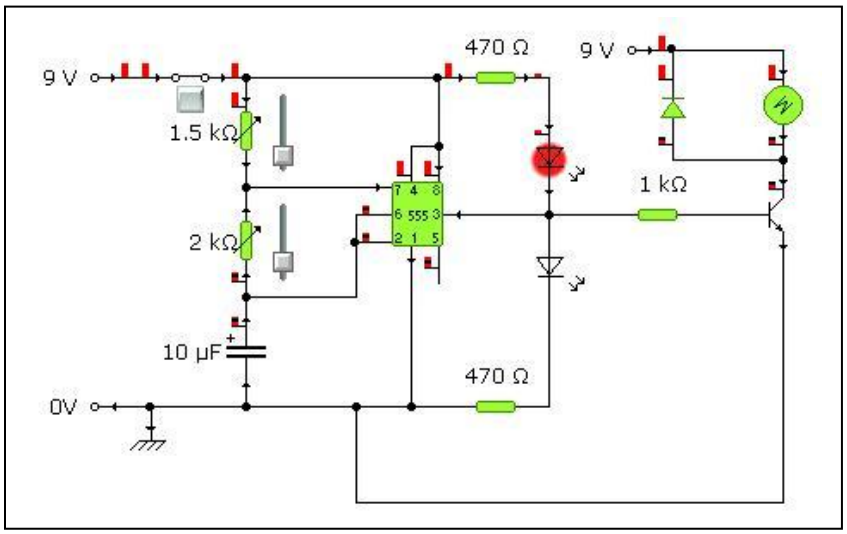
Circuit Construction – 555 Timer Astable Project

The circuit diagram on the right is the circuit for your project, it is called a 555 timer astable circuit, it is called a astable circuit as it has no stable state, its output changes between +VE and 0V, if 2 LEDs are used this would be seen as a constant flashing.

The frequency of this can be calculated using a formula and is determined by the values of the timing components, the timing resistors and timing capacitor.

The speed of the motor is varied according the frequency of the astable.



Circuit example, see below for a schematic

Construction of circuit

You will need to collect the following equipment before you start soldering your circuit:

- Soldering iron and stand
- Damp sponge
- Solder wire
- Side cutters
- Pliers
- Components:

Q1 – BFY51 transistor
C1 – 100nF capacitor**
C2 – 10uF capacitor**
C3 – 10uF capacitor*
D1 – 1N4007 diode**
IC1 – IC holder and 555 timer IC
R1 – 1k resistor (brown, black, red)**
R2, R3 – 470R resistor (yellow, violet, brown)
R4, R5 – These can be fixed resistors or an LDR or thermistor
R6 – 0R
VR1, VR2 – 2k preset resistor*
Power switch
Battery – Battery clip, a terminal block may be used
Output – A terminal block should be used here, your output can be insterted into the terminal block
LEDs – The LEDs used will depend on your project outcome

If a higher quality finish is required then use 5mm 2 way terminal blocks, these will add extra cost

* These components can be varied
** These components can be left out

This project PCB has been designed with maximum flexibility in mind and how it is constructed will depend on what it is you are aiming to achieve with it, for example a teacher or lecturer completing a project with a number of students will probably use it in a different way to a hobbyist with a specific task in mind. The circuit has a drive circuit that utilises a BFY51 transistor but if it is not required it is quite acceptable to leave this section out. If a Piezo sounder is required a PCB mount piezo can be inserted into the component marked output, a shorting link or 0R resistor will need to be used to connect pin 3 of the 555 timer to the buzzer. This should be soldered between the lower part of R1 and the lower part of D1. The circuit has space for 2 LEDs but 1 can be left out as required and if an output is being used then they both may be left out. If an output is being used, for example a DC motor then this should be inserted into the terminal block marked **Output**, a back EMF diode has been included. To allow the time to be varied the circuit uses variable resistors – VR1 and VR2, these can either be PCB mount or an external panel mount type, VR1 and VR2 can also be replaced with fixed resistors or resistive sensors such as a thermistor. There is a fixed resistor R6 that can make the circuit behave in a different way, if this is not required use a 0R resistor. How the circuit is constructed is very much dependent on what it is being used for and calculations will need to be made using the following formulas.

$$f = \frac{1.4}{(R1 + 2R2) \times C1}$$

and

$$T = 0.7 \times (R1 + 2R2) \times C1$$

T = time period in seconds (s)
f = frequency in hertz (Hz)
R1 = resistance in ohms (Ω)
R2 = resistance in ohms (Ω)
C1 = capacitance in farads (F)

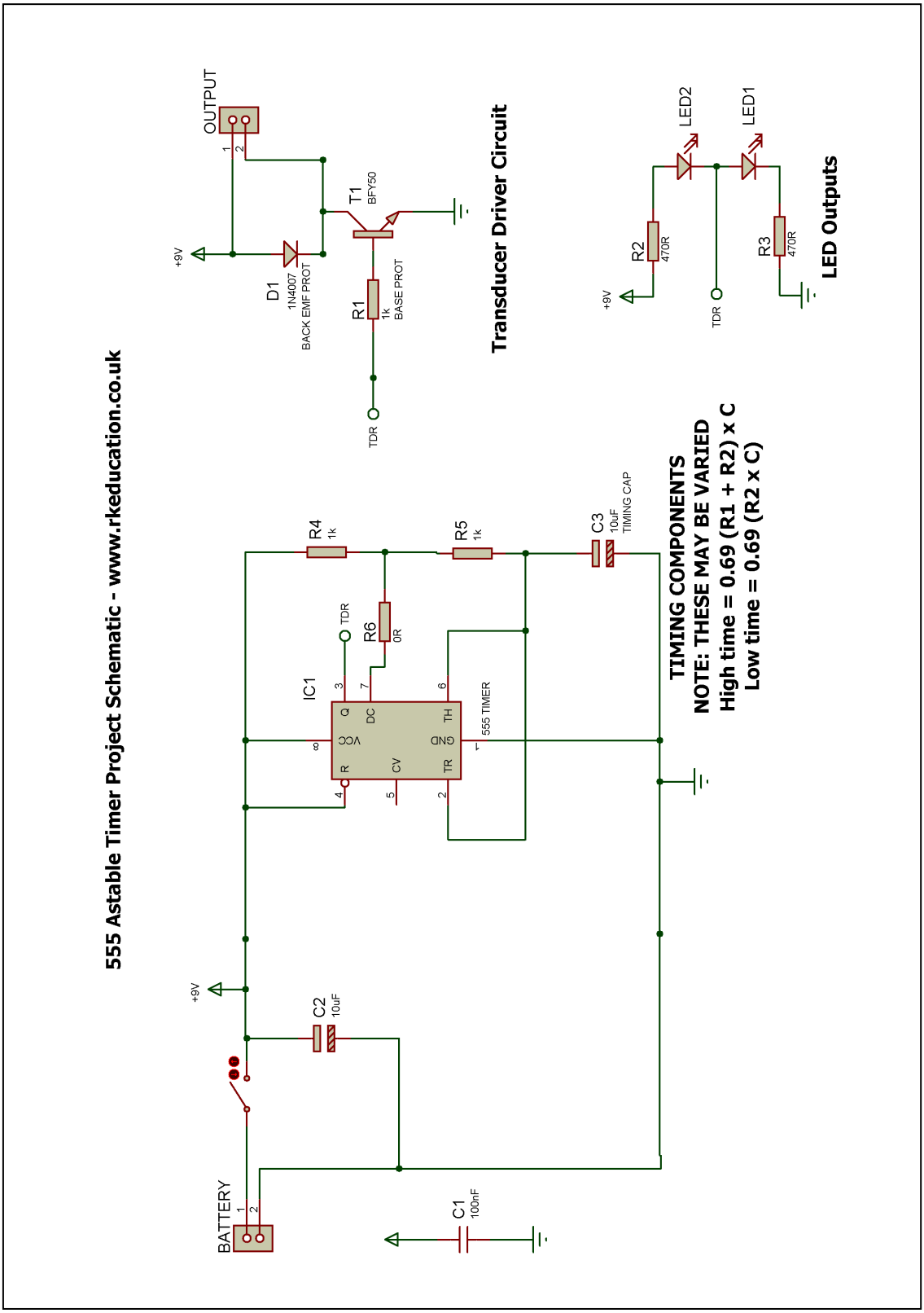
Procedure for construction

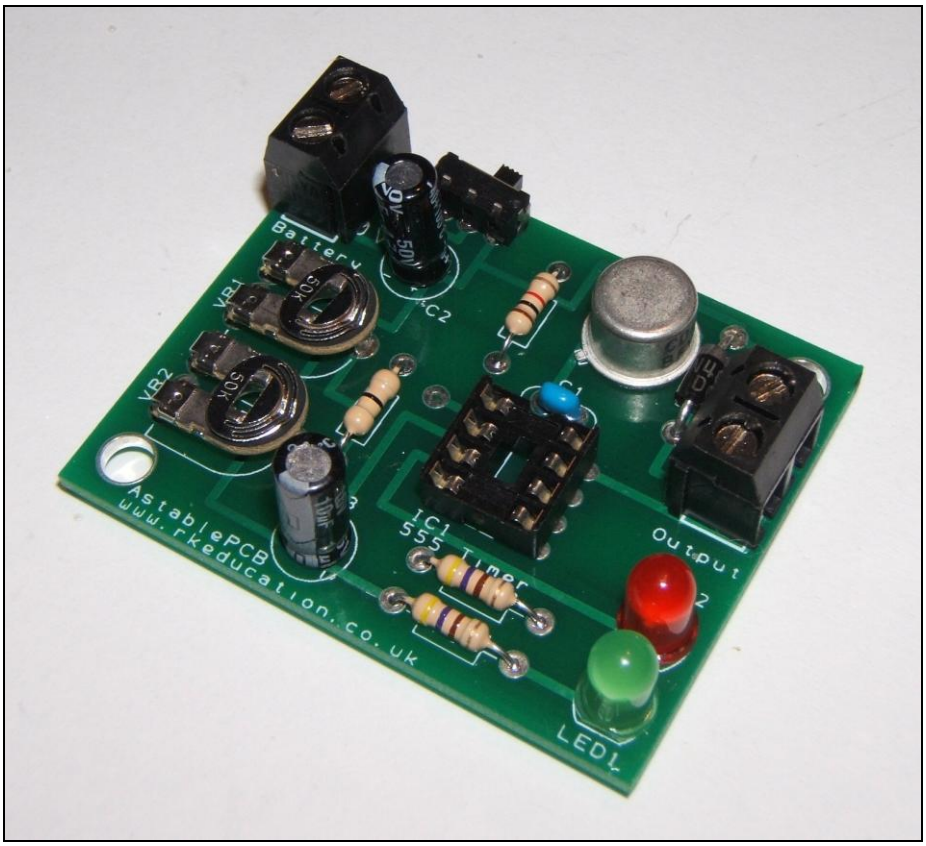
1. Solder the resistors into your PCB, take care to insert the correct resistor into the correct place, if in doubt ask your teacher. When soldering be sure to heat the area sufficiently but not too much as it will damage the PCB.
2. Solder the remainder of the PCB mounting components in place.
3. Solder your power switch in place
4. Solder your battery clip in place
5. Solder your LEDs into the PCB, if you have attached flying leads insert these, be sure to get the LED the correct way around, remember the long and short legs…

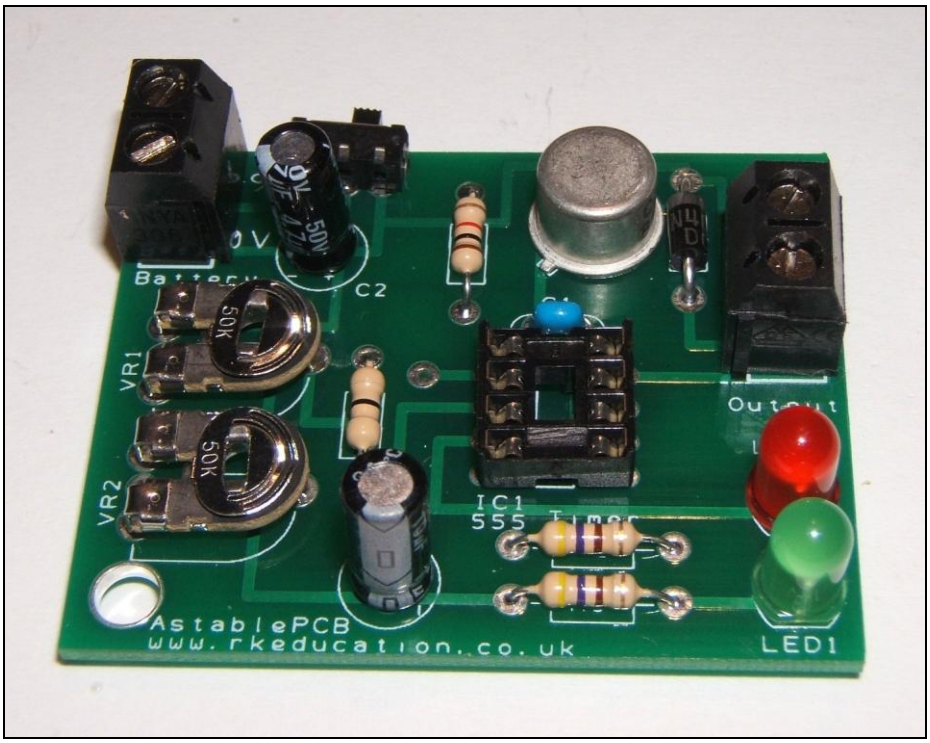
The order in which you solder and what you solder is dependent on your final outcome, always start with the lowest profile components, e.g. resistors.

Please visit our website
www.rkeducation.co.uk

If you have any comments or queries please email us at
technical@rkeducation.co.uk


555 Astable Timer Project Schematic - www.rkeducation.co.uk
Transducer Driver Circuit
LED Outputs
TIMING COMPONENTS
NOTE: THESE MAY BE VARIED
High time = 0.69 (R1 + R2) x C
Low time = 0.69 (R2 x C)
OUTPUT
BATTERY
+9V
D1
1N4007
BACK EMF PROT
T1
BFY50
R1
1k
BASE PROT
TDR
LED2
LED1
R2
470R
R3
470R
R4
1k
R5
1k
R6
0R
C3
10uF
TIMING CAP
IC1
555 TIMER
C2
10uF
C1
100nF


Battery
VR1
50K
VR2
50K
C2
IC1
555 Timer
Output
LED1
AstablePCB
www.rkeducation.co.uk


VR1
50K
VR2
50K
C2
IC1
555 Timer
LED1
AstablePCB
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