

555 Based Timer

1. Overview

This document describes step-by-step instructions to set up a rectangular wave generator circuit using 555 timer IC. Aim is to rig up the circuit and observe the waveforms using a CRO.

2. Components required

i. 555-timer IC

It is an 8 pin IC, pins are numbered as shown in Fig 1. A small notch is provided (as shown in figure) on one side of the IC for referencing the pin numbers.

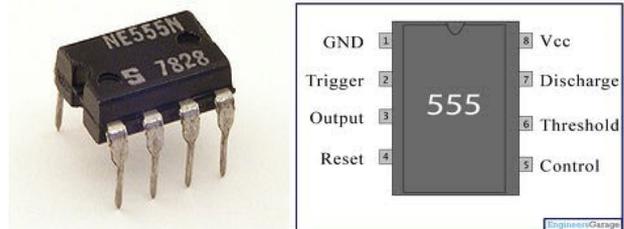


Fig 1. 555 Timer IC

ii. Wires

iii. Power Supply of +5V DC. Black wire is GND and Brown wire is +5V.

iv. LED

LED has two terminals and the shorter terminal should be always connected to ground. Fig 2 shows a LED used in this set-up.



Fig 2. LED

v. Capacitors (10nF and 0.1uF [2 nos])

This set-up makes use of three capacitors:

- A. 10nF B. 0.1uF (2 nos)

All the 3 capacitors are Ceramic type capacitors as shown in Fig 3. Ceramic capacitor printed with “103” on its brown surface is the capacitor A(10nF) and that with “104” printed is capacitor B(0.1uF).



Fig 3. Ceramic Capacitor

vi. Resistors (4.7kΩ [2 nos] and 1kΩ)

This set-up makes use of 3 resistors – 4.7kΩ (2 nos) and 1kΩ. An 1kΩ resistor is shown in Fig 4. The value of the resistor can be calculated by the band of colours appearing on the resistors. There are four equally spaced colour bands on the resistor. For ease of calculation, colour band pattern of each of these resistors is as follows :



Fig 4 : 1kΩ Resistor

- | | |
|-------|-----------------------------------|
| 4.7kΩ | - Yellow-Violet-Red-Golden/Silver |
| 1kΩ | - Brown-Black-Red-Golden/Silver |

vii. Bread Board

A breadboard is a construction base for prototyping electronic circuits. It consists of small holes in a matrix fashion as shown in Fig 5. The leads of most components can be pushed straight into the holes. ICs are inserted across the central gap with their notch or dot to the left.

The top and bottom rows are linked horizontally all the way across as shown by the red and black lines on the diagram. The other holes are linked vertically in blocks of 5 with no link across the centre as shown by the blue lines on the diagram.

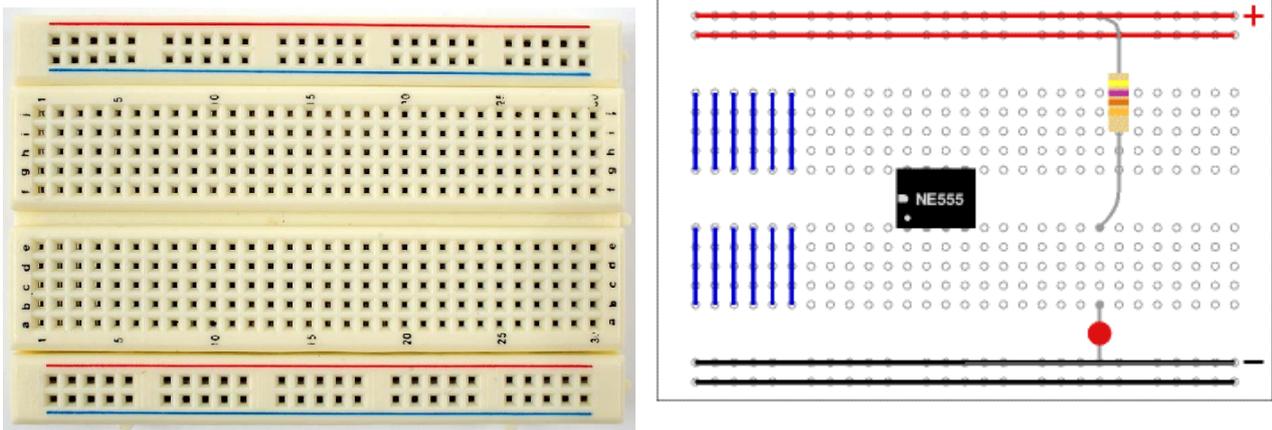


Fig. 5: Breadboard

3. Procedure to rig-up 555 based 1 sec timer system

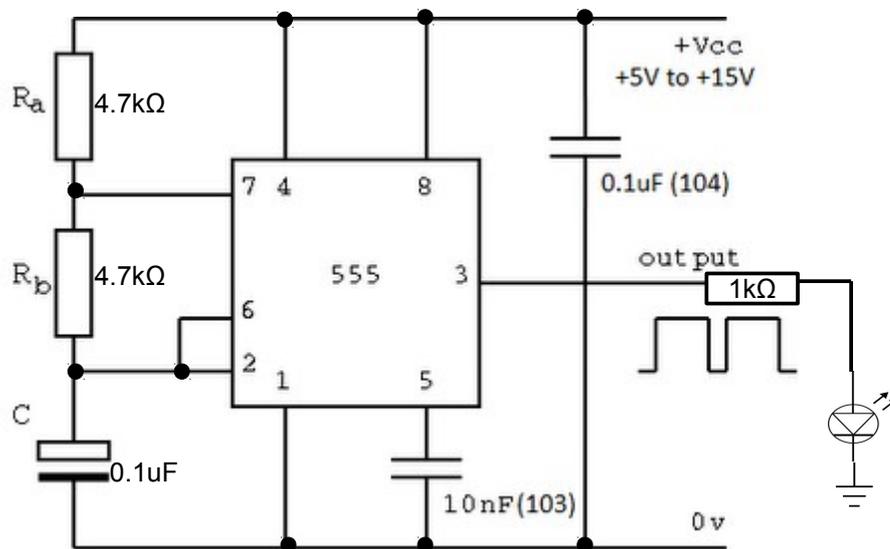


Fig 7: 555 based 1sec LED Blink timer circuit

(a) Place the IC 555 on the breadboard with its pins 5-8 on row E and pins 1-4 on row F of the breadboard as shown in Fig 8.

(b) Connect a wire (black) between pin 1 of IC 555 (GND) and the bottommost row of the Breadboard. This bottommost row will be used as circuit ground.

(c) Connect a wire (red) between pin 8 of IC 555 (VCC) and the topmost row of the Breadboard. This topmost row will be used as circuit VCC.

(d) Connect a wire (red) from Pin 4 to VCC (VCC row on Breadboard).

(e) Connect a $4.7\text{k}\Omega$ resistor between pin 7 and VCC.

(f) Connect a $4.7\text{k}\Omega$ resistor between pin 6 and pin 7.

(g) Connect a wire (green) between pin 2 and pin 6.

(h) Connect a $0.1\mu\text{F}$ capacitor (Capacitor B) between pin 2 and Ground (Ground row on Breadboard).

(i) Connect a 10nF capacitor (Capacitor A) between pin 5 and Ground. Most probably its leads are too short to connect directly, so put in a wire (black) link between Ground and an unused block of holes nearby and connect the other end of the capacitor to that.

(j) Connect a $0.1\mu\text{F}$ capacitor (Capacitor B) between VCC and Ground.

(k) Connect one end of $1\text{k}\Omega$ resistor to pin 3 of 555; connect the shorter pin of LED to the Ground. Now connect other end of $1\text{k}\Omega$ and longer pin of LED together. Use a free vertical column to connect them together.

(l) Turn on the power supply. Measure and record the voltage using a multi-meter and ensure that it is 5V. Connect +5V(VCC) from power supply to upper most row and GND from power supply to the bottommost row.

(m) A snapshot of the entire setup is as shown in Fig 9.

(n) Switch ON the power supply. LED will glow on if the circuit is rigged up correctly. Observe the waveforms from Pin 2 and GND on CRO. Also observe the waveform from Pin 3 and GND on CRO. Record shape of the waveform, peak-to-peak voltage and frequency in both the cases.

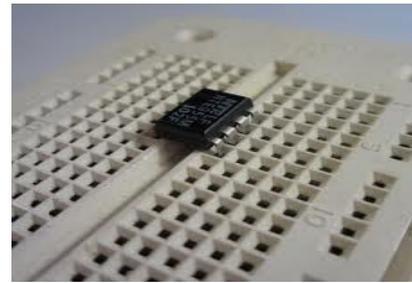


Fig 8:Placing IC 555 on breadboard

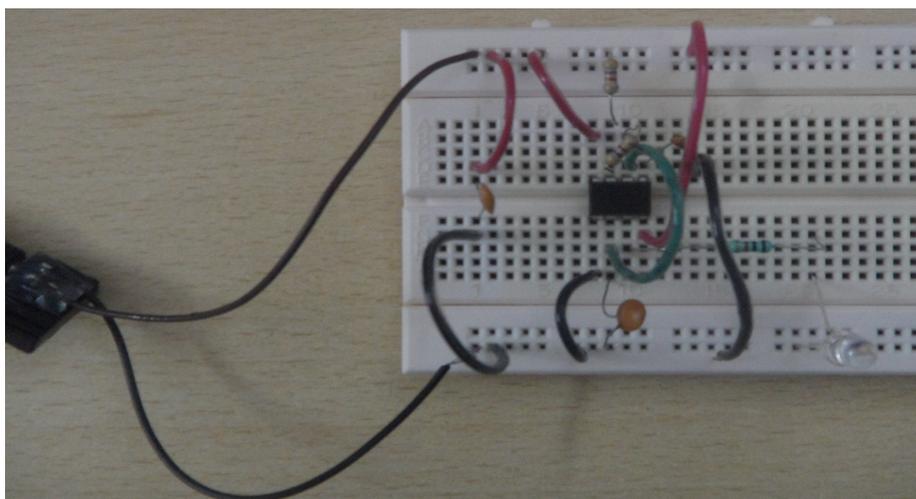


Fig 9: Snapshot of 555 timer set-up