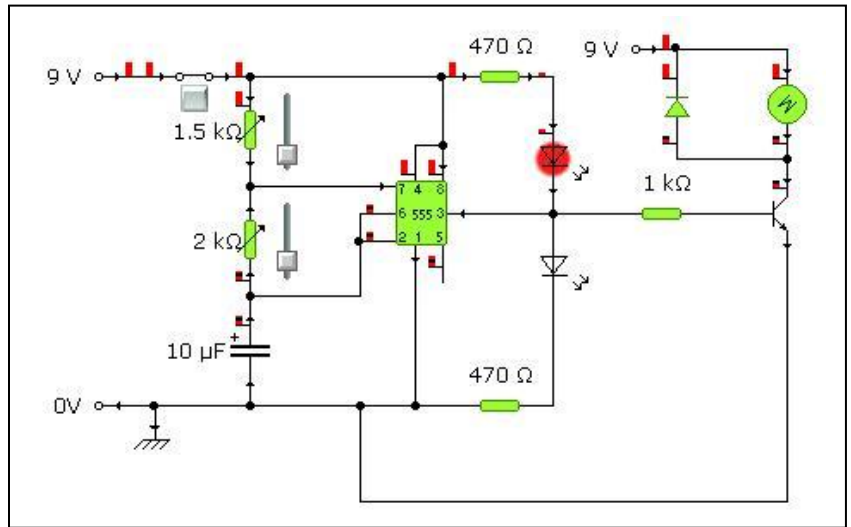


Circuit Construction – 555 Timer Astable Project

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 with a damp sponge
- Solder wire
- Side cutters and 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
 - BZR - 0R resistor for use with piezo sounders
 - VR1, VR2 – 2k preset resistor* (various types can be used)
- Power switch
- Battery – Battery clip, a terminal block may be used
- Output – A terminal block should be used here, your output can be inserted into the terminal block
- LEDs – The LEDs used will depend on your project outcome

If a higher quality finish is required then use terminal blocks

* These components can be varied

** These components can be left out

C3, VR1, VR2 have been drilled to allow various different types of these components to be used. For example different pitch caps and single turn or multi-turn pots. See below for a PCB layout design image.

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. Resistor BZR has been included to allow a piezo sounder to be added, when using a piezo add a 0R resistor to BZR and insert the terminals or leads from the piezo into the output terminals, when doing this D1, R1 and T1 can be left out of the circuit.

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...

Please visit our website
www.rkeducation.co.uk

If you have any comments or queries please email us at
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