

Source Notes:

This lab was modeled after Experiment P43: RC Circuit

Instruction Manual and Experiment Guide for the PASCO scientific Model TD-8558A
Created by Pasco for their Science Workshop Software in 1990

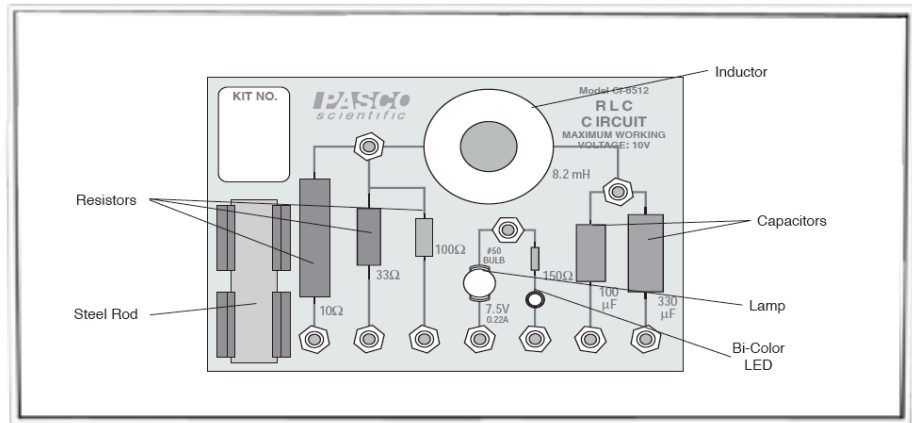
Jim Haine - Wissahickon High School, Ambler PA.
1997(?)
Modified 2010

Teacher Notes:

Modifications:

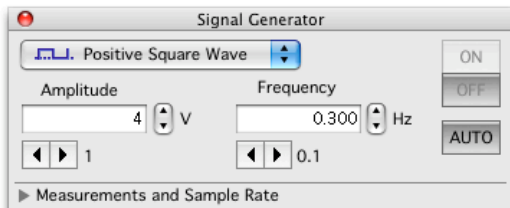
Pasco switched software to Data Studio so some modifications were added. The original .sws files were modified to the new .ds format. (around 2005?)

Procedure:

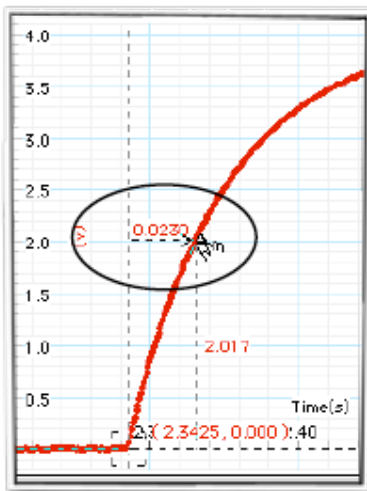


Procedure:

In this activity, the Power Amplifier produces a low frequency square wave (0 to 4 V). This waveform imitates the action of charging and then discharging a capacitor by connecting and then disconnecting a DC voltage source. The Voltage Sensor measures the voltage across the capacitor as it charges and discharges.



Set the signal output to create a positive square wave with a maximum voltage of 4V, and a frequency of around 0.3 Hz. You may have to change the frequency of the signal for some trials.



The *Data Studio* software records and displays the data. You will measure the time for the capacitor to charge to the “half-maximum” voltage. Using the half-life time and the known value of the resistor, you can calculate the capacitance of the capacitor.

Calculations:

$$T_{1/2} = RC \ln 2$$

C (known)	R	T (half voltage)	C (experimental)	Percent Error
100 μF				
100 μF				
330 μF				
330 μF				

Conclusions:

1. The time to half-maximum voltage is how long it takes the capacitor to charge half-way. Based on your experimental results, how long does it take for the capacitor to charge to 75% of its maximum?
2. After four “half-lives” (i.e., time to half-max), to what percentage of the maximum charge is the capacitor charged?
3. What is the maximum charge for the capacitor in this experiment?
4. What are some factors that could account for the percent difference between the stated and experimental values?