PIC-IO development board
User's Manual

Rev.C, October 2012

Pb-free, Green

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INTRODUCTION:

PIC-IO board was designed as simple platform which to allow control of appliances and devices with PIC, the idea was to build something like tiny PLC controller which is possible to program in C or assembler instead of the weird PLC relay language.

Let's see what we have on board:

Four High voltage/ High Current relays – with NO-NC-COM contacts available on terminal block. The relay switching current is rated: 15A/125VAC, 10A/250VAC, 15A/24VDC. Note that these relays are good for switching resistive loads, but if you have to commutate inductive loads the relays will wear off quickly due to the sparking when disconnect the inductive loads (like motors).

Each relay have status LED associated with it so you can easy see which relay is in ON and which in OFF state.

O1 is connected to RA3 CMP1 and PIC CCP module can be used to generate ON/OFF pulses.

O2-O3-O4 are connected to RA2-RA1-RA0.

Four opto-isolated inputs will allow to detect voltages in range +5-24VDC. Opto-couplers are fast and switch On/Off for 10 uS, so quick signals could be detected.

!NOTE for owners of MOD-IO prior to revision C1: the above information is correct only for the opto-isolated couplers – the board is capable to handle up to 22VDC for them. You need to swap R1, R2, R3, R4 - 330R resistors with 470R ones be able to use 24VDC! This has been fixed in the latest revision as seen in the schematics.

I1 is connected to RA4 and is good for counting as this pin is connected to PIC T0CKI.

I2 is connected to RB0 which is INT and generates interrupts.

I3 is connected to CCP1 and is good for pulse width measurement.

I4 is connected to RB4.

The inputs have status LEDs so easy could be seen which input have voltage. Note that the optocouplers inverse the levels i.e. when on the input have +5V the PIC pin will read "0" and vice versa.

Status LED is connected to RB5.

PIC-IO have RS232 connector, but the driver is made by tricky level shifter which uses the other side RS232 negative levels to generate the PIC-IO levels, so on the other side you must

have real RS232 driver (like PC) if you try to connect two PIC-IO boards by RS232 the connection will fail as no one of the boards will generate the negative levels.

The on-board ICSP connector allow you to program the PIC on the board without pulling it of the socket, by ICSP programmer like PIC-MCP, PIC-MCP-USB, PIC-PG1, PIC-PG2, PIC-PG3, PIC-PG4 or to program and debug it with PIC-ICD2, PIC-ICD2-POCKET or PIC-ICD2-TINY. IMPORTANT: all programmers provide power supply through ICSP connector during the programming PIC-IO should not be powered via the external power jack!

The power supply circuit have protection diode for reverse connection. The positive point is the internal pin of the power jack. The input voltage could be in range 12–14V DC.

The oscillator circuit is made with 20 Mhz crystal oscillator, so you can run your PIC at maximum performance.

The RESET is connected with 10K to +5V and allow safe use of PIC-ICD2 or PIC-MCP programming.

FEATURES:
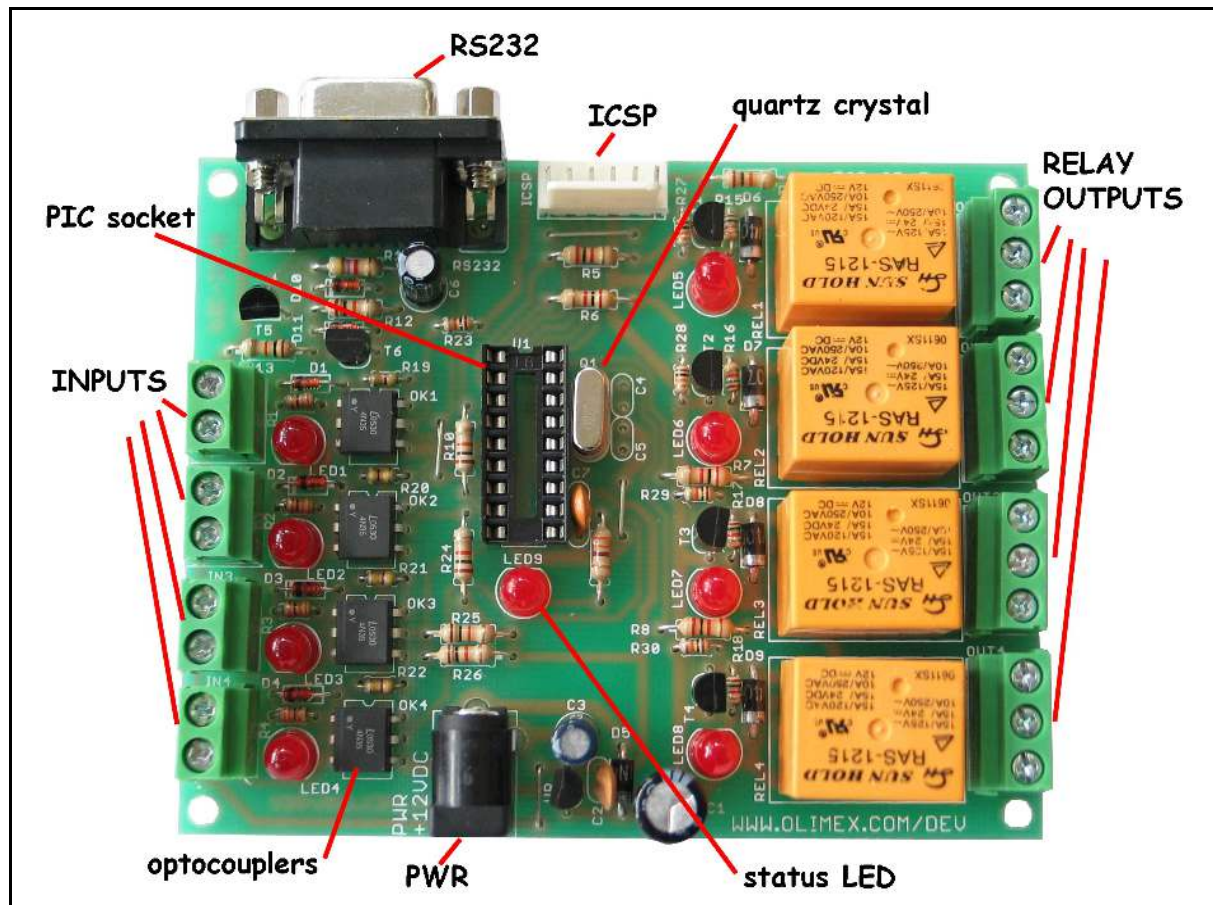
- ICSP/ICD connector for programming and debugging
- RS232 interface
- DIL18 socket
- Quartz crystal 20Mhz
- LED to RB5 through jumper
- Four opto-isolated inputs with status LEDs
- Four Relays 10A/250VAC with status LEDs
- Power plug-in jack, accept AC and DC input
- Four mounting holes 3,3 mm (0,13")
- FR-4, 1.5 mm (0,062"), green soldermask, white silkscreen component print
- Dimensions 100x80 mm (3,9x3,15")

HARDWARE:

PIC-IO_rev_C1

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http://www.olimex.com/dev
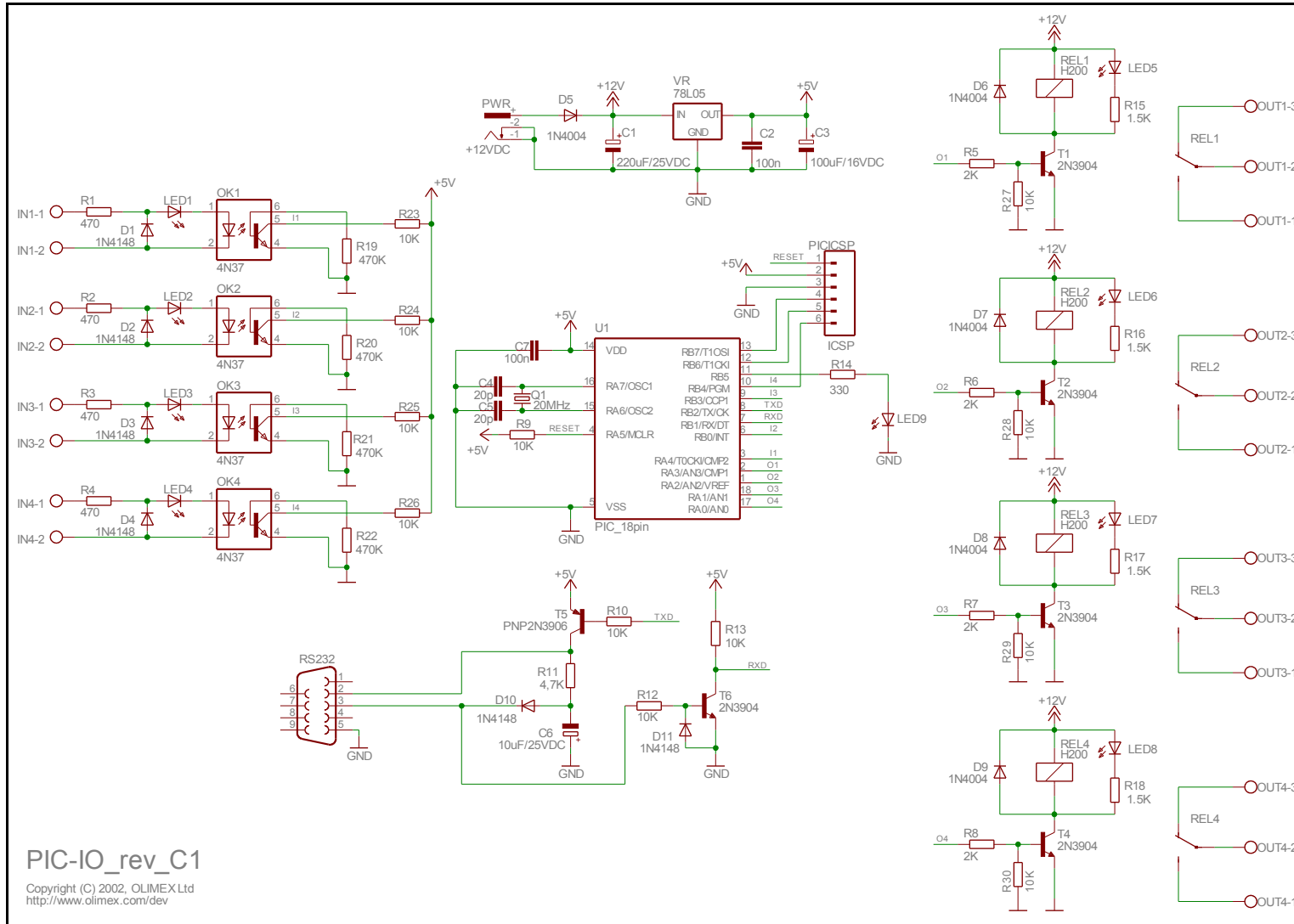
SOFTWARE:

DEMO1:   **PIC16F628-I/P   CONTROL SOFTWARE**

This is demo code, which allow control of the PIC-IO inputs/outputs via PC with Hyper terminal.

Connect PIC-IO RS232 with cable to your PC and run Hyper terminal with these settings: 9600,8,N,1,NONE. When you apply power this will be seen on the Hyper terminal window:
```
***************************
* PIC-IO CONTROL      *
* (C) 2007, OLIMEX Ltd*
***************************
>_
```

To read the inputs in binary format type "r", PIC-IO will respond with something like:
%0000   if all inputs are 0 or
%1111   if all inputs are 1 (i.e. +5V is applied)
the inputs are with right less significant bit i.e. the order is: I4 I3 I2 I1

To read the inputs in HEX format type "R", PIC-IO will respond with something like:
$0   if all inputs are 0 or
$F   if all inputs are 1

To change the outputs type "w0101", this will switch on relay 1 and relay 3 and will switch off relay 2 and relay 4.
If you want to use HEX value you can write "W5" for instance which will switch on relay 4 and relay 1 and will switch off relay 2 and relay 3.

Any other commands will not be recognized and PIC-IO will respond with "ERR"

ORDER CODE:

PIC-PIO – assembled and tested (no kit, no soldering required)

How to order?

You can order directly from us or from any of our distributors.

Check our web https://www.olimex.com for more info.

Revision history:

REV.A   - created June 2007

REV.B   - added info about the maximum voltage possible on the opto-couplers, 22VDC by default

REV.C   - changed schematic with the latest one, revision C1 of the board has adjusted resistors on the
                 relay inputs (330R were replaced with 470R); added a note about differences in different
                 revisions; updated disclaimer; added support and warranty info

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The software is released under GPL.

It is possible that the pictures in this manual differ from the latest revision of the board.

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THERE IS NO WARRANTY FOR THE DESIGN MATERIALS AND THE COMPONENTS USED TO CREATE PIC-IO. THEY ARE CONSIDERED SUITABLE ONLY FOR PIC-IO.

Product support

For product support, hardware information and error reports mail to: support@olimex.com. Note that we are primarily a hardware company and our software support is limited.

Please consider reading the paragraph below about the warranty of Olimex products.

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Warranty and returns:


Our boards have lifetime warranty against manufacturing defects and
components.

During development work it is not unlikely that you can burn your programmer
or development board. This is normal, we also do development work and we have
damaged A LOT of programmers and boards during our daily job so we know how it
works. If our board/programmer has worked fine then stopped, please check if
you didn't apply over voltage by mistake, or shorted something in your target
board where the programmer was connected etc. Sometimes boards might get
damaged by ESD shock voltage or if you spill coffee on them during your work
when they are powered.


Please note that warranty do not cover problems caused by unproper use,
shorts, over-voltages, ESD shock etc.


If the board has warranty label it should be not broken. Broken labels void
the warranty, same applies for boards modified by the customer, for instance
soldering additional components or removing components - such boards will be
not be a subject of our warranty.


If you are positive that the problem is due to manufacturing defect or
component you can return the board back to us for inspection.

When we receive the board we will check and if the problem is caused due to
our fault and we will repair/replace the faulty hardware free of charge,
otherwise we can quote price of the repair.


Note that all shippings back and forth have to be covered by the customer.
Before you ship anything back you need to ask for RMA. When you ship back
please attach to it your shipping address, phone, e-mail, RMA# and brief
description of the problem. All boards should be sent back in antistatic
package and well packed to prevent damages during the transport.
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