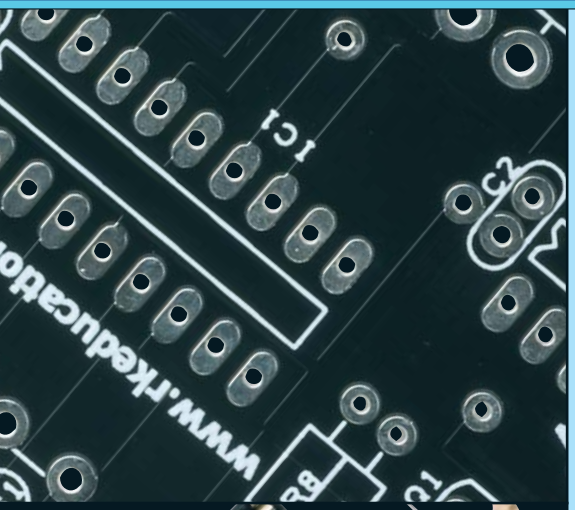
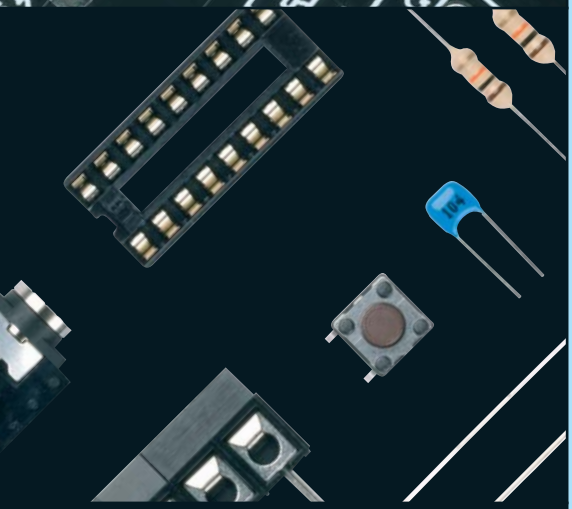
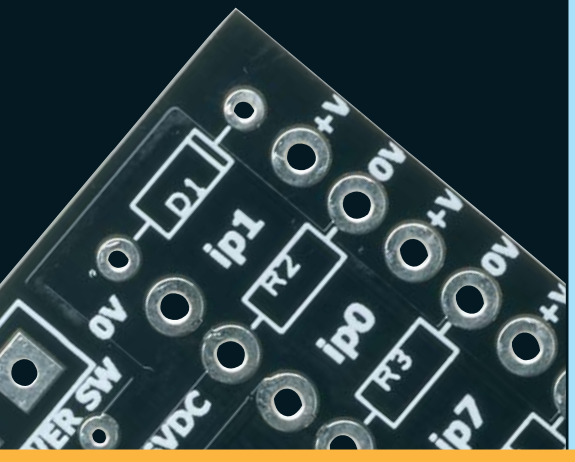
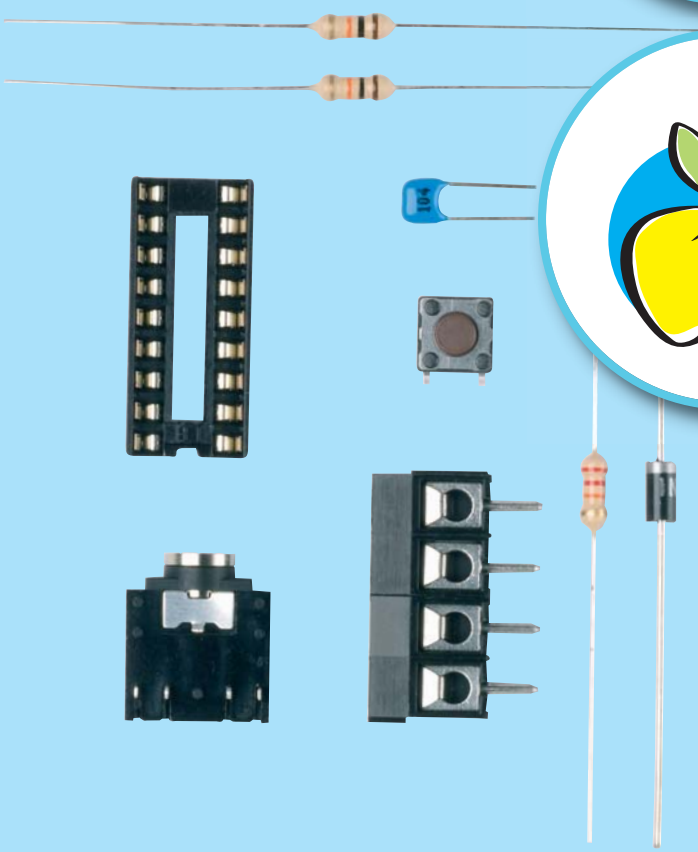
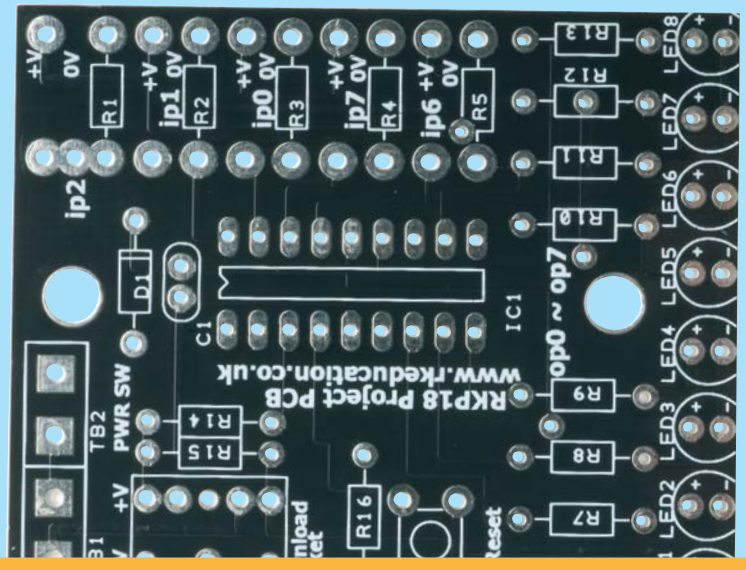
RKP18 Motor project board









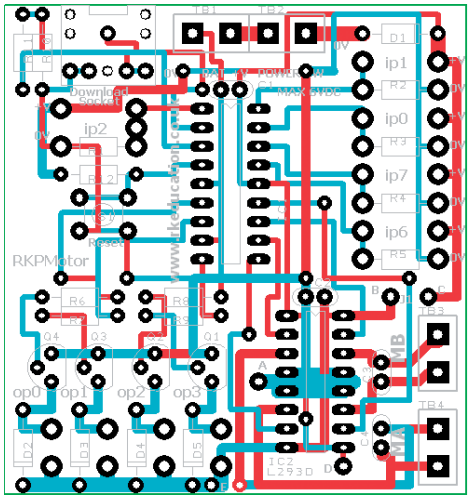


Component list and instructions for:

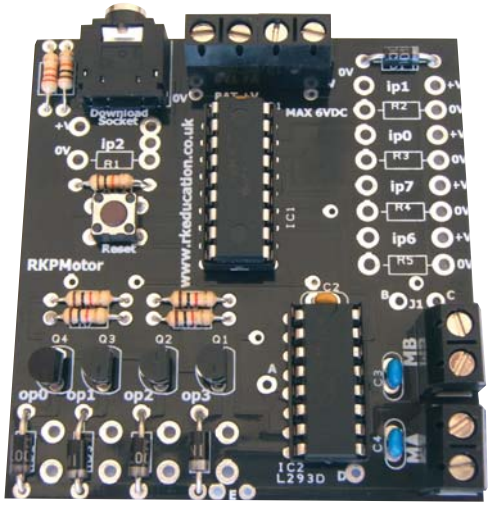
RKP18 Motor project board 70-6003

Rapid

RKP18 Motor component list and instructions



PCB layout



Constructed PCB

Description

The RKP18 Motor project PCB has been designed to use PIC microcontrollers such as the Kicchip – **www.kicchip.co.uk** – the microcontroller shown here is a kicchip.

- The software is downloaded from a PC into the microcontroller via a 3.5mm stereo socket
- The clock reference is from the microcontrollers internal resonator
- 4 outputs are connected to a L293D h-bridge driver chip
- Motors attached via terminal blocks
- 4 outputs are connected to BC182 transistors
- Transistor outputs have back EMF diodes
- 5 potential divider inputs, 3 can be used as analogue
- Ip2 can have a PCB mount potentiometer directly mounted

Component list

BAT & PWR SW – 2-way 5mm pitch terminal blocks
C1, C2 – 100nF multilayer ceramic capacitor
C3, C4 – 220nF multilayer ceramic capacitor
TB3, TB4 – 3-way 5mm terminal block
D1 ~ D5 – 1N4007
IC1 – 18-way DIP socket with microcontroller e.g. kicchip
IC2 – 16-way DIP socket with L293D
R6 ~ R9 – 1k brown black red
R11 – 22k red red orange
R10, R12 – 10k brown black orange
S1 – RESET – PCB mounting tactile switch
Software download socket – PCB mount 3.5mm stereo connector
Q1 ~ Q4 – BC182 transistors
Add a wire link between pads **B** and **C**

Instructions

For instructions on using your chosen microcontroller, e.g. kicchip, please see the appropriate website – **www.kicchip.co.uk**

Connecting power

The power is connected to 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 6V DC power supply should be used.

A power switch can be used and should be inserted into the terminal next to the battery terminal block, if a power switch is not required short the terminals together.

Using the L293D

The L293D is an h-bridge drive chip, for more information on this chip please refer to a datasheet for this device.

The L293D powers two motors at up to 600mA each or 1 motor up to 1.2A, motors are reversible, the outputs to the motors are clearly marked MA and MB. The motors are controlled by sending appropriate output signals from the microcontroller to the L293D, the L293D is already enabled. Use the following as a guide,

Microcontroller		L293D	
Pin-10	to	pin-7	MA
Pin-11	to	pin-2	MA
Pin-12	to	pin-15	MB
Pin-13	to	pin-10	MB

Both inputs low	- motor stop
First output high, second output low	- motor forward
First output low, second output high	- motor reverse
Both inputs high	- motor stop

To attach a motor simply screw the flying leads from the motor into the appropriate terminal block.

Please note that if you use the L293D near to its maximum limits then a heat sink will need to be used.
A number of pads have been added to allow users to change the power supply to the outputs, changing this is not recommended for beginners.

Transistor Outputs

The BC182 transistors 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 BC182 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 PCB pads, please note a capacitor will need to be used on the motor terminals.

They are connected to the microcontroller as follows,
B0 – op0 – pin-6
B1 – op1 – pin-7
B2 – op2 – pin-8
B3 – op3 – pin-9

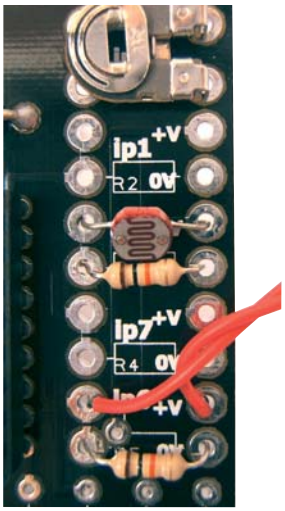
To use an output simply attach flying leads to the appropriate PCB pads.

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 – pin-17
Ip1 – pin-18
Ip2 – pin-1
Ip6 – pin-15
Ip7 – pin-16

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.

If you have any comments or queries please email us at

tech@rapidelec.co.uk