

OCEAN CONTROLS

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PIXEL Programmable Controller

CONNECTING TO THE PIXEL CONTROLLER

The Pixel Programmable Controller features the following I/O

4 Eight bit Single Ended Analog Inputs

8 Digital Inputs

8 Relay Outputs

The connections to the analog inputs and digital inputs and outputs are via a screw terminals (See the table below for a listing of the terminals) which can accommodate wires up to 2.5mm in dia.

TERMINAL DESCRIPTIONS			
Terminal	Description	Terminal	Description
Vs	+12VDC External Power Supply	NO1	Relay Output 1 Normally Open Contact
COM	Common External Power Supply	C1	Relay Output 1 Common Contact
		NC1	Relay Output 1 Normally Closed Contact
		NO2	Relay Output 2 Normally Open Contact
A1	Analog Input 1	C2	Relay Output 2 Common Contact
COM	Common For Analog Inputs	NC2	Relay Output 2 Normally Closed Contact
A2	Analog Input 2	NO3	Relay Output 3 Normally Open Contact
A3	Analog Input 3	C3	Relay Output 3 Common Contact
COM	Common For Analog Inputs	NC3	Relay Output 3 Normally Closed Contact
A4	Analog Input 4	NO4	Relay Output 4 Normally Open Contact
		C4	Relay Output 4 Common Contact
		NC4	Relay Output 4 Normally Closed Contact
DI1	Digital Input 1	NO5	Relay Output 5 Normally Open Contact
COM	Common For Digital Inputs	C5	Relay Output 5 Common Contact
DI2	Digital Input 2	NC5	Relay Output 5 Normally Closed Contact
DI3	Digital Input 3	NO6	Relay Output 6 Normally Open Contact
COM	Common For Digital Inputs	C6	Relay Output 6 Common Contact
DI4	Digital Input 4	NC6	Relay Output 6 Normally Closed Contact
DI5	Digital Input 5	NO7	Relay Output 7 Normally Open Contact
COM	Common For Digital Inputs	C7	Relay Output 7 Common Contact
DI6	Digital Input 6	NC7	Relay Output 7 Normally Closed Contact
DI7	Digital Input 7	NO8	Relay Output 8 Normally Open Contact
COM	Common For Digital Inputs	C8	Relay Output 8 Common Contact
DI8	Digital Input 8	NC8	Relay Output 8 Normally Closed Contact

POWERING THE CONTROLLER

The pixel controller requires a 12VDC 350mA power supply. A 12VDC 450mA plug pack can be used. Connect the +12VDC supply to the terminal marked Vs and the common of the power supply to the terminal marked COM.

CONNECTING TO ANALOG INPUTS

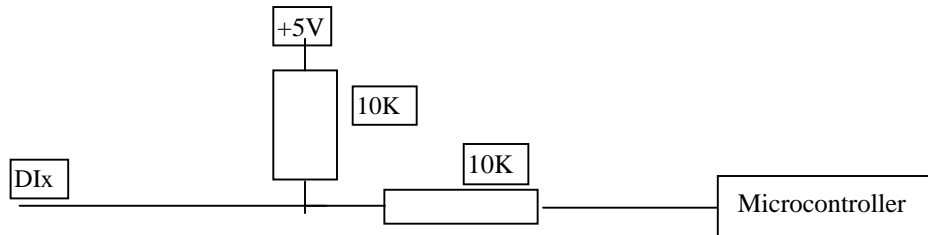
The 4 eight bit analog inputs range from 0 to 5.12V with each bit ranging 20mV. The analog inputs are single ended where the positive and negative sides of a signal are connected to an input channel and common respectively.

Each analog input is protected from overvoltage by a 4K7 resistor. Please note overvoltage on an analog input may affect the readings on other analog inputs.

DIGITAL INPUTS

Each of the 8 digital inputs are fitted with a 10K pull up resistor and a 10K resistor to protect the inputs from overvoltage. Hence the inputs can monitor TTL, CMOS, open collector and relay contacts.

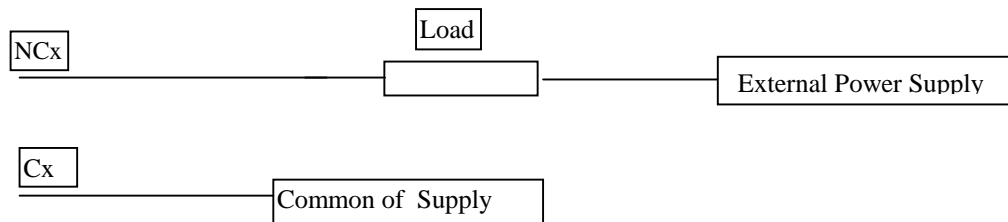
Each of the digital inputs is wired as per the diagram below. To connect the digital signal to the controller connect the positive end of the signal to the terminal marked DI and the negative end of the signal to the terminal marked COM.



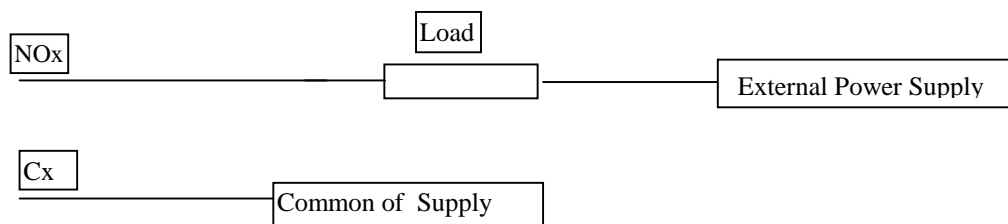
RELAY OUTPUTS

The controller has 8 relays marked RLY1 to RLY8. The relays are type **RWH-SH-112D** from [Goodsky](#). They are rated to switch 250VAC at 12A. However, because of the PCB track thickness and width we do not recommend using the relay to switch more than 5A @ 240VAC, 5A @ 110VAC and 5A @ 24VDC. If you want to switch more current then we suggest you solder some heavy duty wire links, on the bottom of the PCB, from the relay contacts to the screw terminal block (effectively in parallel with the PCB track). The terminals blocks are rated 300V / 10A.

To wire a load to the relay contacts using a normally closed contact



To wire a load to the relay contacts using a normally open contacts



INSTALLING THE PIXEL PROGRAMMING SOFTWARE

The Pixel programmer uses a Picaxe 28A microcontroller from Revolution Education. You can download the Program Editor from

<http://www.rev-ed.co.uk/picaxe/software.htm>

or purchase it, data sheets and sample programs on a CD.

To install the software place the Microcontrollers CD in the CD drive of your PC. A window will automatically appear. Click on the button marked Install Programming Editor Software and follow the instructions

Connect a 9pin Female to 9 pin Male RS232 cable from the PC to the microcontroller card and apply power to the card.

Start the Program Editor. Click the View option on the Main Menu and then select Options. A window appears click the Mode tab and then select the PICAXE-28A followed by the OK button.

Enter the following sample program into the editor. It reads analog input 1 and if it is above 128 (2.56Volts) it switches relay 7 on and below turns off relay 7. It then reads digital input 1 and if it is high it switches Relay 8 on and off every 1 second
When you are finished writing the program save it by clicking File and then Save. To run the program click PICAXE on the main menu and then the option Run. The program will connect to the controller and then download the program. After downloading the program to flash memory the program will automatically start running.

Example Program

```
main:
    readadc 0,b0
    if b0<128 then testlow
    gosub highip
    goto chkfl
testlow:
    gosub lowip
chkfl:
    if pin0=1 then flash
    goto main

flash:
    high 7
    pause 1000
    low 7
    pause 1000
    goto main

highip:
    high 6
    return
lowip:
    low 6
    return
```

PICAXE PROGRAMMING

It is a good idea to read the basic programming data sheet for the Picaxe controllers which gives a description of all the programming functions used by the Picaxe 28A. It also gives a number of sample programs with explanations. This document can be found on the CD under \datasheets\AXE001_basic_commands.pdf

It can also be found on the internet at

www.rev-ed.co.uk/docs/axe001_basic_commands.pdf

KIT ASSEMBLY

Solder the resistors into place first. Make sure to get the right ones in the right place. Note the 1.5K resistors R24 to R31 stand vertically. Next solder the LEDs L1 to L8 into place.

Next fit the diode (noting polarity) and the two capacitors. Solder into place the D9 RS232 connector and the terminals. Terminals T1 to T2 are constructed using the four 2 way terminal blocks. Terminals T3 to T9 are constructed using the 3 way terminal blocks.

Solder into place the LM317 regulator and the 2K trimpot R33.

Now connect a +12VDC supply to the terminals marked Vs and COM. Using a multimeter monitor the voltage between pin 20 on IC1 and COM. **Adjust the trimpot R33 set the voltage to read 5.12V**. This is done to ensure the ADC reads 20mV per bit.

Disconnect the +12VDC supply and solder into place the 3 pin 4MHz resonator (just next to R8) and the IC sockets. Note two 14pin IC sockets are used to construct the socket for the 16F872. Finally insert the two ICs into there sockets noting their orientation.

PART	COMPONENT	NUMBER
Resistors and Capacitors		
240	R32	1
1K5	R24-R31	8
4K7	R1-R5	5
10K	R7-R23	17
22K	R6	1
2K 25 turn Trimpot	R33	1
100nF Capacitor	C2-C3	2
Semiconductors		
1N4004 Diode	D1	1
3mm Red Led	L1-L8	8
LM317T	V1	1
PICAXE28A Microcontroller	U1	1
ULN2803	U2	1
4MHz Resonator	X1	1
Relays and Terminals		
RWH-SH-112D Relay	RL1-8	8
3 Way Screw Terminals	T3-T9	12
2 Way Screw Terminals	T1-T2	4
9 pin D Connector	C1	1