RC Circuit Lab Report

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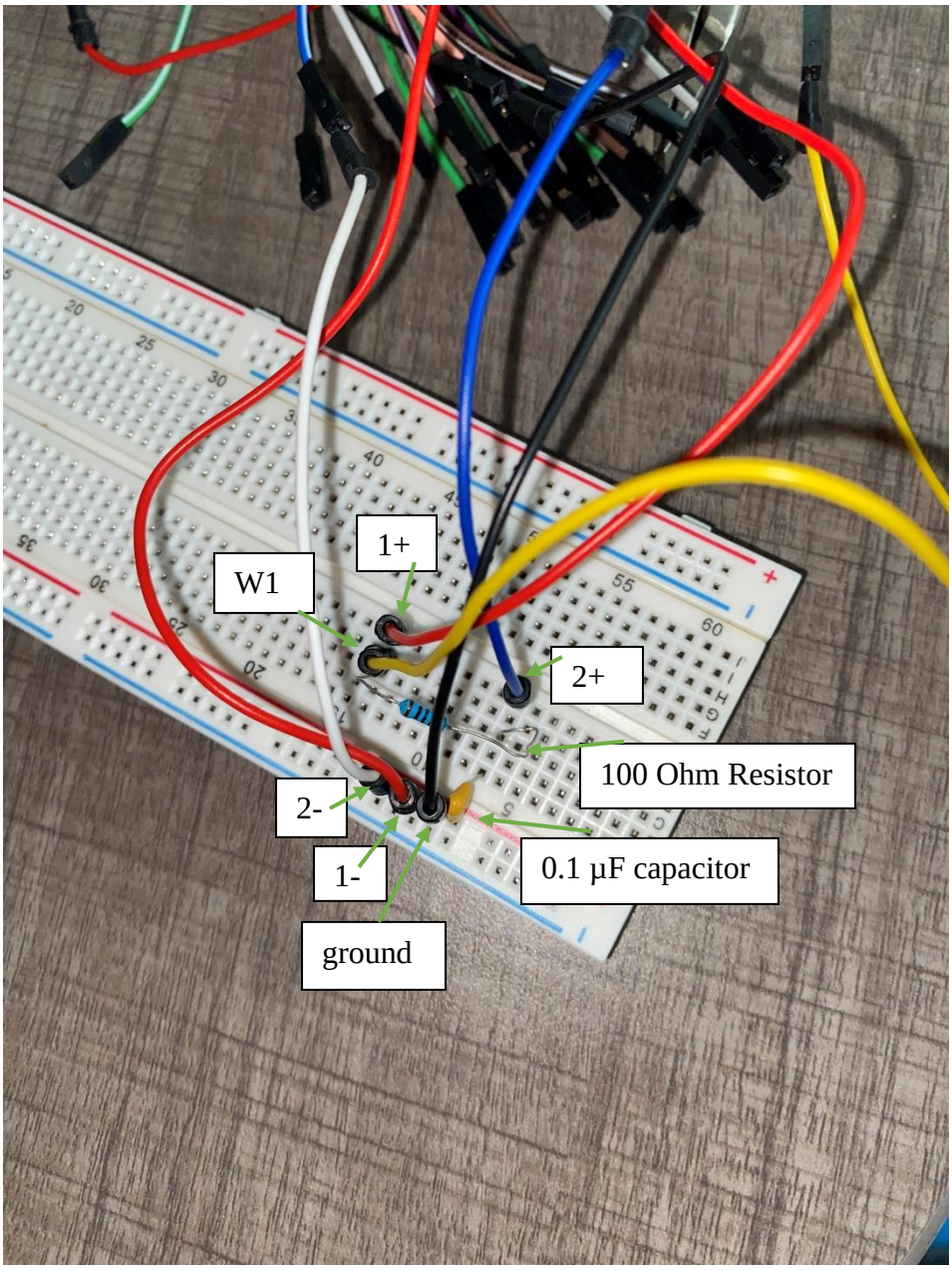
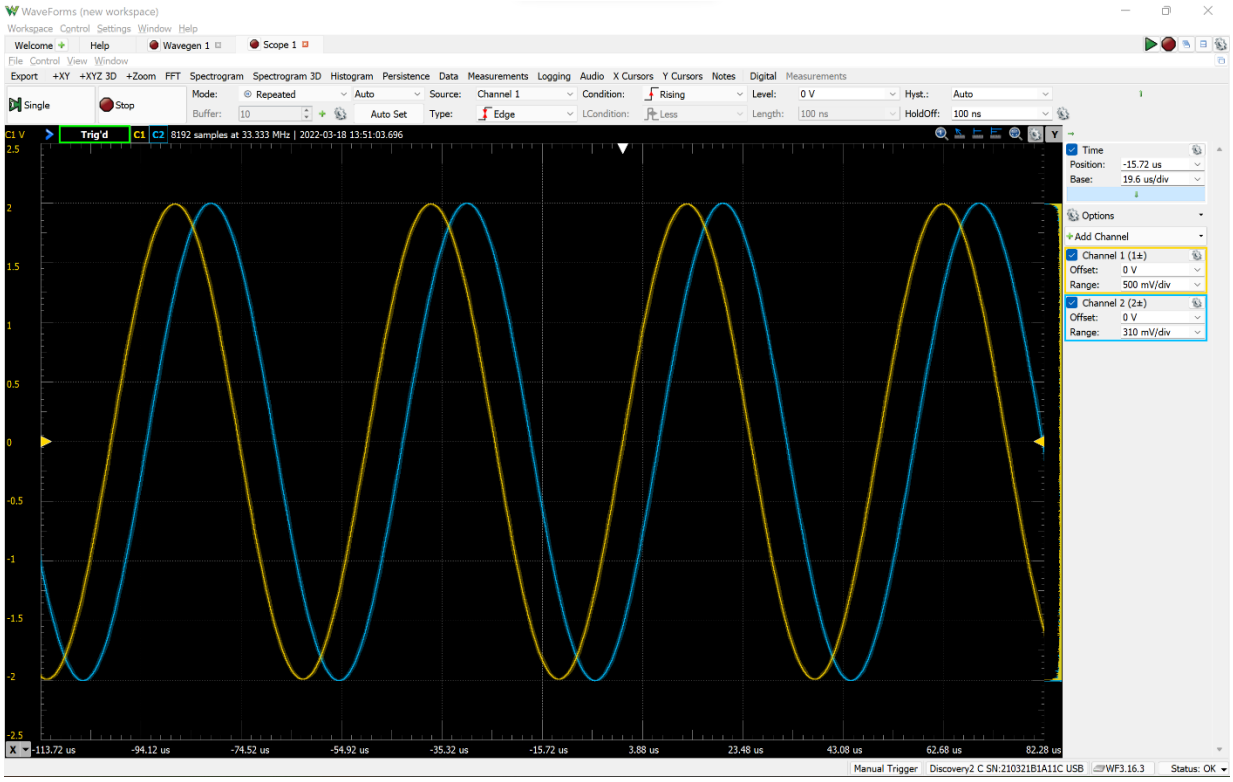
Part I **Breadboard connections**

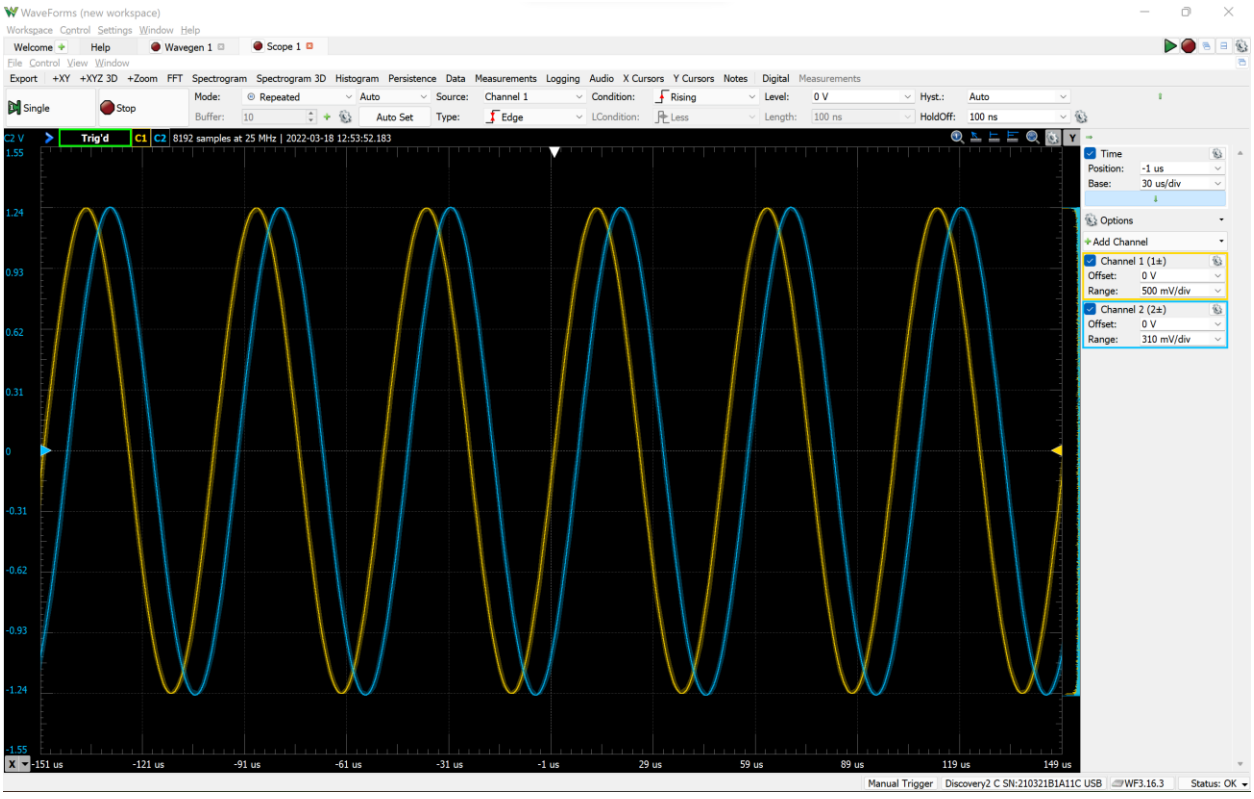


Part II **Waveform Screenshots**

1. Y-axis shows input voltage amplitude



2. Y-axis shows output voltage amplitude



Part III **Experiment Measurements**

Input Voltage Amplitude: 2 V

Output Voltage Amplitude: 1.24 V

Output Voltage Time Shift (Δt): 7.03 µs

Output Voltage Phase Angle: -0.8834 rad

Part IV **MATLAB Results**

Capacitor Voltage Amplitude: 1.2454 V

Capacitor Phase: -0.8986 µs

Part V **Conclusion**

The MATLAB results and experimental results very similar so it is safe to assume that our procedure was done correctly. We were able to see that techniques such as nodal analysis do work on real world circuits and not just theoretical circuits.

Part VI **MATLAB Code**

```
clc
clear all
format compact
Vs=2;
R=100;
C=0.1e-6;
f=20e3;
om=2*pi*f;
ZC=-j/(om*C);
%Matrices
Y=[1/R+1/ZC];
Is=[Vs/R];
V=Y\Is;
%V amplitude & phase angle
Vm=abs(V);  %output voltage
Vph=angle(V);
```

```
%Current through circuit
I=Vs/(R+ZC);
Im=abs(I);
%Voltage through R
Vr=I*R;
Vrm=abs(Vr);
%Voltage through C
Vc=Vs-Vr;
disp("Theoretical results:")
Vcm_theoretical=abs(Vc)
Vcph_theoretical=angle(Vc)
disp("-----------------------------------")
%----------Comparing to experimental values-------------------------
disp("Experimental Results")
%Experimental voltage amplitude
Vcm_experimental=1.24
%calculate experimental phase shift in radians
deltaT=7.03e-6  %time delay between waves
Vcph_experimental=(-1*360*f*deltaT*pi)/(180)  %times negative 1 since the output voltage is leading
```