	Bit 15 Return	48	Bit 15 Out
49	Bit 15 Supply	50	Ground

Table 6-1: Connector Pin Assignments

Customer Comments

If you experience any problems with this manual or just want to give us some feedback, please email us at: ***manuals@accesio.com.*** Please detail any errors you find and include your mailing address so that we can send you any manual updates.

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