ECE 1895 - ASSIGNMENT 1 REPORT (SECOND ATTEMPT)

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If pictures are obscure, they can be found from /LATEX. Calculation source codes can be found under /MATLAB. Schematics can be found under /LTSPICE.

Values selected:

According to the data sheet and and the relationships between resistors and periods, minimizing R_A yields $t_h = t_l$. I selected the following values because such resistors are common, and making sure R_A is very small compared to R_B:

$$R_A = 100\Omega$$

$$R_B = 10K\Omega$$

```
%Inputs:
val_RA = 0.1e3;
val_RB = 10e3;
val_pRan = [20e-6,500e-6]; %period range
%Calculations:
val_CRan = val_pRan/(0.693*(val_RA+2*val_RB))
```

$$C_2 \subset (1.4358nF, 35.8956nF)$$

Picking a common capacitance values:

$$C_2 = 10nF = 0.01\mu F$$

All other capacitors and resistors have no effect on the period, so I'll leave them unchanged from the data sheet. **I have removed the load resistor from the schematic as per the requirement.** For the source voltage,however, since no peak voltages are specified as per the requirements, I'll select an arbitrary source voltage:

$$V_{CC} = 10V$$

All other required calculations are as follows:

```
val_C = 10e-9;
val_peri = 0.693*(val_RA+2*val_RB)*val_C %period
val_freq = 1.44/((val_RA+2*val_RB)*val_C) %frequency
val_oddc = val_RB/(val_RA+2*val_RB) %output driver duty cycle
val_owdc = 1 - val_RB/(val_RA+2*val_RB) %output waveform duty cycle
val_lthr = val_RB/(val_RA+val_RB) %low-to-high ratio
```

Results:

$$\text{Period} = 139.293\mu s$$

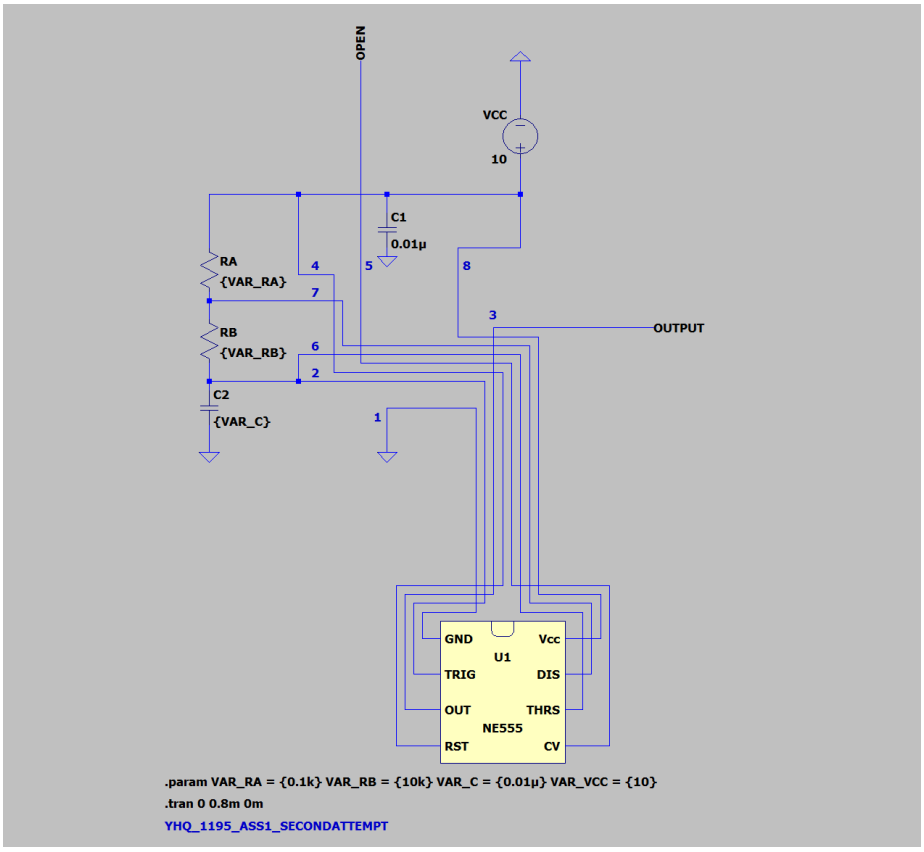
$$\text{Frequency} = 7.164KHz$$

$$\text{Output Driver Duty Cycle} = 49.75\%$$

$$\text{Output Waveform Duty Cycle} = 50.25\%$$

$$\text{Low-to-high Ratio} = 99.01\%$$

Schematics



Simulations

Note that the period corresponds with what we desires.