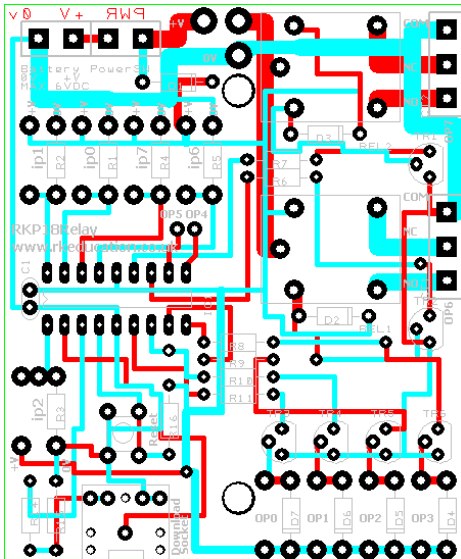
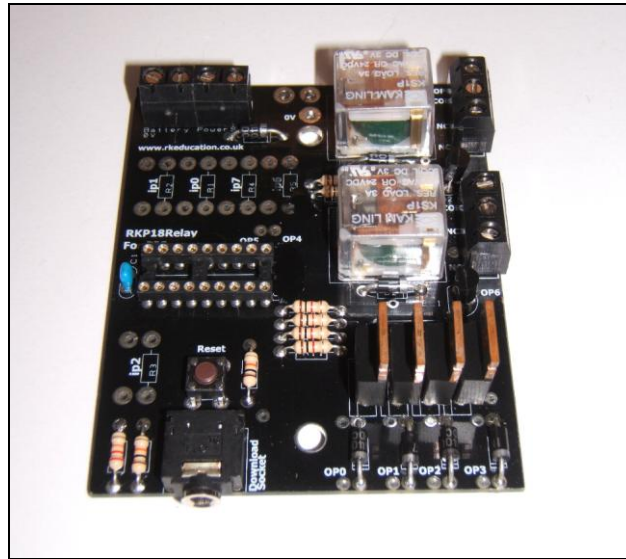


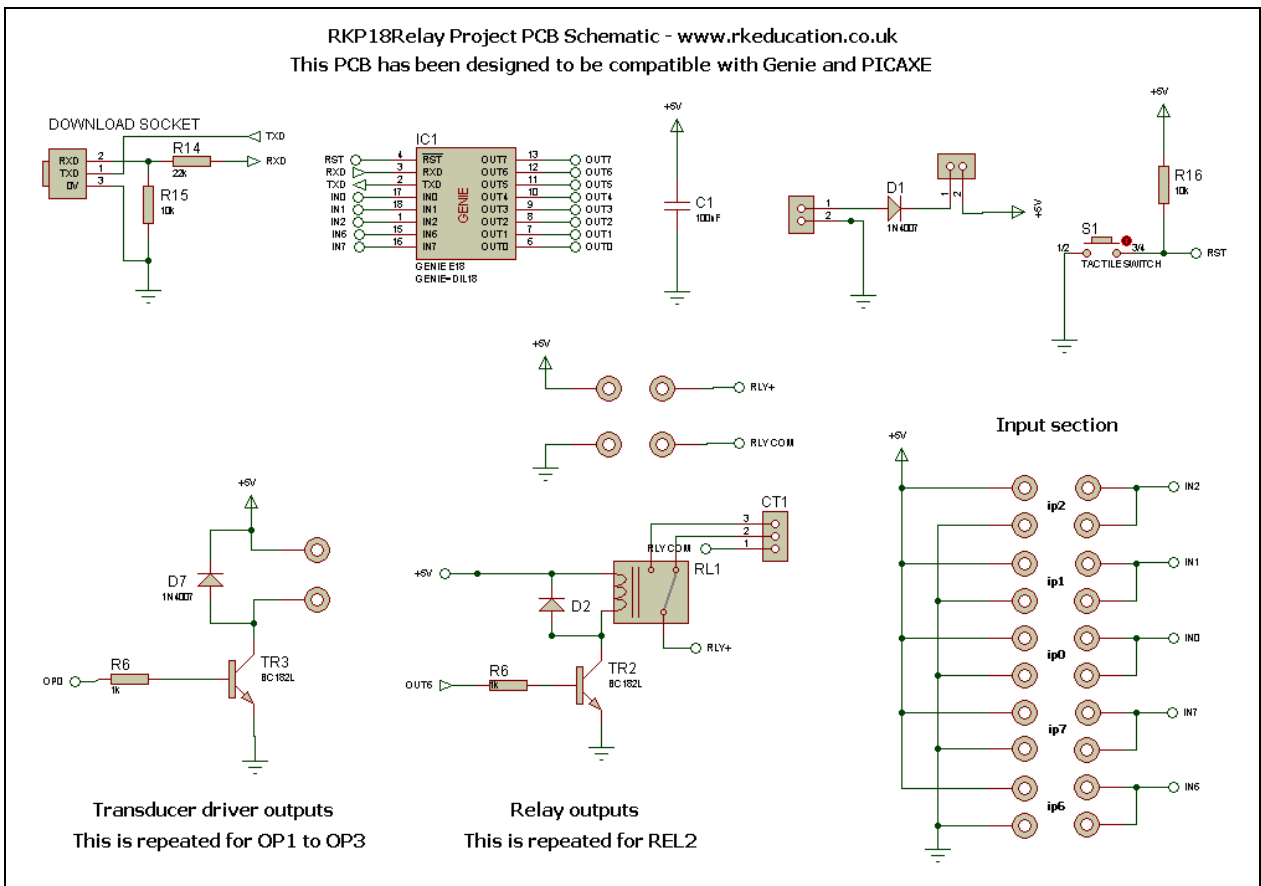
# RKP18Relay Component List and Instructions



PCB layout



Constructed PCB



Schematic

## Description

The RKP18Relay project PCB has been designed to use PIC microcontrollers such as the Genie or PICAXE

- Software is downloaded from a PC into the microcontroller via a 3.5mm stereo socket
- The clock reference is from the microcontroller's internal resonator
- 2 outputs are connected to 3A Kam Ling SPST relays
- Power to the relay contacts can either be from the main power supply or from an external source
- 4 outputs are connected to BC182L NPN transistors
- 2 outputs are low power and accessed via a pad next to the corresponding pins
- 5 potential divider inputs, 3 can be used as analogue
- 1 input can have a PCB mount potentiometer directly mounted

## Component List

BAT & PWR SW - 2 way 5mm pitch terminal blocks

C1 - 100nF multilayer ceramic capacitor

CT1 ~ CT2 - 3 way 5mm terminal block

D1 ~ D7 - 1N4007

IC1 - 18 way DIP socket with microcontroller e.g. Genie

R6,R7 R8 ~ R11 - 1k brown black red

R14 - 22k red red orange

R15 ~ R16 - 10k brown black orange

REL1 ~ REL2 - Kam Ling KS1P SPCO relay

RESET - PCB mounting tactile switch

Software download socket - PCB mount 3.5mm stereo connector

TR1 ~ TR6 - BC182L

## Instructions

For instructions on using your chosen microcontroller, e.g. Genie please see the appropriate website.

### Connecting Power

The power is connecting the terminal block marked Battery, the 0V input, usually black is put in the left hand terminal and the +VE, usually red, is put in the right hand terminal, a regulated 6VDC power supply should be used.

A power switch can be used and should be inserted into the terminal block marked Power SW, if a power switch is not required short the terminals together

Power to the relay contacts can either be internal or external, if you want to use the internal supply, that is the +6VDC on the BAT terminal block, then short the pads to the right of +V together. If you want to use an external power supply connect the 0VDC to the 0V pad and the +VDC to pad directly, alternatively the 0VDC from the external power supply could be inserted into the 0V of the Battery terminal block.

## Downloading software

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.

## Using the relays

The relays are energised by powering the transistors TR1 and TR2, this is done by turning on the output pins output 6, 7 on the microcontroller. When a relay is energised a click can be heard and when it returns to its non energised state a further click can be heard, the movement can be seen in the top of the relay.

Each relay has 3 connections that are located on the 3 way terminal block, they are called COM – common, NC – normally connected and NO – normally open. When the relay is not energised there is a circuit between COM and NC and when the relay is energised there is a circuit between COM and NO. To power a DC motor connect one lead to COM and one to NC, the motor will be powered until the relay is energised and the circuit changes to between COM and NO, if the motor leads were between COM and NO then this would be reversed.

## FET outputs

The FETs can be turned on by sending a +VE output from the microcontroller, by sending a logic 1 from the software to the appropriate output pin.

Each of the FET outputs has a back EMF protection diode and as such a DC motor can easily be added, simply insert the cables from the motor into the appropriate terminal block, please note a capacitor will need to be used on the motor terminals.

They are connected to the microcontroller as follows,

B0 – FET1 – pin6  
B1 – FET2 – pin7  
B2 – FET3 – pin8  
B3 – FET4 – pin9

To use an output simply attach flying leads to the appropriate output terminal block.

There are a further 2 outputs available that are connected to the output pins of B4 (pin 10) and B5 (pin 11), they are labelled op4 and op5 and are 2 through holes located near IC1, output a logic 0 or 1 from your software to use these.

## Inputs Ip0 ~ Ip7

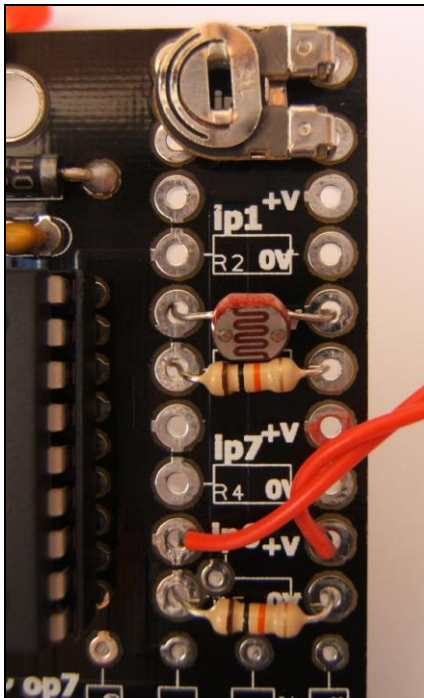
These are used as digital inputs and Ip0, Ip1 and Ip2 can also be used as analogue inputs. They are arranged as potential dividers with the +V and 0V parts clearly marked, the centre of the potential divider or output are the 2 pads to the left hand

side of the potential divider. Ip2 has been designed to allow a PCB mounting potentiometer to be soldered directly to the PCB.

They are connected to the microcontroller as follows,

ip0 – pin17  
ip1 – pin18  
ip2 – pin1  
ip6 – pin15  
ip7 – pin16

**Please see below for an example of using inputs**



Here the input section can be seen close up. It can be seen from ip1 that the inputs are set up as potential dividers and the +V and 0V are clearly labelled.

For the preset resistor 1k has been used, it is not recommended to use a high value as it will affect the a2d conversion. The analogue value from the preset can be read using the appropriate function in your software. Ip2 has been used.

The LDR and resistor can be used to detect when it is light or dark. This can be done with an a2d conversion but as the LDR has a very wide resistance range it can also be read like a digital switch. Ip0 has been used.

The PTM switch and 10k pull down resistor would be read as a digital signal, either on or off. The state of the switch would be read in software as high or 1 for pressed and low or 0 for not pressed. It is important to use a pull up or pull down resistor and if the switch and resistor were reversed then a press would give a 0 or low signal.

Please visit our website

[www.rkeducation.co.uk](http://www.rkeducation.co.uk)

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