

# APCI-RELAY8/IN8

## Introduction

The APCI-RELAY8/IN8 is a 32-bit PCI local BUS board which provides 8 changeover relays and 8 opto isolated digital input signals. Each relay has a power rating of 60W (resistive load). This allows switching of voltages up to 48V DC (to meet low voltage directive) and currents of up to 1.0A.

## Features

- 8 Changeover relays with power switching rating of 60W (resistive load)
- Switching voltage up to 48V DC (to meet low voltage directive) and currents up to 1.0A
- 8 Opto Isolated inputs with current limiting resistors
- Opto input switching voltage 10V to 30V
- Relay status readback register
- N.O. and N.C. contacts provided at connector
- Relay drivers disabled at power-up and reset
- Link selectable debounce option on inputs
- Board access LED
- PCI 2.1 Compatible Bus interface
- Plug and Play software compatible
- Operating Temperature range 0 to +70C
- Relay operating life 500,000 operations (DC Full load)
- CE Compliant design
- Power Consumption 60mA + 30mA per relay operating @ +5V
- MTBF 323,293 hours (using generic figures from MIL-HDBK-217F at benign ground)

## Getting Started

- Power down your PC system.
- Install the board in a spare PCI Slot (See Installation for CE compliance).
- Power up system with MSDOS.
- Run APCI.EXE (supplied on the utility disk), this will search for the board and check I/O access. If this fails, check board is correctly located.

## Warning

This board contains **CMOS** devices which may be damaged by static electricity. Please ensure anti-static precautions are taken at all times when handling this board. If for any reason this board is returned to Arcom Control Systems, please ensure it is adequately packed to prevent damage during shipment.

# Operation

## PCI Bus Interface

The PCI bus is a high speed alternative to ISA bus, it has been designed to overcome some of the limitations of ISA bus, and provide faster throughput for I/O intensive peripheral devices. PCI bus also supports Plug and Play configuration which allows the system software to allocate resources during initialisation helping to overcome resource conflicts, which might exist in a system.

The APCI-RELAY8/IN8 uses a single chip PCI bus slave controller which is designed and manufactured by PLX Technology. This device has been designed to fully support the PCI 2.1 specification and provides plug and play software capabilities. During power-up initialisation the PCI BIOS will detect the card and assign a unique I/O address location and interrupt line. This ensures that there are no resource conflicts on the PCI bus. Multiple cards are supported through this mechanism without the need for address decode links.

The PLX device contains a standard type 00H configuration space header. The table below shows the registers within this header which are required for configuration of the APCI-RELAY8/IN8.

## Configuration Space Header

Offset	Register Name	Description	Value
00-01H	Vendor ID	ID of PCI device manufacturer	10B5H (PLX Technology)
02-03H	Device ID	ID of PCI device	9050H
18-1BH	Base Address Register	I/O base address assigned to card	0000xxxxH
2C-2DH	Subsystem Vendor ID	ID of board manufacturer	13ABH (ARCOM)
2E-2FH	Subsystem ID	ID of Board	0594H(APCI-RELAY8/IN8)
3CH	Interrupt Line	Interrupt line assigned to device	0xH

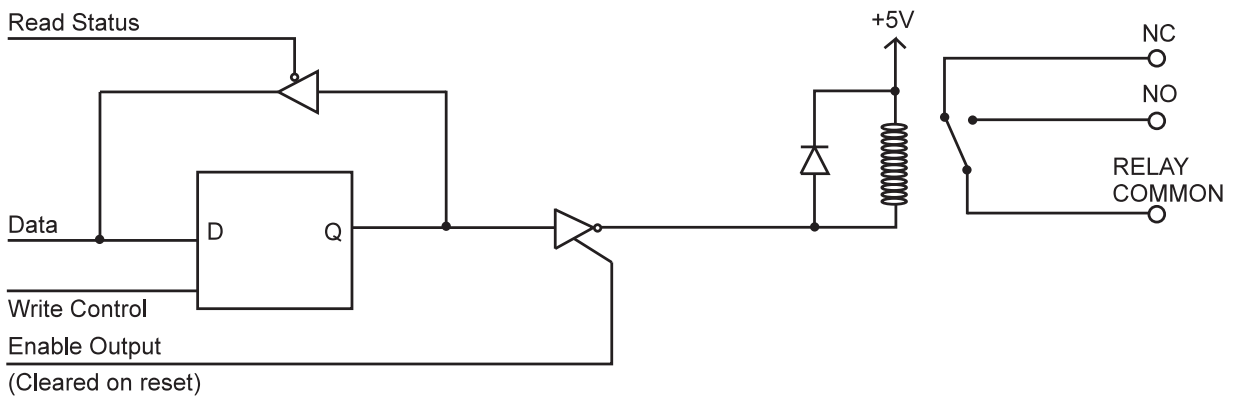
These registers can be accessed using PCI BIOS functions. Please contact Arcom control systems customer support team (Tel: 01223 412428) for a copy of the PCI BIOS Specification if required.

# Relays

When the board is switched ON, all relays are in the normally closed position. To switch a relay ON (i.e. change to normally open position) a logic '1' must be written to the corresponding bit in the relay output register. This will have no effect until a logic '1' is written to bit 0 of the relay enable register. For system initialisation, it is recommended that the output register is written with the required relay states before the relay enable bit is set.

A relay status register has been incorporated in the design to enable reading of the relay outputs. If a bit in this register is set to logic '1' the corresponding relay is in the N.O position.

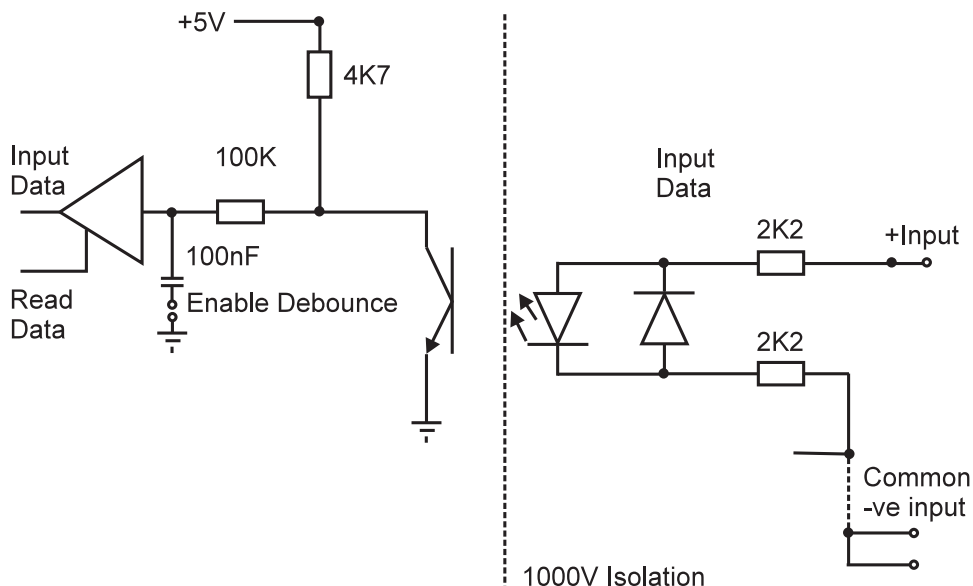
## Relay Configuration



# Opto Isolated Inputs

The status of the opto isolated inputs can be read via the opto input register. If the input is switched ON (i.e. a voltage has been applied to the input line) the corresponding bit in this register is set to logic '0'. A voltage in the range 10-30V must be applied to the input to ensure it is switched ON. Each opto-isolated input has an optional debounce circuit which can be enabled/disabled via LK1.

## Opto Isolated Inputs



## I/O Map

The APCI-RELAY8/IN8 uses two consecutive I/O address locations to access the onboard functions. The I/O base address is set by the PCI BIOS during initialisation (refer to the PCI BUS section of this manual for details). A PCI BIOS function call may be used to determine the base address once the system has been initialised. Multiple boards may be used in a system as each will be given a unique I/O address.

Offset	Register Name	Read/Write	Comments	Bit Function
00	Relay Output	Write	Configure Relay Outputs	Bit 0-7 for relay 0-7 '0' = relay NC contacts closed '1' = relay NO contacts closed
00	Relay Status	Read	Readback Status	Bit 0-7 for relay 0-7 '0' = relay NC position '1' = relay NO position
01	Relay Enable	Write	Enable Relay latches	Bit 0 '0' = all relays OFF (NC position) '1' = relays enabled. Bit 1-7 unused.
01	Opto Inputs	Read	Read Opto Inputs	Bit 0-7 '0'=input ON '1'=input OFF

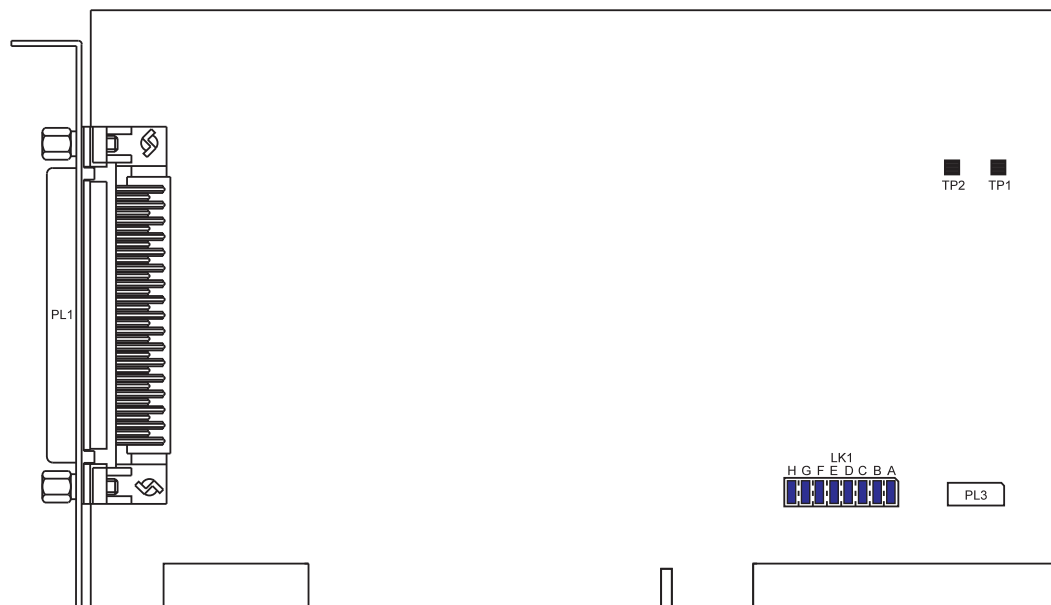
# Links

Each opto-isolated input line has an optional debounce circuit which can be enabled/disabled via LK1. If a link is fitted the corresponding debounce circuit will be enabled.

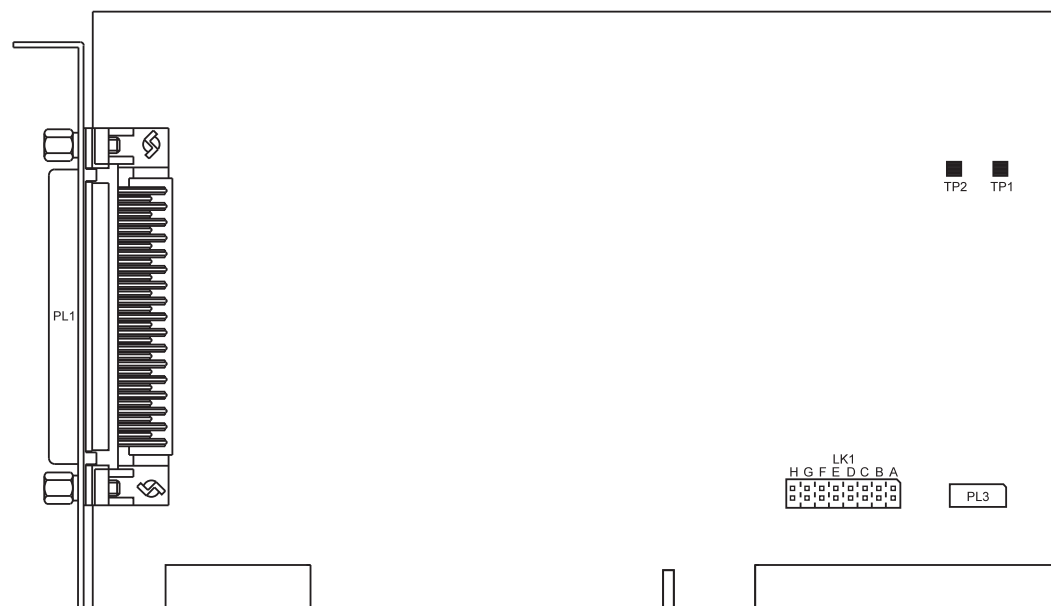
## LK1

Position	Opto Input bit
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7

## Default Link Position Diagram



## User Configuration Record Diagram



## D-50 I/O Connector (PL1) Pin Assignments

The pin assignments are listed with the pin number of the D-50 connector and also the pin number when a 50-way IDC ribbon cable is connected to the D-50. The pin assignments conform to the Arcom signal conditioning system (SCS) and may be connected to an external signal conditioning board.

Ribbon Cable Pin No.	D-Type Pin No.	Function	Ribbon Cable Pin No.	D-Type Pin No.	Function
1	1	N/C	26	42	N/C
2	34	Relay 1 common	27	26	Relay 6 common
3	18	Relay 1 NO	28	10	Relay 6 NO
4	2	Relay 1 NC	29	43	Relay 6 NC
5	35	N/C	30	27	N/C
6	19	N/C	31	11	N/C
7	3	Relay 2 common	32	44	Relay 7 common
8	36	Relay 2 NO	33	28	Relay 7 NO
9	20	Relay 2 NC	34	12	Relay 7 NC
10	4	N/C	35	45	N/C
11	37	N/C	36	29	N/C
12	21	Relay 3 common	37	13	Relay 8 common
13	5	Relay 3 NO	38	46	Relay 8 NO
14	38	Relay 3 NC	39	30	Relay 8 NC
15	22	N/C	40	14	N/C
16	6	N/C	41	47	Common -ve input (low bits)
17	39	Relay 4 common	42	31	+ve input bit 0
18	23	Relay 4 NO	43	15	+ve input bit 1
19	7	Relay 4 NC	44	48	+ve input bit 2
20	40	N/C	45	32	+ve input bit 3
21	24	N/C	46	16	+ve input bit 4
22	8	Relay 5 common	47	49	+ve input bit 5
23	41	Relay 5 NO	48	33	+ve input bit 6
24	25	Relay 5 NC	49	17	+ve input bit 7
25	9	N/C	50	50	Common -ve input (high bits)

## Installation for CE Compliance

To maintain compliance with the requirements of the EMC directive (89/336/EEC), this product must be correctly installed. The PC system in which the board is housed must be CE compliant as declared by the manufacturer. The type of external I/O cable required can be chosen according to the notes below:

1. Remove the cover of the PC observing any additional instructions of the PC manufacturer.
2. Locate the board in a spare PCI slot and press gently but firmly into place.
3. Ensure that the metal bracket attached to the board is fully seated.
4. fit the bracket clamping screw and firmly tighten this on the bracket.

Note:- Good contact of the bracket to the chassis is essential.

5. Replace the cover of the PC observing any additional instructions of the PC manufacturer.

### Cable

Cable length 1 Metre or less	:	Ribbon cable satisfactory.
Cable 1 Metre to 3 Meters	:	Commercial screened cable.
> 3 Meters or noisy environment:		Use fully screened cable with metal backshells e.g. Arcom CAB50CE

The following standards have been applied to this product:

- BS EN50081-1 : 1992 Generic Emissions Standard, Residential, Commercial, Light Industry
- BS EN50082-1 : 1992 Generic Immunity Standard, Residential, Commercial, Light Industry
- BSEN55022 : 1995 ITE Emissions, Class B, Limits and Methods.

## Product Information

Full information about other Arcom products is available via the **Fax-on-Demand System**, (Telephone Numbers are listed below), or by contacting our **WebSite** in the UK at: [www.arcom.co.uk](http://www.arcom.co.uk) , or in the US at: [www.arcomcontrols.com](http://www.arcomcontrols.com)

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## Revision History

Manual	PCB	Comments
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