Lab 6: Transient Response of a 1st Order RC Circuit

ECEN 214 - 517

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Due Date: October 28, 2020

Procedure

Task 1

For the first task we built the circuit shown in figure 6.5 using the calculated values from the prelab for R1, R2, R and C. The voltage is set to +9 and -9, which were V1 and V2 and those were connected to the oscilloscope to the AD2. We note down the waveform and calculate RMS, peak to peak, and frequency of oscillation.

Task 2:

In the second task, The students are required to replace R1 and R2 with a 10K ohm potentiometer. Then we adjusted the potentiometer, changing the resistance values until the frequency of the graph reached 2Hz. Then calculate R1 and R2 and voltage division ratio. For the next part half the value of R and measure the new frequency. Then adjust the potentiometer and keep R halved. Then calculate R1 and R2 and voltage division ratio.

Data Tables

Task 1:

Values of the Circuit:

R1	7.1k Ohm
R2	3.3k Ohm
R	470k Ohm
C	1 microF
Vcc	9 V
-Vcc	-9 V

Task 2:

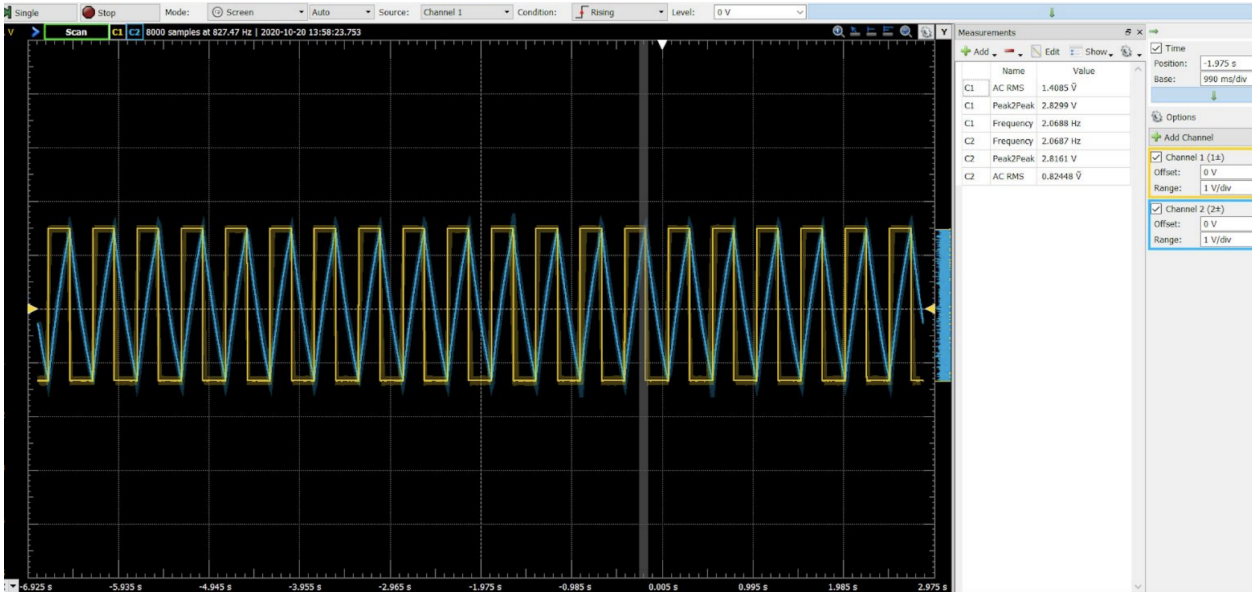
No data tables for this task

Measured Waveforms / Calculations

Task 1:

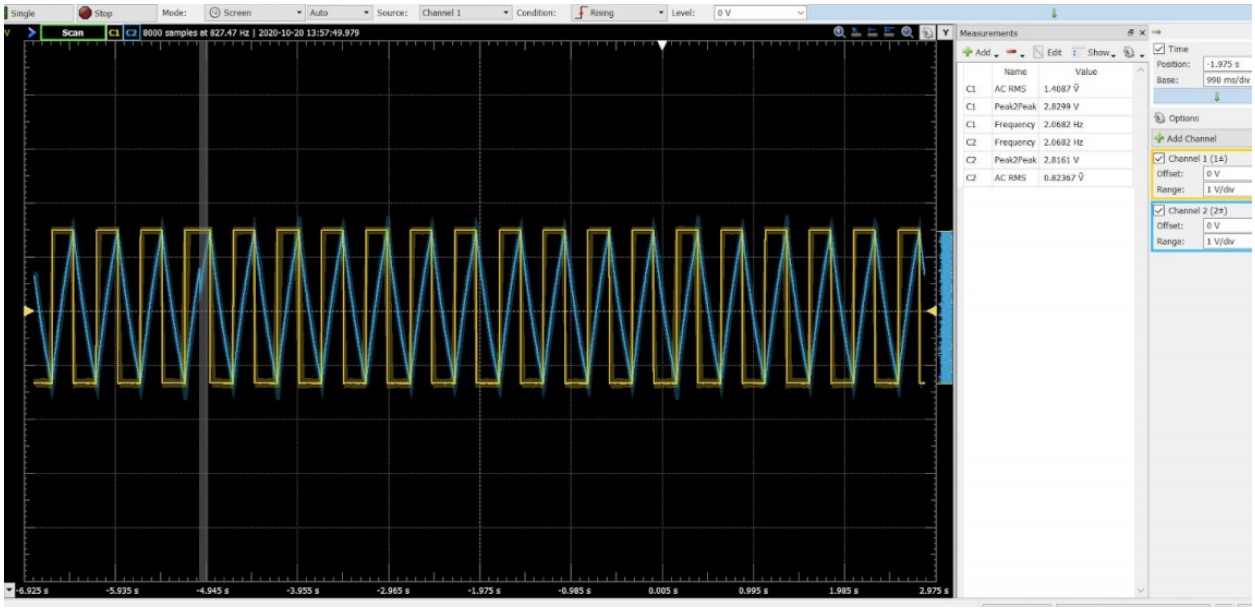
Calculated values	$V_1(t)$	$V_2(t)$
Peak to Peak Voltage	2.86 V	2.87 V
RMS Voltage	1.46 V	0.84 V
Frequency of oscillation	2.08 Hz	2.08 Hz

The values for task one were from the prelab.



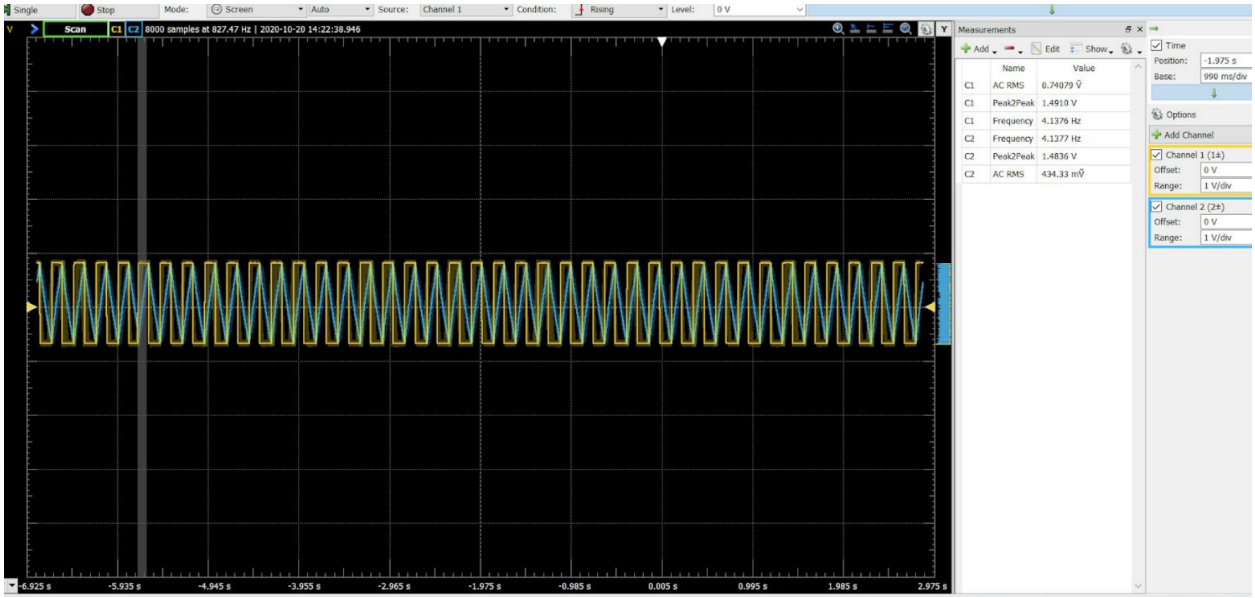
Task 2:

Waveform for replacing resistors (R1 and R2) with potentiometer. The Frequency is adjusted to 2Hz:



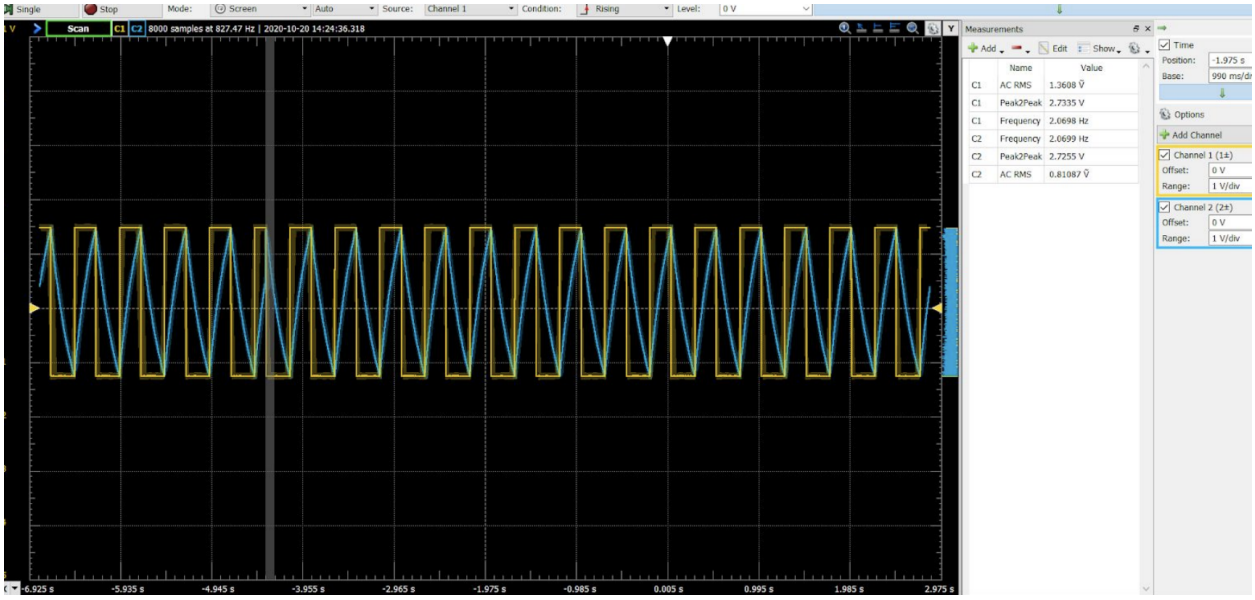
R1	6.5k Ohm
R2	3.2k Ohm
Voltage Division Ratio - R2/(R1+R2)	.33

Half the value of R:



Given R	470k
Half R - 470/2	235k
Frequency	4.15Hz

Using half R to achieve 2Hz frequency:



R1	6.3k Ohm
R2	3.5k Ohm
Voltage Division Ratio - R2/(R1+R2)	.37

Discussion

In task 1 the voltages that were calculated were different from the actual is the saturation voltage calculated in the prelab.

In task 2, we determine the difference of the voltage tis a saturation voltage is twice the actual voltage. Hence, we can conclude that the other voltage calculations we're also inaccurate buy some amount this is with the exception of the proportional difference in the voltages since these calculations match our results.