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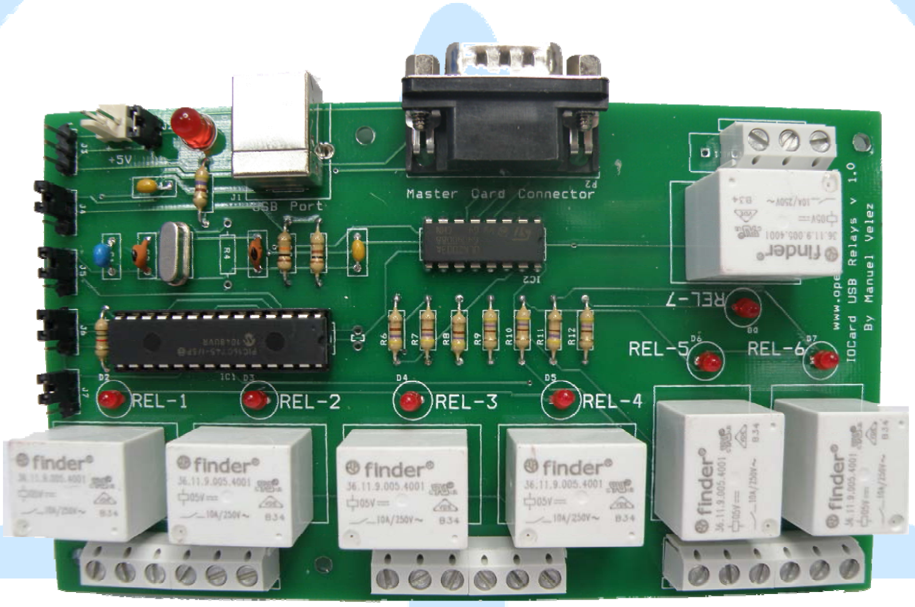
Rev.:2.0

Opencockpits



IOCard USB Relays Manual

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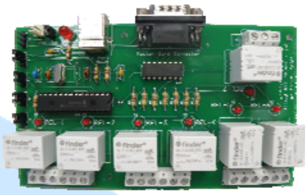
Introduction:

The IOCard USB Relays has been designed to manage up to 7 relays and control 5 analog inputs. The card is connected to the computer via USB port.

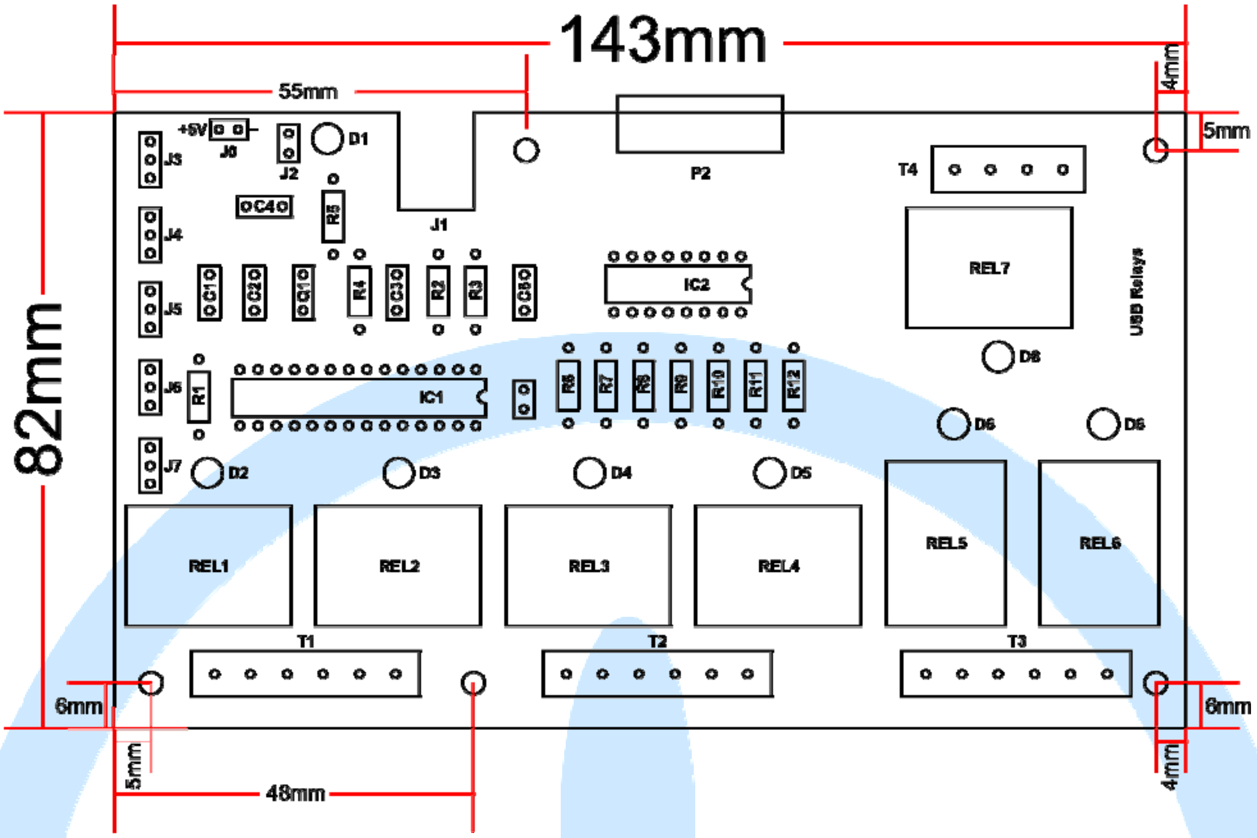
Usb Relays:

The IOCard USB Relays is recognized as a HID device and is controlled by the IOCP protocol. Alternatively the card can be connected directly to Master's outputs.
There is also available a version without USB port that connects with P2 port directly with Master card.



Esquema y componentes:

- C1 = CAPACITOR 220nf
- C2, C3 = CAPACITORS 22pF
- C4, C5 = CAPACITOR S 0.1mF
- D1…D8 = LED DIODES
- IC1 = MICROCONTROLLER 16C745
- IC2 = INTEGRATED CIRCUIT ULN2003A
- J0 = POWER SUPPLY CONNECTOR +5V
- J1 = USB CONNECTOR
- J2 = JUMPER SELECTION FOR EXTERNAL/INTERNAL POWER SUPPLY
- J3, J4, J5, J6, J7 = 3 PINS CONNECTORS
- P2 = DB9 CONNECTOR
- Q1 = QUARTZ CRYSTAL 6Mhz
- REL1…REL7 = RELAYS OMRON G5LE-1
- R1 = RESISTOR 1K5
- R2 = RESISTOR 10K
- R3 = RESISTOR 100R
- R4 = NOT USED (FUTURE OPTIONS)
- R5 … R12 = RESISTORS 470R
- T1, T2, T3, T4 = SCREW CONNECTORS



Connectors description:

- J0 = +5V power connector (the board is not protected against reverse polarity).
- J1 = USB connector to the computer. The computer will automatically recognize the card as a HID device.
- J2 = Jumper for selecting the power supply: If the jumper is closed the power will come from internally (USB), if is open feeding will be external (power supply).
- J3 to J7 = Connectors for analog inputs.
- P2 = Type DB9 connector, to connect the card directly to Master card, without using the USBport (never connect both ports at once).

Connection squeme:

The connection is simple, each relay has 3 outputs correlated in screw connectors T1 to T4:

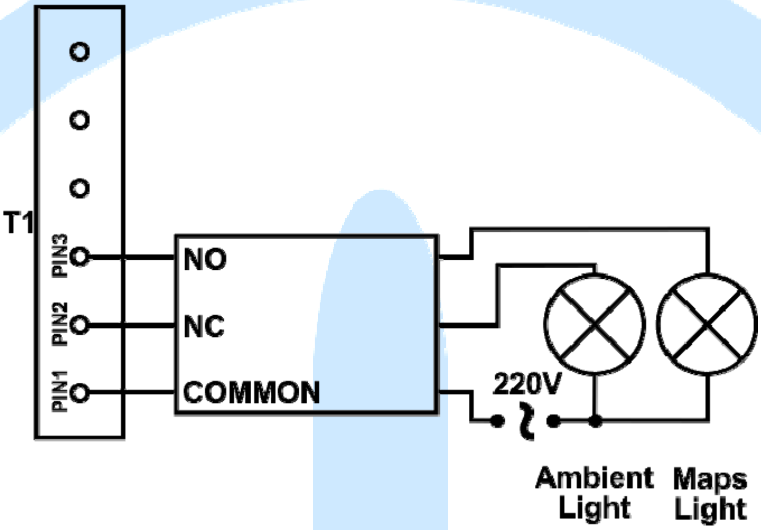
PIN	FUNCTION
1	COMMON
2	NC (normally closed)
3	NO (normally open)

The relay at rest has closed circuit pin 2 and pin 3 circuit is open, when the relay is activated, changes the situation being the pin 2 circuit open and pin 3 circuit closed.

Connection example:

We will work with two 220V lamps, we want to activate the maps light and automatically deactivate the cockpit ambient light that is always on, for to do that we will connect an ambient lamp pole to pin COM and the other pole to NC (normally closed) and on the other hand, a maps light pole to pin COM and the other pole to pin NO (normally open), not forgetting to feed the lamps with 220v (see connection drawing) so, connecting the card, the ambient light will light on and the maps light will remain off, but activating the relay the ambient light will be off and maps light will be on and deactivating the relay ambient light will be on and maps light will be off.

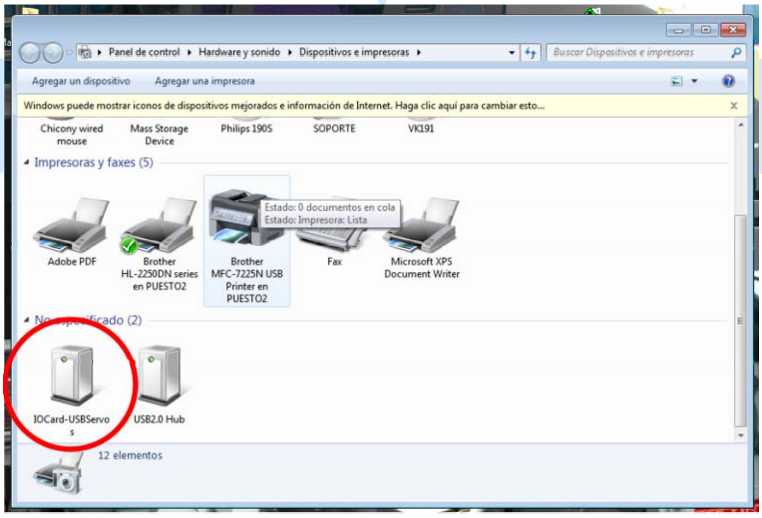
For a better explanation of connection, see the next drawing:



Starting the card:

We already knows the connection theory of IOCard USB Relays, now we will connect and test it to see the results.

In our exercise we will connect the USB Relays to the USB port and we will see that the computer recognizes it.


Panel de control ▸ Hardware y sonido ▸ Dispositivos e impresoras ▸

Buscar Dispositivos e impresoras

Windows puede mostrar iconos de dispositivos mejorados e información de Internet. Haga clic aquí para cambiar esto...

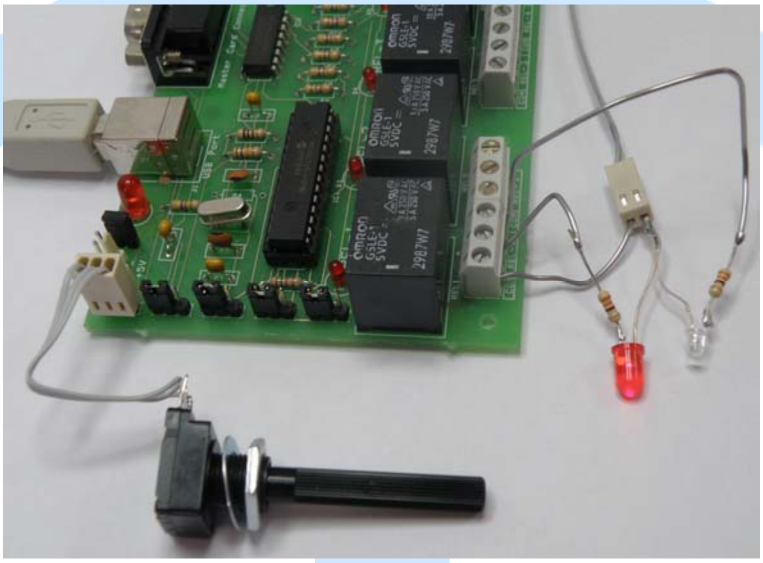
Estado: 0 documentos en cola
Estado: Impresora: Lista

12 elementos

It has been recognized, so we will practice with the above example, but instead of working with 220V lamps, we will do with 5V LEDs for convenience and safety.

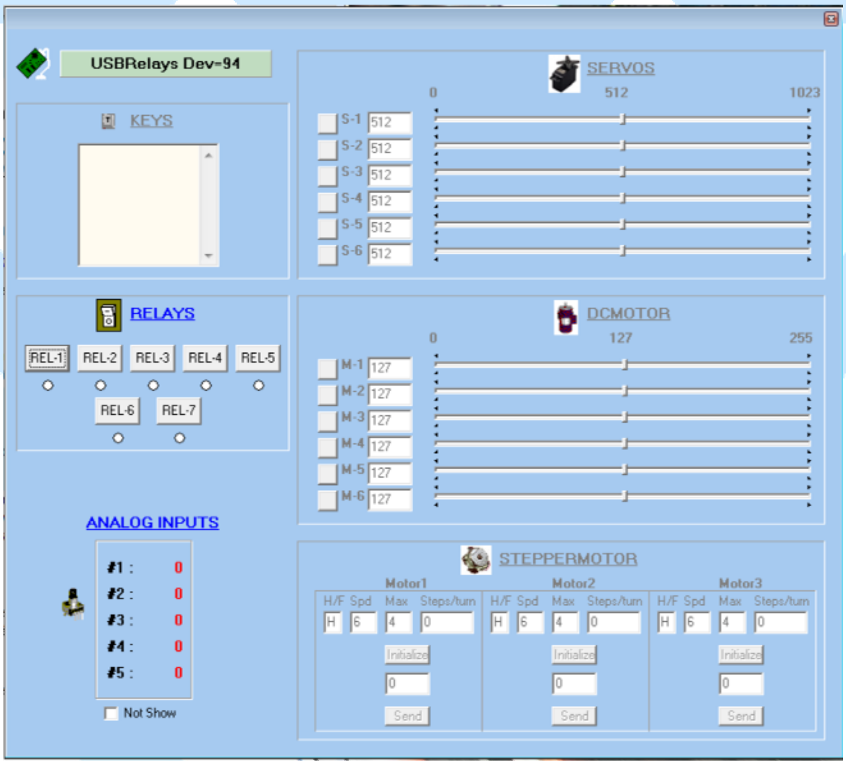
In this test we will close jumper J2 to feed the card from USb system because we will use low comsumption charge (only 1 relay), if we connect all relays is advisable to open the J2 jumper and feed the USB Relays card with external power supply (5V 1A).

We will also connect a potentiometer to test the analog inputs. Summarizing: 1 potentiometer on J3, 1 white LED to pin 3 (maps light), 1 red LED to pin2 (ambient light) and into pin 1 we will connect the lights common and the external feeding, besides to avoid false readings from unused analog inputs we will put jumpers on them:



Warning: When we will connect the external feeding the red card LED will be on.

Now we will test with SIOC Monitor our assembly. Run SIOC, we will see if the card has been recognized and if yes push Monitor button, USB Relays and check the assembly:



USBRelays Dev-94

KEYS

SERVOS

0 512 1023

S-1 512
S-2 512
S-3 512
S-4 512
S-5 512
S-6 512

RELAYS

DCMOTOR

0 127 255

M-1 127
M-2 127
M-3 127
M-4 127
M-5 127
M-6 127

ANALOG INPUTS

#1 : 0
#2 : 0
#3 : 0
#4 : 0
#5 : 0

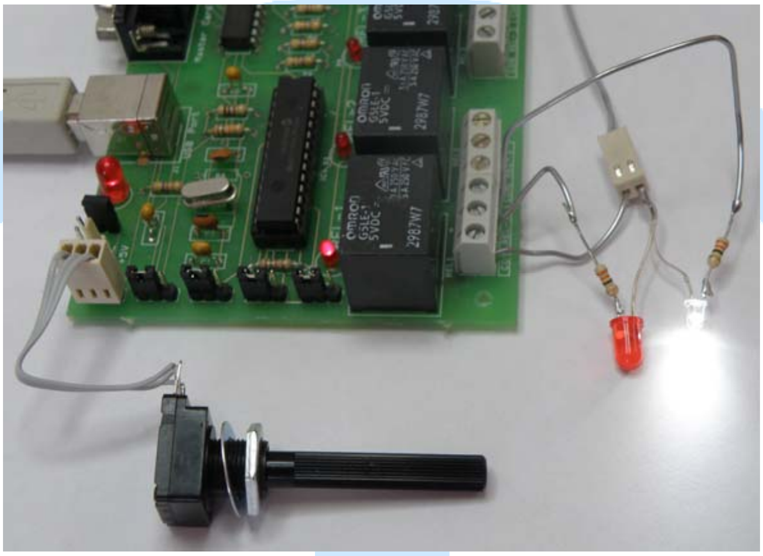
□ Not Show

STEPPERMOTOR

Motor1				Motor2				Motor3			
H/F	Spd	Max	Steps/turn	H/F	Spd	Max	Steps/turn	H/F	Spd	Max	Steps/turn
H	6	4	0	H	6	4	0	H	6	4	0

How we can see the analog input #1 shows the potentiometer value and the rest are at 0, if we turns the potentiometer we will see the value changing to more or less or vice versa (it depens of wire connection), we can change the turn direction changing the J3 wires to opposite pins or using a SIOC script.

Try now the relay 1, if we click on the relay REL-1 button, the relay will be activated and the white LED will be on, the red LED will be off and the control led will be active in the monitor software and on the card. If we click REL-1 button again the relay will be deactivated, the red LED will be on and white LED will be off.



We should do this test for all relays connectors.

Installation and configuration:

To use the USB Relays features we should have installed SIOC (last version if possible), a flight simulator like FS, FSX, Xplane, etc.

At the end of this document there is a list of links to download the necessary software to put into practice this manual.

To manage this cards we use scripts, to control the IOCard USB Relays with SIOC we will declare it in sioc.ini, so we will assign a device index number to each card connected. Is important remember that USB Relays has two functions, one for control relays and other for control analog inputs that must be declared in sioc.ini too:

USBRelays=XX,YY

XX represents the order number (IDX) of the board on our cards list.
YY represents the hardware device identifier of USB port to wich is connected the board. This information can be read running USBCheck.exe or the proper sioc.exe (upper right window).

USBAnalogic=XX,YY

XX represents the order number (IDX) of the board on our cards list.
YY represents the hardware device identifier of USB port to wich is connected the board. This information can be read running USBCheck.exe or the proper sioc.exe (upper right window).

For example, if we connect two USB Relays cards with USB device numbers 94 y 42 (these numbers can be easily known with SIOC) then we will declare it into sioc.ini:

USBRelays=3,94 (as our practice computer, 3: is the IDX and 94 is the device USB port).
USBRelays=4,42 (4: IDX and 42 is the device USB port).
USBAnalogic=3,94 (as our practice computer, 3: is the IDX and 94 is the device USB port).
USBAnalogic=4,42 (4: IDX and 42 is the device USB port).

Relays declaration:

To refer the exact relay number, we must consider the IDX number assigned to each USB Relays card. We will define the variable as:

Var *VVVV*, **name** *NNNN*, **Link USB_RELAYS, device** *DD,* **Output** *S*

VVVV = variable number.
NNNN = variable name (optional).
DD = IDX number declared in sioc.ini (if is the unique card declared as IDX 0: it is not necessary to put this code).
S = relay number 1-7.

Definition example:

Var 0001, name relay_maps, Link USB_RELAYS, Device 3, Output 1

Analog input declaration:

To read the analog inputs we will use next format:

Var *VVVV,* **name** *NNNN,* **Link USB_ANALOGIC, Device** *DD,* **Input** *EE*, **posL** *LLL*, **posC** *CCC*, **posR** *RRR*

VVVV = variable number.
NNNN = variable name (optional).
DD = IDX device number defined in sioc.ini (if it is declared as IDX 0 is not necessary to put this code.
EE = analog input number 1-5.
LLL = maximum position of potentiometer to the left.
CCC = middle position of potentiometer.
RRR = maximum position of potentiometer to the right.

Definition example of analog input:

Var 0002, name pot_flaps, Link USB_ANALOGIC, Device 3, Input 2, posL 1, posC 128, posR 255

Example scripts:

Relays:

The example that we used before will serve to us to test the USB Relays card with the Expansion card and Master Card and a switch, we will copy the " USB Expansion + Master Manual" assembly. The simulator is not necessary in this example.

To start we will write a file named "test_relay1.txt":

```
// ******************************************************************************
// * Config_SIOC ver 4.01  - By Manolo Vélez - www.opencockpits.com
// ******************************************************************************
// * FileName : test_relay1.txt
// * Date : 13/03/2012

Var 0001, name rele, Link USB_RELAYS, Device 3, Output 1
Var 0002, name map_switch, Link IOCARD_SW, Input 1
{
  If &map_switch = 1
  {
    &rele = 1
  }
  ELSE
  {
    &rele = 0
  }
}
// End of file
```

We will save and run the script with SIOC, we will see that red LED (ambient light) will stay on until we active the switch to put on the white LED (maps light).

Analog inputs:

Now we will use the potentiometer connected to move a servo connected to an USB Servos declared as IDX = 0 and device port 2.

To start we will write a file named "test_relay1_servo1.txt":

```
// ******************************************************************************
// * Config_SIOC ver 4.01  - By Manolo Vélez - www.opencockpits.com
// ******************************************************************************
// * FileName : test_relay1_servo1.txt
// * Date : 13/03/2012

Var 0001, name servo, Link USB_SERVOS, Device 0, Output 1, PosL 190, PosC 512, PosR 1023
Var 0002, name trim, Link USB_ANALOGIC, Device 3, Input 1, posL 1, posC 128, posR 255
{
&servo = &trim
}
// End of file
```

We will save the file and will run it with SIOC, simulator is not necessary, if we turn the potentiometer the servo will move the same as defined potentiometer range.

With this gives end to this manual, we invite you to read the manuals of the others Opencockpits elements and of the SIOC software and give you the thanks for trusting in we.

Links of interest:

Support area for clients:

http://www.opencockpits.com/catalog/info/