Breadboarding Guidelines and Lab Component Usage

3rd Laboratory Report for ECE 383 Microcomputers

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Abstract:

The main objectives of this lab are to introduce students to guidelines and sound practices for breadboarding digital systems and usage of digital multimeter, oscilloscope and power supply units. Students will carry these skills with them throughout their careers. Task one tells students to familiarize themselves with the components they will be using. This requires recording the values of expected tolerance of resistors R1 and R2, using that to estimate the expected range in Ohms of the resistors. They will then use the lab equipment to find the correct values. Task two instructs students to create the schematic seen in the lab instructions. After, they will solve for the values and record their results. Task three is where students will use the DMM to measure current throughout their circuit. Task four instructs students to create a clock system using the 555 timer chip by following the schematic in the lab instructions. Students are then asked to record the period, frequency, duty factor, on time and cycle time by using lab equipment and formulas. Finally, students will calculate the percent error by comparing their results from the values measured from the lab equipment.

Introduction:

The objective of the lab is to introduce students to guidelines and sound practices for breadboarding digital systems and usage of digital multimeter, oscilloscope and power supply units.. Task one focuses on making students measure components using the lab equipment. In task two students are instructed to use a schematic, provided in the lab instructions, to recreate on their breadboard. Task three is where students will use the DMM to measure current throughout their circuit. Task four instructs students to create a clock system using the 555 timer chip by following the schematic in the lab instructions.

Procedure/Results:

Task 1:

a. Go to the Digikey website to find the voltage output and max current that the voltage regulator can supply

i. **R_1 and R_2 Tolerance:** ±5%,

ii. **R_1 and R_2 Estimated Ohms:** 2.2k Ohms

iii.

Figure 1. R_1 Measurements

iiii.

Figure 2. R_2 Measurements

x

iv. The resistors were slightly off but within the percent of error

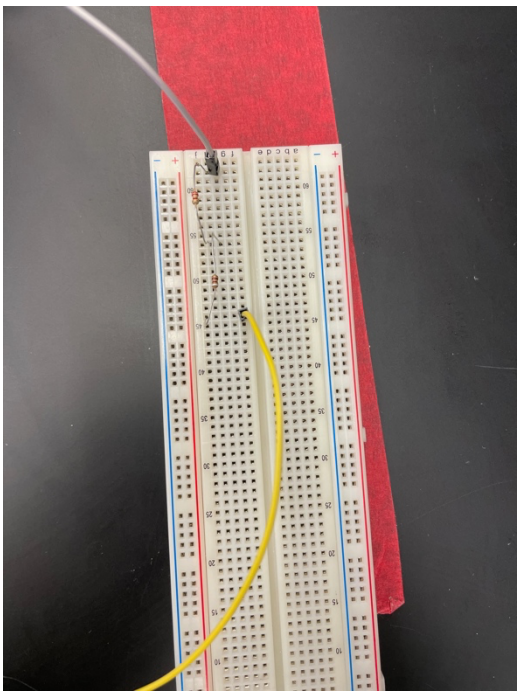
v.

Figure 3. C Measurements

vi. The calculated percent error was 5.6%.

Task 2:

a. Build voltage divider. Take picture of breadboard.

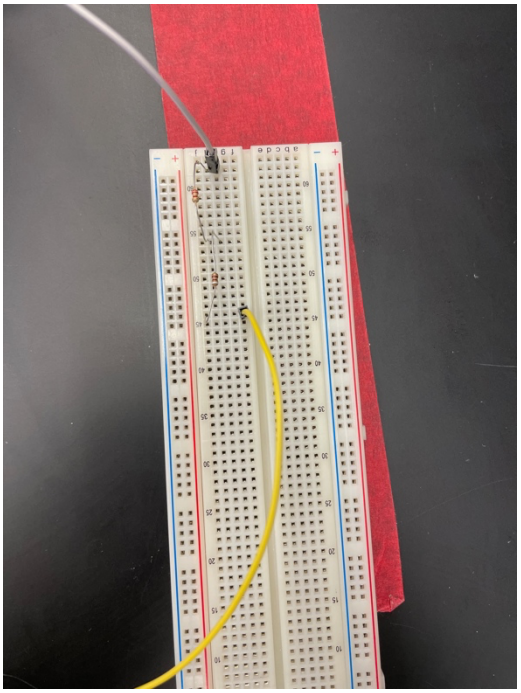
i. 

ii. **Nominal Value:** 1.46V **Experiment Value:** 1.47V

Task 3:

a. Create schematic in lab instructions

i.

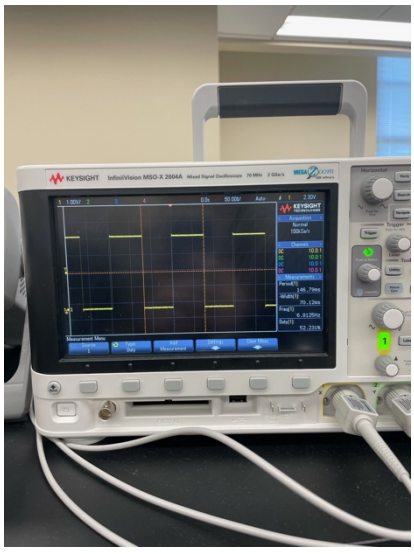


Task 4:

a. Record Values for Components

i. $\mathbf{R_a}$ = 98.6k $\mathbf{R_b}$ = 9.84k **C** = .985uF

b. 555 Timer



Conclusion:

After completion of the lab students learned sound practices for breadboarding digital systems and usage of digital multimeter, oscilloscope and power supply units. As well as revisiting useful circuit equations. Students also deepened their understanding of the lab report format, which will be used throughout their academic endeavors.