

In this lab we created a 555 timer circuit on a solderless breadboard using readily available circuit components and 2 different timers, the LMC 555 and the NE555. The objective of this lab was to gain experience building the circuits by hand and learning how to use the scope to take measurements. We used the following schematic to build the circuit with values of $R_A = 1k \text{ Ohm}$, $R_B = 1k \text{ Ohm}$, and $C_1 = 1\mu\text{F}$.

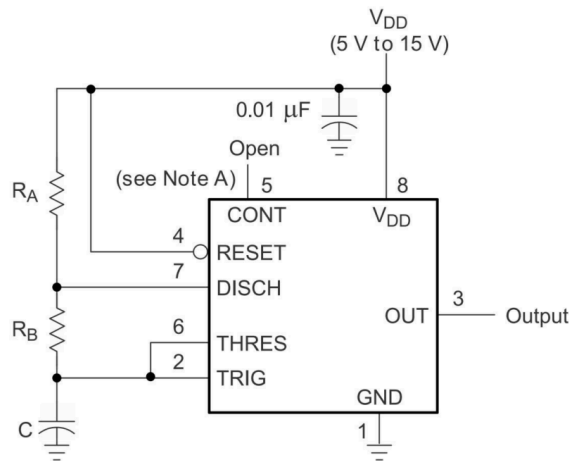


Figure 1: Schematic of 555 Timer Circuit from the Lab Manual.

The values chosen gave us an expected frequency of 500hz. This value was derived using the following formula from the datasheet of the LMC 555:

$$f = \frac{1}{T} = \frac{1.44}{(R_A + 2R_B)C} = 480\text{Hz}$$

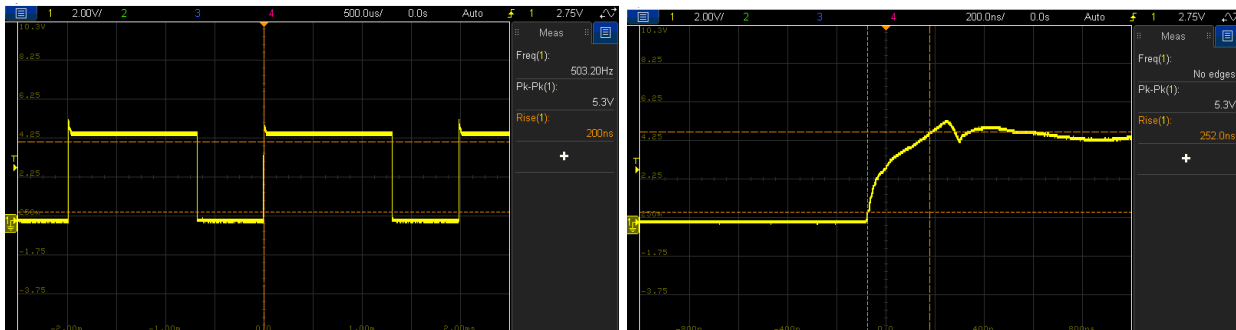
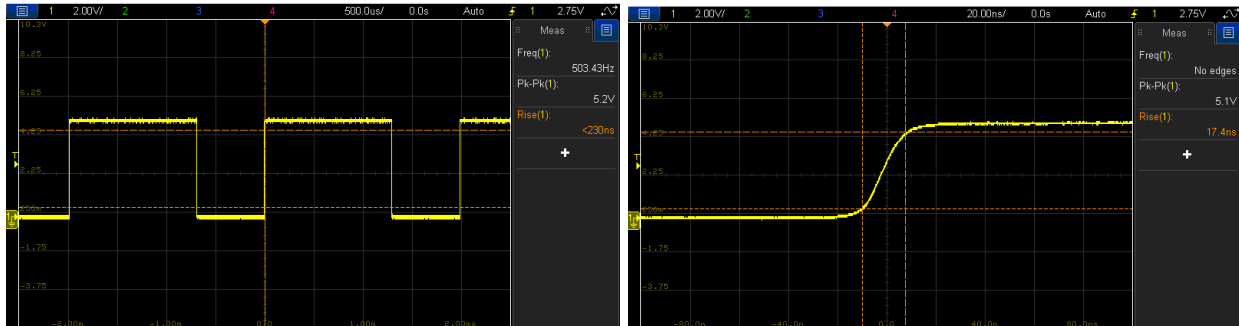


Figure 2&3: Scope measurements from the NE555 Timer Circuit.

This shows a frequency of 500Hz with a rise time of 250ns. Due to imperfections in the components, we are not able to get exactly a 480Hz frequency but are very close which is expected according to our previous calculations. After looking at the datasheet we can see that the NE555 has a typical rise time of 100ns and a maximum of 300ns. The measured rise time falls neatly in between those values and we can assume that the component works as expected.



Figures 4&5: These are scope measurements from the LMC 555 Timer Circuit.

These last 2 images show the same frequency of 500 Hz with a rise time of 17ns. The LMC 555 has a typical rise time of 15ns with no listed maximum. The measured rise time is very close to the expected meaning that this timer works as expected.

In conclusion, both timers work and the measured values are close to the expected/calculated values. Both timers are able to produce the 500Hz square wave with varying “speeds”. The difference between the timers comes down to the internal components they use. The LMC 555 uses a CMOS transistor and the NE555 uses a BJT. CMOS transistors are able to switch more rapidly but BJTs are able to deal with higher current loads. There are suitable applications for both and the choice is dependent on either design requirements or personal preference.