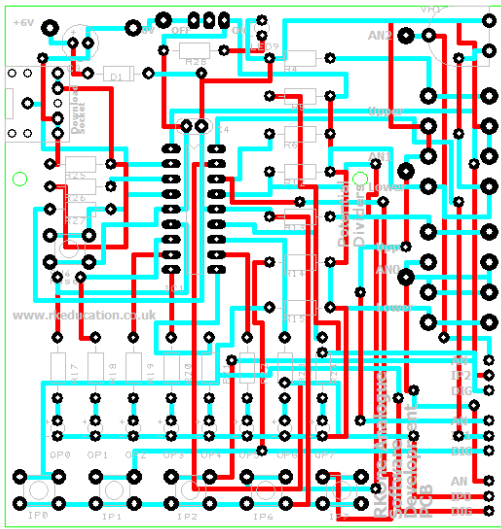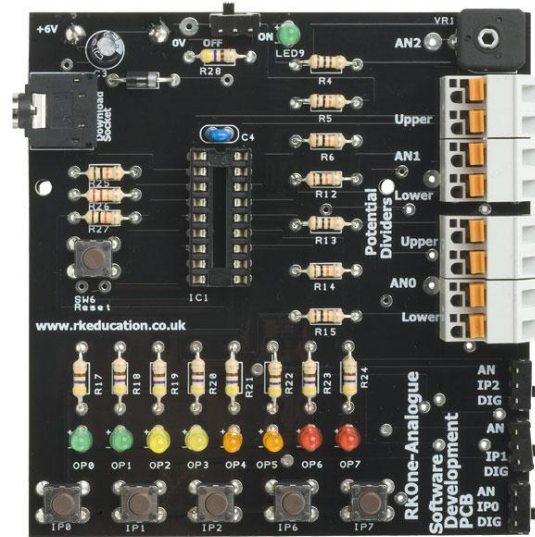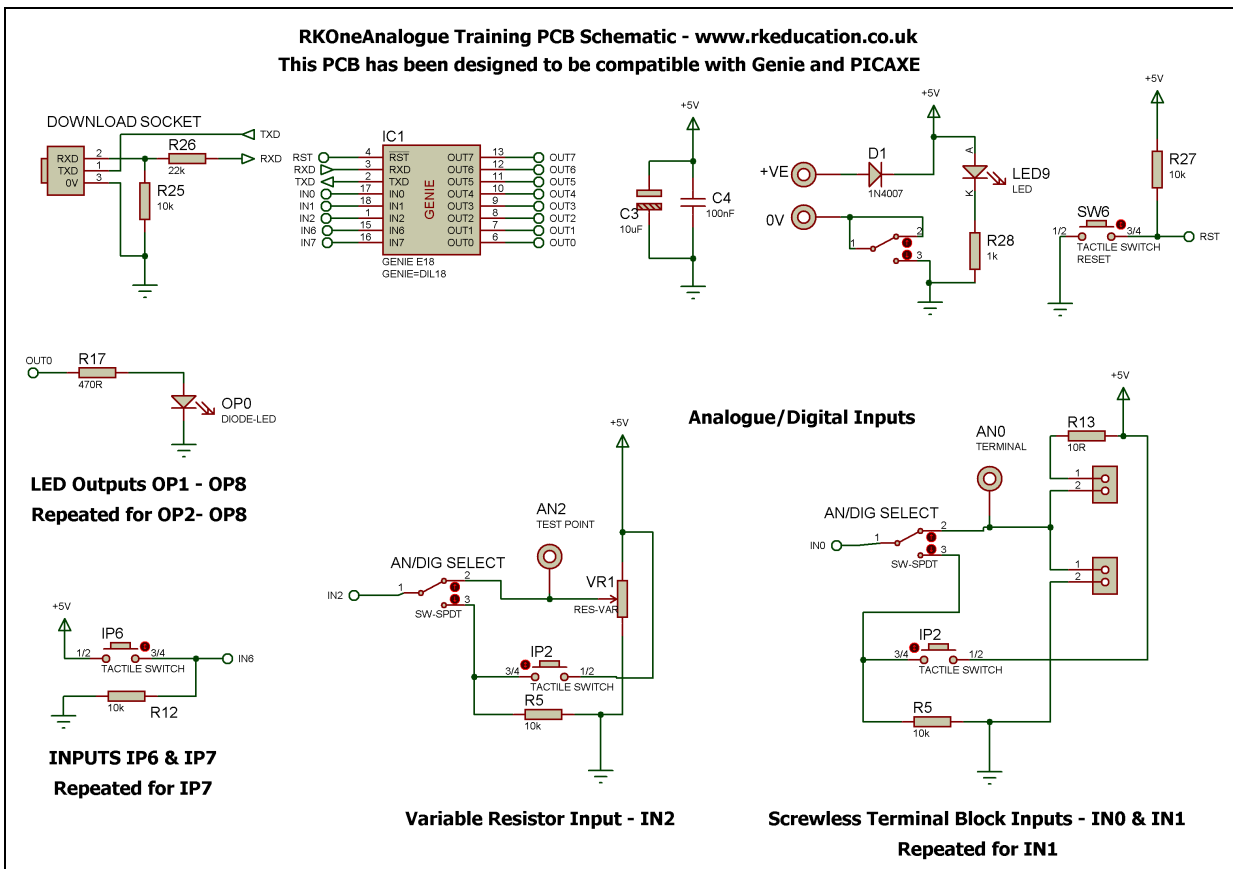# RKOneAnalogue Component List and Instructions

PCB layout

Constructed PCB

Schematic Diagram

Description

The RKOneAnalogue software development PCB has been designed to use 18 pin PIC microcontrollers such as Genie and PICAXE

- Simple, low cost and hand held
- Designed to teach students PICs in a very simple way
- Perfect for testing PIC software
- Compatible with your existing software, e.g. Genie Programming Studio
- Ideal for use in schools when designing PIC based products
- Great for simple PIC projects such as dice, timers, games etc
- Software is downloaded from a PC into the microcontroller via a 3.5mm stereo socket
- Each of the out outputs uses an LED
- Each of the 5 inputs use a tactile switch
- Analogue inputs are included and are accessed using screw less terminal blocks
- Perfect for using potential dividers
- Inputs can be changed between analogue and digital using slide switches
- The clock reference is from an internal resonator
- Powered from 4AA batteries
- High quality, professional double sided PCB
- Power switch and LED power indicator

Component List

Battery box – 4 x AA with PCB leads - **SOLDER LAST!**
C3 – Smoothing cap, 10uF electrolytic or suitable alternative
C4 – IC smoothing cap, 100nF radial ceramic capacitor
Power Switch – Ultra miniature slide switch
Analogue/digital selection switches - Ultra miniature slide switches
Download Socket – 3.5mm stereo socket
D1 – 1N400x
R4, R13 – 10R – (brown, black, black)
R5, R6, R12, R14, R15 – 10k (brown, black, orange)
R26 – 22k (red, red, orange)
R25, R27 – 10k (brown, black, orange)
R17 to R24, R28 – 470R (yellow, violet, brown)
SW6, IP0 to IP7 – 6mm tactile switch
LED9, OP0 to OP7 – 3 or 5mm LED (Not blue or white)
IC1 – 18 pin DIP socket with PIC, e.g. Genie
VR1 – PCB mounting 1k potentiometer/variable resistor
4x 2 way screwless terminal blocks

When constructing always start with the components that have the lowest profile and work high, for example start with the resistors and end on the electrolytic capacitor. For this kit please solder the battery box last, this is very important. The battery box can be secured to the PCB using a hot/cold glue gun or sticky pads.

Instructions

The PCB has been designed to use microcontrollers based on the PIC e.g. Genie, please see the appropriate website

There are 6 areas to familiarize yourself with.

1. Power
2. Software download socket
3. Tactile switch inputs
4. LED outputs
5. Analogue/digital input selection switches
6. IC socket for the PIC/Genie chip

Connecting Power

The first step is to power the PCB, there is a battery box attached to the rear of the PCB and it will take 4AA 1.5V DC batteries, the battery case can be changed for a 4AAA version and it can be powered using a suitable DC power supply but the voltage must not exceed 6V DC. The maximum voltage for a PIC is 5.5VDC, there is a diode that reduces the voltage from 6V by approximately 0.7VDC.

The system can now be turned on using the ultra-miniature slide switch at the top of the PCB, it is marked **ON** and **OFF.** The green power LED should light up, it is below the power switch. If it does not light up it may indicate faulty batteries or power supply, check them carefully or check for a short circuit.

Downloading software into the RKOneAnalogue

Once the software has been written using the Genie Programming Editor (or equivalent) it can be downloaded into the Genie (or equivalent). This is downloaded using a download cable that connects either to your PC's serial port or USB port. Insert the download plug into the download socket and activate the program function in your Programming Editor, if all goes well it will tell you the program download was successful.

If the software has been written correctly and the inputs and outputs (i/o) have been set correctly in your software the PCB will work in the way you planned, if you are a beginner it is always best to start simple and work up, this makes it easier to on out any bugs in your software. For example a good first piece of software would be to toggle an LED, this can be extended to toggling the LED in response to a switch press.

When using download cables please refer to the manufacturer of the cable's website for information on how to use them.

Tactile switch inputs

When pressed the tactile switches connect the +VE supply to the appropriate pin of the PIC, when released there is a PULL DOWN resistor that pulls the input down to 0V. The standard state is 0V, 0V represents a logic 0 and +VE represents logic 1. The inputs are clearly labelled on the PCB.

LED outputs

When a logic 0 is sent to an output LED the LED will not turn on, when a logic 1 is sent to an LED the LED will turn on. An LED is used for each output and these are clearly labelled on the PCB.

Analogue/digital input selection switches

The unit has 3 inputs that can be set as analogue inputs, they are set as either analogue – **AN** or digital – **DIG** using the slide switches situated along the right hand side of the PCB. When set as analogue the value will need to be read in using software, how this is done will depend on the chosen microcontroller e.g. Genie, please see the appropriate website for information on how to do this.

There are 3 analogue inputs and 2 of these are in the form of a potential divider using screwless terminal blocks and the other uses a PCB mounted potentiometer/variable resistor. By using an LDR – light dependent resistor and resistor in a pair of screwless terminal blocks a resistive light sensor can be created, this is as the LDR and resistor form a potential divider. When this is used with the pot a comparator can be made, this would of course have to be done using software. The idea of a resistive sensor can be extended to sensing temperature using a thermistor and resistor or sensing the presence or absence of moisture using a moisture sensor.

The reading from the analogue inputs can then be displayed on the LEDs, for example a bar graph display or 2 LEDs to indicate a high or low reading. There are many different ways to use and display analogue readings.

Located near the Analogue Inputs are test points that allow the user to measure the analogue voltage. To read a voltage use a digital multimeter set to dead DCV and place the black probe at 0V, near the power switch and the red probe on the appropriate analogue test point, AN0, AN1 or AN2.

**IC Socket for PIC Microcontroller**

This PCB has been designed to use PIC microcontrollers, specifically Genie and PICAXE. In order for the unit to function a Genie or PICAXE will need to be inserted into the IC socket. For instructions on using your chosen device please see the appropriate website for guidance.
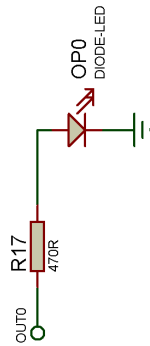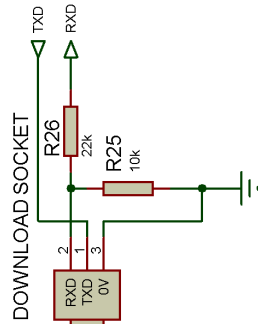
Please visit our website

www.rkeducation.co.uk

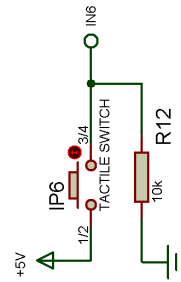If you have any comments or queries please email us at

technical@rkeducation.co.uk
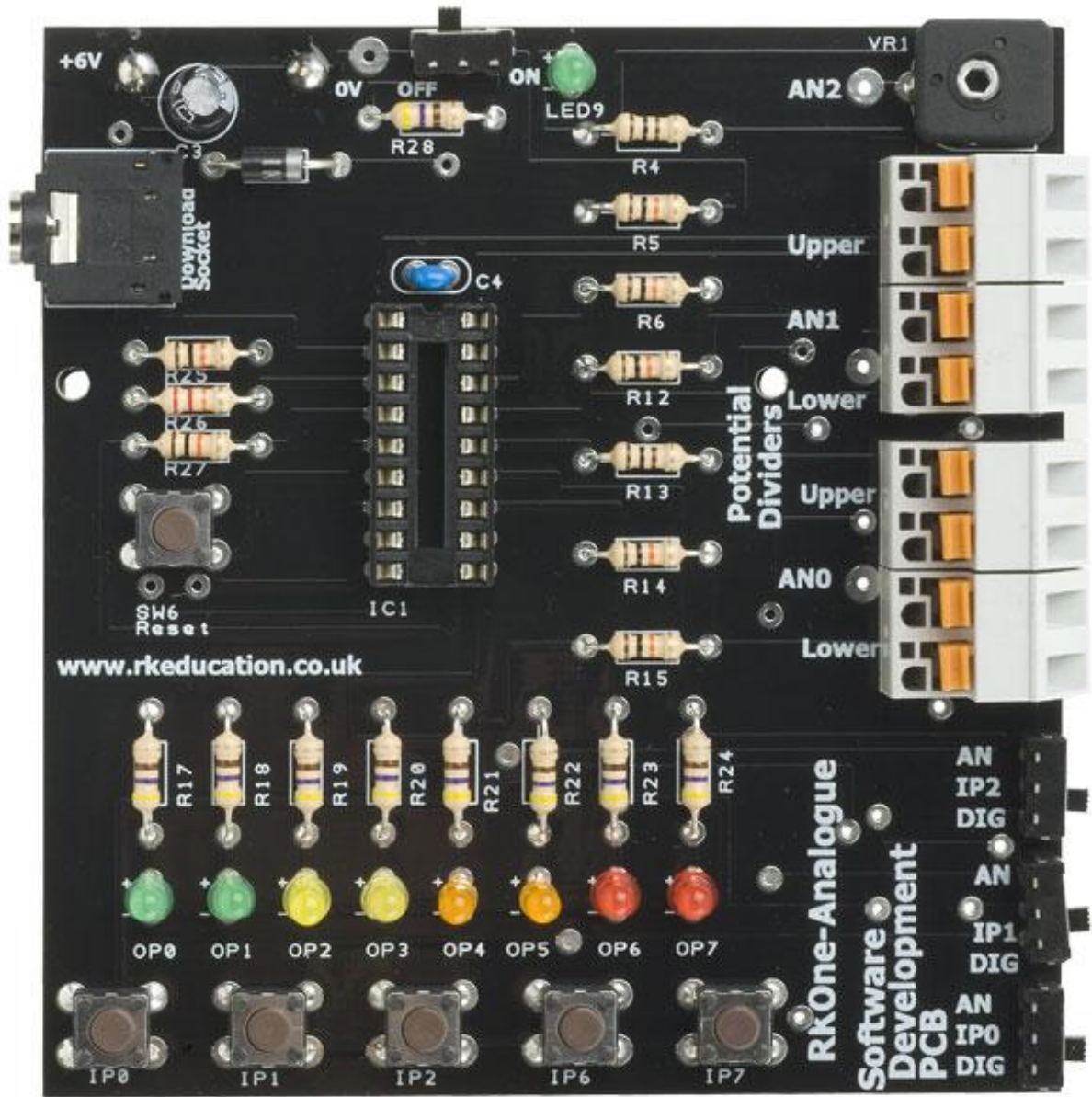
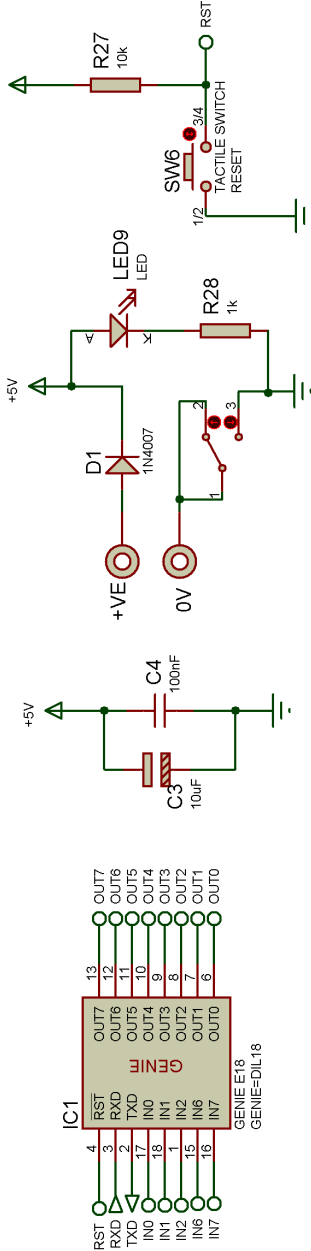**RKOneAnalogue Training PCB Schematic – www.rkeducation.co.uk**

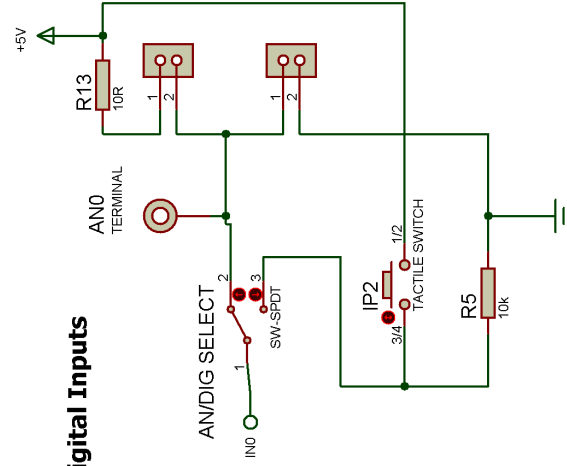**This PCB has been designed to be compatible with Genie and PICAXE**

Analogue/Digital Inputs

Screwless Terminal Block Inputs – IN0 & IN1

Repeated for IN1

Variable Resistor Input – IN2

LED Outputs OP1 – OP8

Repeated for OP2- OP8

INPUTS IP6 & IP7

Repeated for IP7