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MODEL LPCI-IIRO-8

USER MANUAL

FILE: MLPCI-IIRO-8.A1f

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Chapter 1: Introduction

The LPCI-IIRO-8 is a Low-Profile PCI bus compatible card that provides isolated digital input and output interface for PCI-Bus computers. The card has eight optically-isolated digital inputs for AC or DC control signals and eight electromechanical relay outputs. LPCI-IIRO-8 occupies four consecutive 8-bit registers in I/O space.

Features:

- 8 optically-isolated, non-polarized CMOS compatible digital inputs accept +/-31volts DC or AC rms
- 8 form C electro-mechanical relays switch up to 1 A each

Inputs

The LPCI-IIRO-8 provides eight optically-isolated inputs. These inputs can accept either AC or DC signals and are not polarity sensitive. Input signals are rectified by photocoupler diodes while unused power gets dissipated thru a 1.8k-ohm resistor in series. The inputs may be driven by either DC sources of 3 to 31 volts (rms) or AC sources at frequencies of 40 Hz to 10 KHz. Standard 12/24 AC control transformer outputs can be accepted as well. External resistors connected in series may be used to extend the input voltage range, however this will raise the input threshold range. Consult with factory for available modified input ranges.

Each input circuit contains a switchable filter that has a 4.7 millisecond time constant. (Without filtering, the response is less then 40 microseconds) The filter must be selected for AC inputs in order to eliminate the on/off response to AC. The filter is also valuable for use with slow DC input signals in a noisy environment. The filter may be switched out for DC inputs in order to obtain faster response. Filters are individually selected by jumpers. The filters are switched into the circuit when the jumpers are installed in position FLT0 to FLT15.

Outputs

The board's outputs are comprised of eight FORM C SPDT electro mechanical relays. These relays are all de-energized at power-on.

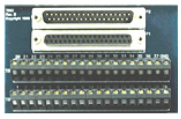
Optional Accessories

For screw terminal connectivity, please order the Terminal Block / Cable Kit

The Terminal Block / Cable Kit simplifies field wiring requirements by creating a direct cabled connection between a DB37M/F screw terminal block and the DB44F connector on the mounting bracket of the LPCI-IIRO-8 board .

The kit includes a 72" long DB44M to DB37M cable, DB37M/F terminal block, Snap Track, and DIN mounting clips.





Specification

Isolated Inputs

Number of inputs:	Eight
Type:	Non-polarized, optically isolated from each other and from the computer (CMOS compatible)
Voltage Range:	3 to 31 DC or AC Rms (40 to 10000 Hz)
Isolation:	500V*(see note) channel-to-ground or channel-to channel
Input Resistance:	1.8K ohms in series with opto coupler
Filter Response Times:	Rise Time = 4.7 mS / Fall Time = 4.7 mS
Non-Filter Response Times:	Rise Time = 10 uS / Fall Time = 30 uS

***Notes on Isolation:**
Opto-Isolators and connectors are rated for at least 500V, but isolation voltage breakdowns will vary and is 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 40V AC and 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. For example, when working with AC voltages do not connect the hot side of the line to an input. Tolerance of higher isolation voltage can be obtained on request by applying a conformal coating to the board.

Relay Outputs

Number of outputs:	Eight SPDT form C
Contact Type:	Single crossbar; Ag with Au clad
Rated Load:	0.5 A at 125 VAC (62.5 VA max.) 1A at 24 VDC (30 W max.)
Max. Switching Volts/Current:	125 VAC, 60 VDC/ 1A
Contact Resistance:	100 mΩ max.
Contact Life: mech'l:	5 million operations min.
Operate / Release Time:	5 milliseconds max.

Power Required: 30 mA typical per Relay Energized

Environmental:

Operating Temp:	0 - 70 °C (Non-icing)
Weight:	2.85 oz

I/O Connector: DB44F

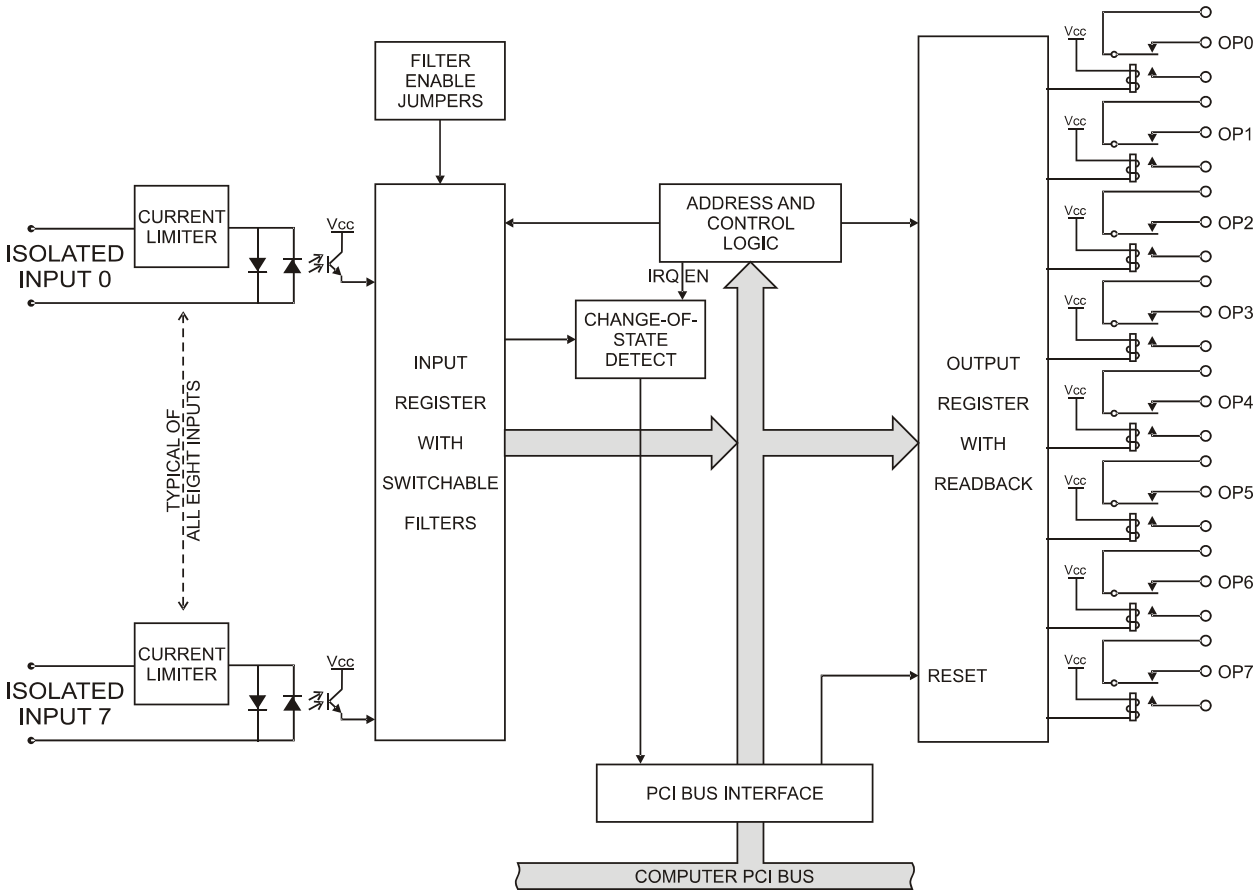


Figure 1-1: Block Diagram

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.

Configure Card Options via Jumper Selection

Before installing the card into your computer, carefully read Chapter 3: Option Selection of this manual, then configure the card according to your requirements. Our Windows based setup program can be used in conjunction with Chapter 3 to assist in configuring jumpers on the card, as well as provide additional descriptions for usage of the various card options.

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.htm 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. Make sure to set switches and jumpers from either the Option Selection section of this manual or from the suggestions of SETUP.EXE.
2. Do not install card into the computer until the software has been fully installed.
3. Turn OFF computer power AND unplug AC power from the system.
4. Remove the computer cover.
5. Carefully install the card in an available 5V or 3.3V PCI expansion slot (you may need to remove a backplate first).
6. Inspect for proper fit of the card and tighten screws. Make sure that the card mounting bracket is properly screwed into place and that there is a positive chassis ground.
7. Install an I/O cable onto the card's bracket mounted connector.
8. 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.
9. Run PCIfind.exe to complete installing the card into the registry (for Windows only) and to determine the assigned resources.
10. 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.

    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

The only user configurable option available with this card are the input filters. If you install a jumper shorting block at any of the FLT0 through FLT7 jumper positions, that input channel (0-7, respectively) will have a filter applied. With the jumper shorting block removed the filter is also removed.

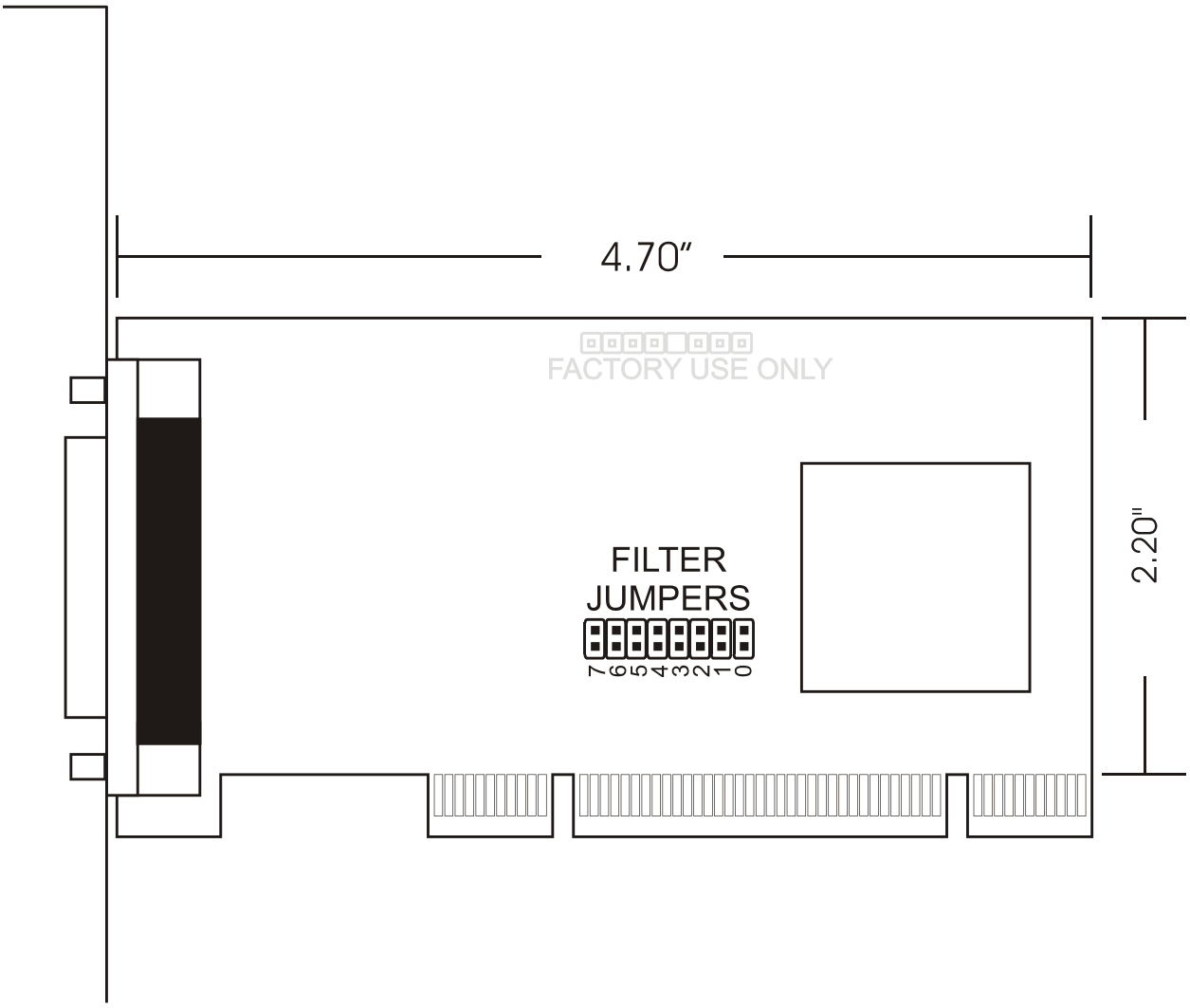


Figure 3-1: Option Selection Map

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 0F01

An example of how to locate PCI card resources is provided in the PCI/SOURCE directory, under your installation directory. This code runs in DOC, 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 or starting address is assigned by the computer system during installation and will fall on a four bit boundary. LPCI-IIRO-8 read and write functions as follows:

I/O Address	Read	Write
Base +0	Read Relay Output	Write Relay Output
Base +1	Read Isolated Inputs	Clear Interrupt
Base +2	Enable IRQ	Disable IRQ
Base +3	IRQ Status	Unused

Digital Inputs

Digital input states are read as a single byte from the port at Base Address +1. Each of the eight bits within the byte corresponds to a particular digital input. A "1" signifies that the input is energized and a "0" signifies that the input is de-energized.

Bit Position	D7	D6	D5	D4	D3	D2	D1	D0
Digital Input	IP7	IP6	IP5	IP4	IP3	IP2	IP1	IP0

The card supports interrupts on change of state of digital inputs. Thus, it is not necessary to continuously poll inputs (by reading at base address +1) to detect any state change. To enable this interrupt capability, read at base address +2. To disable interrupts, write at base address +2. To clear an IRQ, write at base address +1.

Relay Outputs

At power-up, all relays are de-energized. The current state of the relays can be determined at any time by a read operation at the base address. The relay outputs are controlled by writing to the base address. Data are written to all eight relays as a single byte. Each bit within the byte controls a specific relay. A "1" energizes the corresponding relay and a "0" turns it off.

Bit Position	D7	D6	D5	D4	D3	D2	D1	D0
Relay Contr'd	OP7	OP6	OP5	OP4	OP3	OP2	OP1	OP0

For example, if bit D5 is turned on by writing hex 20 to the base address the relay that controls OP5 is energized (closing the associated normally-open contacts). All other relays would be de-energized and their normally-closed contacts would be closed.

Base+3 IRQ Status

Bit Position	D7	D6	D5	D4	D3	D2	D1	D0
Function							IRQ Enable	IRQ Occurred

Reading Base+3 provides status bits associated with IRQ operations.
Bit 0: a high bit indicates an IRQ has occurred since you last read this register.
Bit 1: a high bit indicates the IRQs are enabled (by writing to base+2).

Chapter 6: Connector Pin Assignments

Pin #	Signal Name	Pin #	Signal Name
1	Ground	23	Relay 7 NO
2	Input 7 B	24	Relay 6 NO
3	Input 5 A	25	Relay 5 NO
4	Input 4 B	26	Relay 4 NO
5	Input 2 A	27	Relay 3 NO
6	Input 1 B	28	Relay 2 NO
7	No Connect	29	Relay 1 NO
8	Relay 7 Common	30	Relay 0 NO
9	Relay 6 Common	31	Input 7 A
10	Relay 5 Common	32	Input 6 B
11	Relay 4 Common	33	Input 4 A
12	Relay 3 Common	34	Input 3 B
13	Relay 2 Common	35	Input 1 A
14	Relay 1 Common	36	Input 0 B
15	Relay 0 Common	37	Relay 7 NC
16	No Connect	38	Relay 6 NC
17	Input 6 A	39	Relay 5 NC
18	Input 5 B	40	Relay 4 NC
19	Input 3 A	41	Relay 3 NC
20	Input 2 B	42	Relay 2 NC
21	Input 0 A	43	Relay 1 NC
22	No Connect	44	Relay 0 NC

Table 6-1: DB44F 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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