

KT-5220**USB IO Module V2**

- 8 Relay Outputs
- 4 Opto-Isolated Inputs
- 2 Analog Inputs (10 bit)
- 1 PWM Output (8 bit)
- 254 Byte User EEPROM
- Connections via Pluggable Screw Terminals
- 0-5V or 0-20mA Analog Inputs, Jumper Selectable
- 5A Relay Switching
- Power Indicator LED
- All enclosed in Professional looking plastic case
- Visual Basic DLL and Example Program provided

The KT-5220 is a USB controlled IO module for interfacing PC's to real world applications, such as controlling lights and sprinkler systems, reading sensors and monitoring switches and other digital signals. The Relays are capable of switching up to 7A at 240VAC but the PCB tracks will only handle up to about 5A.

Connections:**Table 1 - Connections**

Label	Description
+	Opto-Isolated Input Positive
-	Opto-Isolated Input Negative
AN1	Analog Input 1
COM	Common Connection (Ground)
AN2	Analog Input 2
COM	Common Connection (Ground)
PWM	PWM Output
COM	Common Connection (Ground)
D+	Unused
COM	Common Connection (Ground)
D-	Unused
V+	12V Power Supply Positive Input
COM	Common Connection (Ground)
USB	USB B-type connection to PC
NO	Relay Normally Open Contact
C	Relay Common Contact
NC	Relay Normally Closed Contact

Jumper Settings:

The Analog inputs of the KT-5220 can be set for 0-5V or 0-20mA operation. Opening the case and inserting jumper shunts in the positions J1 and J2 will set the analog inputs to 0-20mA operation. Removing the shunts will set the analog inputs to 0-5V operation. Care must be taken to ensure that the inputs do not go above 5V or 20mA as damage to the microcontroller could occur.

Using the Controller:

The KT-5220 requires 12VDC to operate, this can come from a plug-pack, but you will need to remove any plug and connect the wires directly to the terminals.

Connect the 12VDC positive to the V+ terminal and negative to the COM terminal next to it.

Connect the KT-5220 to a PC using a USB A male to USB B male cable. When the power is turned on the PC should recognise that a USB device has been connected and if it is the first time it has been connected to that PC it will install drivers automatically.

Run the setup program to install the visual basic test program and source code.

Go to Start->Programs->Ocean Controls->KT-5220 USB IO Module to run the program.

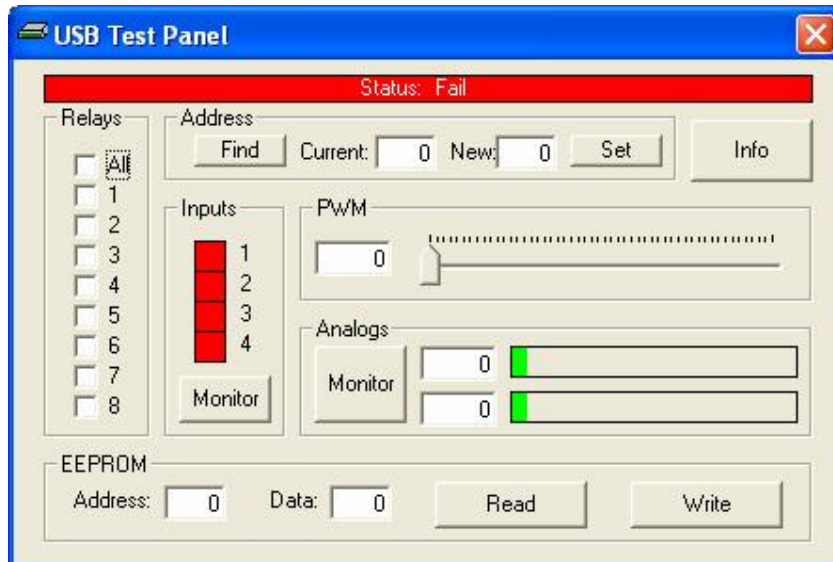


Figure 1 - Test Program

The main window of the software is shown in Figure 1.

If the Address of the unit you wish to control is known put it in the "Current" text box, if not, you can find the Address of a unit by clicking on "Find"

Relays can be turned on or off by checking or un-checking the check-boxes in the Relays group.

Clicking the Monitor button in the Inputs group will make the program poll the KT-5220 inputs. When an input is active the related box will change from red to green. The slider in the PWM group sets an output PWM percentage on the PWM output and the monitor button in the Analogs group polls the units analog inputs and displays them on the bar graphs and in the text boxes.

Data can be Read from and Written to the EEPROM using the "Read" and "Write" buttons and putting the Data and Address in the relevant text boxes.

Programming:

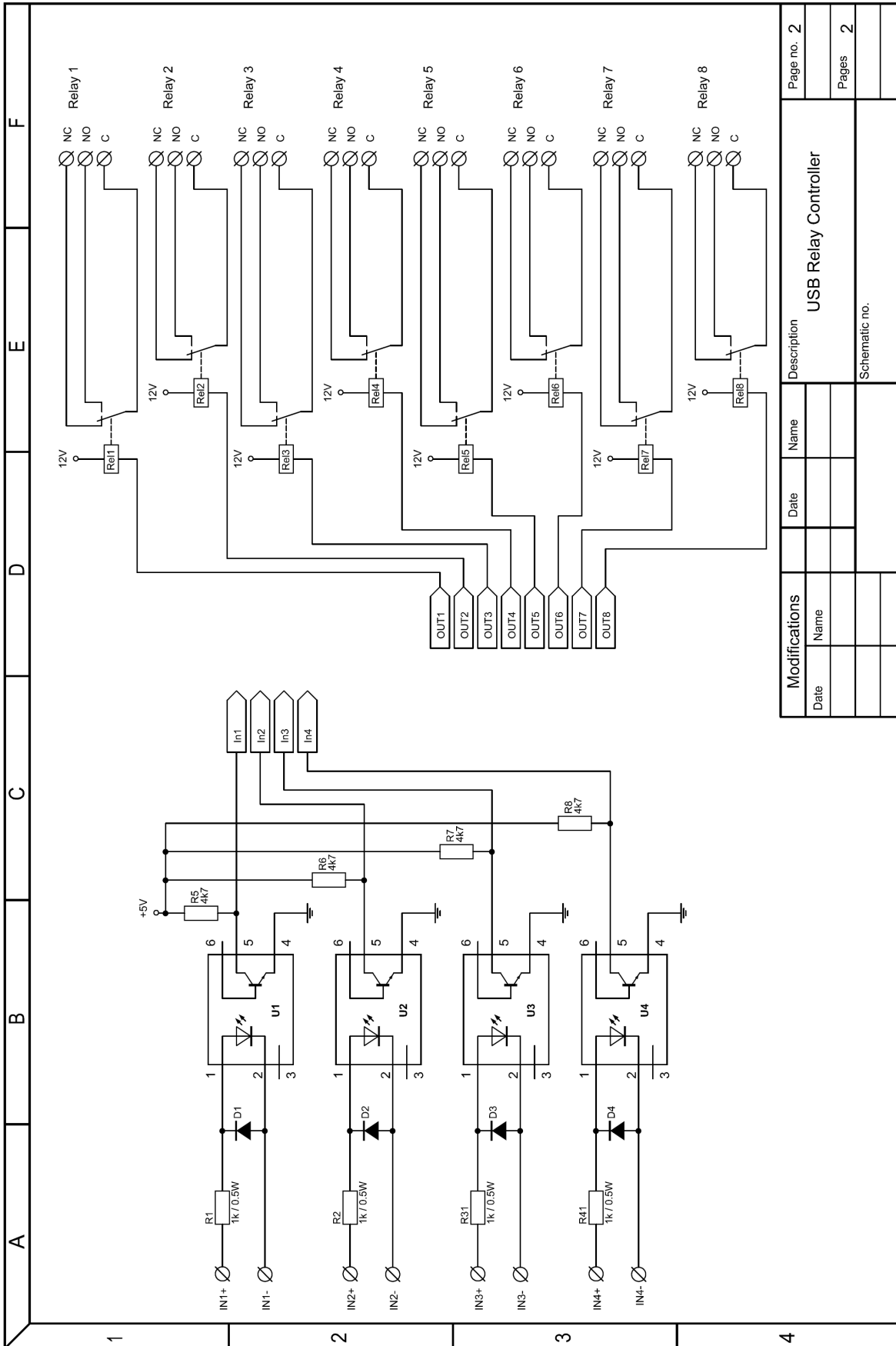
Installing the software will copy the OCUSB.dll file to your system directory. This is usually C:\Windows\System32

The DLL is provided so that anyone can write custom software to operate the KT-5220.

The functions available to be called from the DLL are:

- RelayOn(Address As Byte, Number As Byte) As Boolean
Turns on the relay as defined by Number for unit with address defined by Address, 0 turns all relays on. Returns True for success or False for failure.
- RelayOff(Address As Byte, Number As Byte) As Boolean
Turns off the relay as defined by Number for unit with address defined by Address, 0 turns all relays off. Returns True for success or False for failure.
- RelayStat(Address As Byte, Number As Byte) As Byte
Reads the status of a relay as defined by Number for unit with address defined by Address. Returns -1 (True) if the relay is on, 1 if the relay is off or 0 (False) if the operation failed.
- ReadIn(Address As Byte, Number As Byte) As Byte
Reads the input as defined by Number for unit with address defined by Address. Returns -1 (True) if the input is on, 1 if the input is off or 0 (False) if the operation failed.
- ReadAn(Address As Byte, Number As Byte) As Integer
Reads the value of the analog input as defined by Number for unit with address defined by Address. Returns 1-1024 as the 10 bit analog reading or 0 if the operation failed.
- SetPWM(Address As Byte, Number As Byte) As Boolean
Sets the PWM output duty 0=0% 255=100% for unit with address defined by Address. Returns True for success or False for failure.
- EEPRead(Address As Byte, EEPAddr As Byte) As Integer
Read byte of data at EEPAddr of EEPROM of unit defined by Address. EEPAddr can be from 0 to 255. Returns 0 on timeout or 1-256 for data (EEPROM data + 1).
- EEPWrite(Address As Byte, EEPAddr As Byte, EEPdata as byte) As Boolean
Write byte EEPdata to EEPAddr of EEPROM of unit defined by Address. EEPAddr can be 0-254, 255 is reserved. Returns True for success or False for failure.
- SetAddr(Address As Byte, NEWAddr As Byte) As Boolean
Change the Address of the unit defined by Address to NEWAddr. Returns True for success or False for failure.
- FindFirst() As Integer
Reads the Address of the first USB unit found. Returns 1-256 = Address of first unit found plus 1, or 0 on timeout.

Circuit Page 2/3 - Inputs and Outputs:

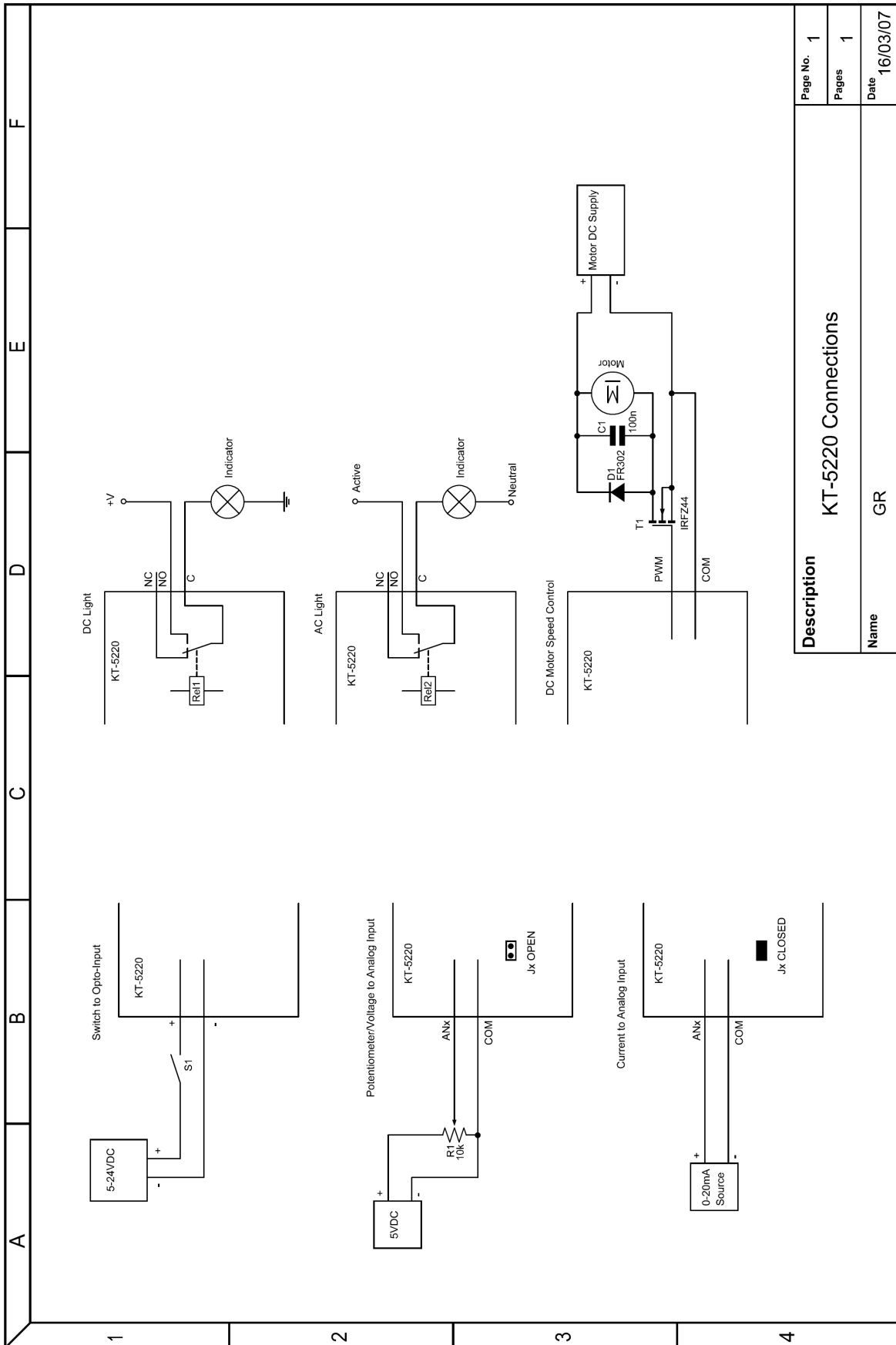


Modifications		Description	
Date	Name	Date	Name

USB Relay Controller

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Circuit Page 3/3 - Connecting to the KT-5220:



Parts List:

6-pin DIP socket	U1-U4	4
18-pin DIP socket	U5	1
28-pin DIP socket	U8	1
4N35 Optocoupler	U1-U4	4
ULN2803A Darlington Array	U5	1
PIC 18F2550 Microcontroller	U8	1
7805 Regulator	VR1	1
1N4004 Diode	D1-D5	5
120 Ohm Resistor	R16	1
240 Ohm Resistor	R7, R8	2
680 Ohm Resistor	R19	1
1k 1W Resistor	R1-R4	4
4k7 Resistor	R5, R6, R9-R12	6
8MHz Low Profile Crystal	CR2	1
USB-B Female Connector	USB-B	1
5mm LED in panel clip	L1	1
22pF Capacitor	C1, C2	2
0.1uF Capacitor	C3-C9	7
1000uF 25V Capacitor	C10	1
Small Heatsink	VR1	1
12V Relays	RL1-RL8	8
Pluggable Terminal Socket 12 way	X1-X14	3
Pluggable Terminal Socket 5 way	X15-X16	1
Pluggable Terminal Socket 2 way	X17	1
Pluggable Terminals 2 way	X9-X15, X17	8
Pluggable Terminals 3 way	X1-X8, X16	9
Case		1
M3 Screw 10mm		1
M3 Nut		1
Self Tapping Screws		4
PCB with Side Panels		1
Header pins (2pins)	J1, J2	2
Jumper Shunts	J1, J2	2
2 Wire Ribbon 100mm		1
Not Used	R13-R15,R17,R18, J3, U6, U7, CR1, BAT1	