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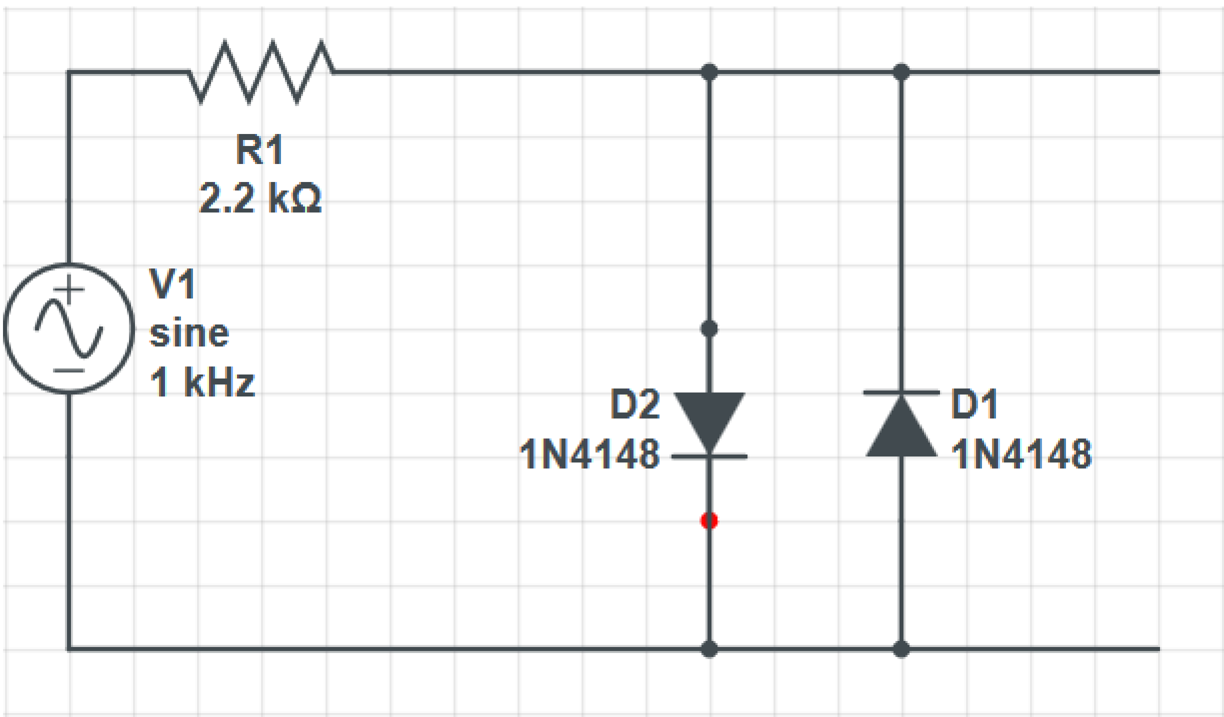
Electrotechnology lab 2 report :

Objective:

For our second lab, we are to determine the cut-in voltages of a diode. Then to understand and interpret the second circuit.

Method:

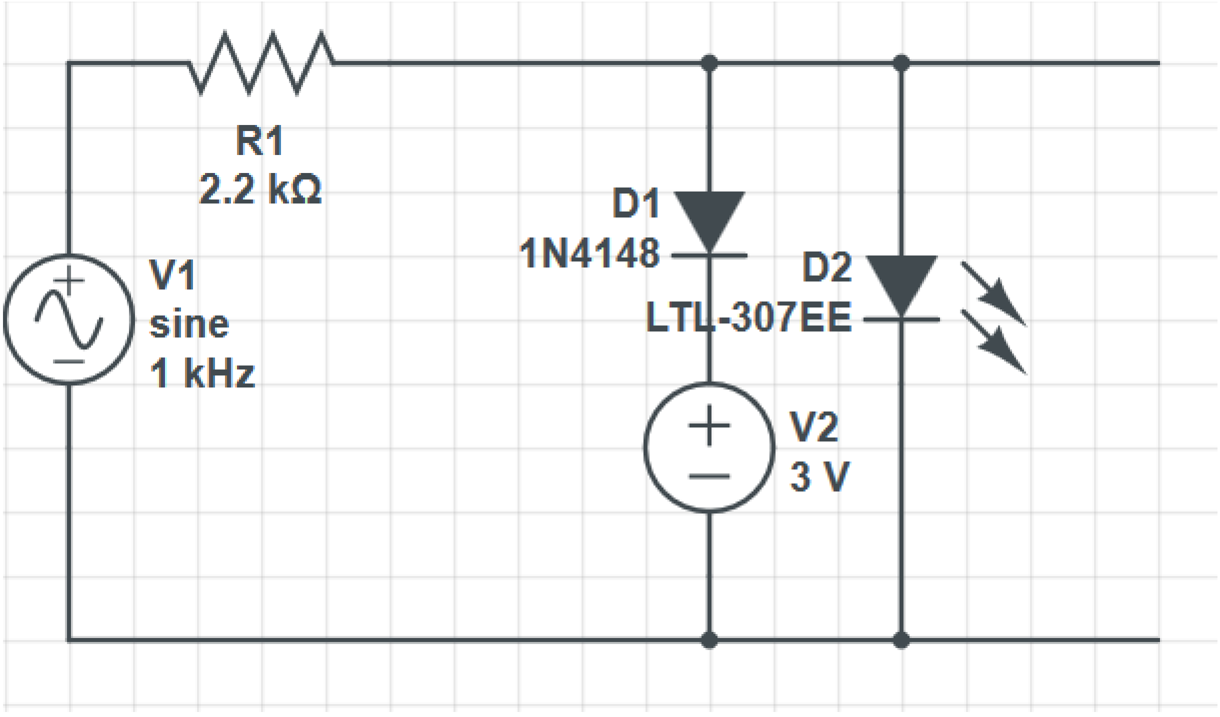
We first reproduced the following circuit:



With an oscilloscope we are to determine the cut-in value for the diodes. The oscilloscope is going to graph the voltage drop between the diodes in function of time. The AC power supply is set to 5volt peak to peak. In forward bias, the current first goes through the resistance and then through D2, as D1 has the N-type semiconductor material facing the current it will have a really big resistance and all the current will go through D2. In reverse bias, it's the opposite, it first goes through D1 and then through the resistance R1.

Since the oscilloscope is measuring the voltage drop across the diodes we can expect a higher voltage in reverse bias than in forward bias. In forward bias, the current entering the diode will be smaller compared to reverse bias because it has to go through the resistance first.

Then we build this second circuit:

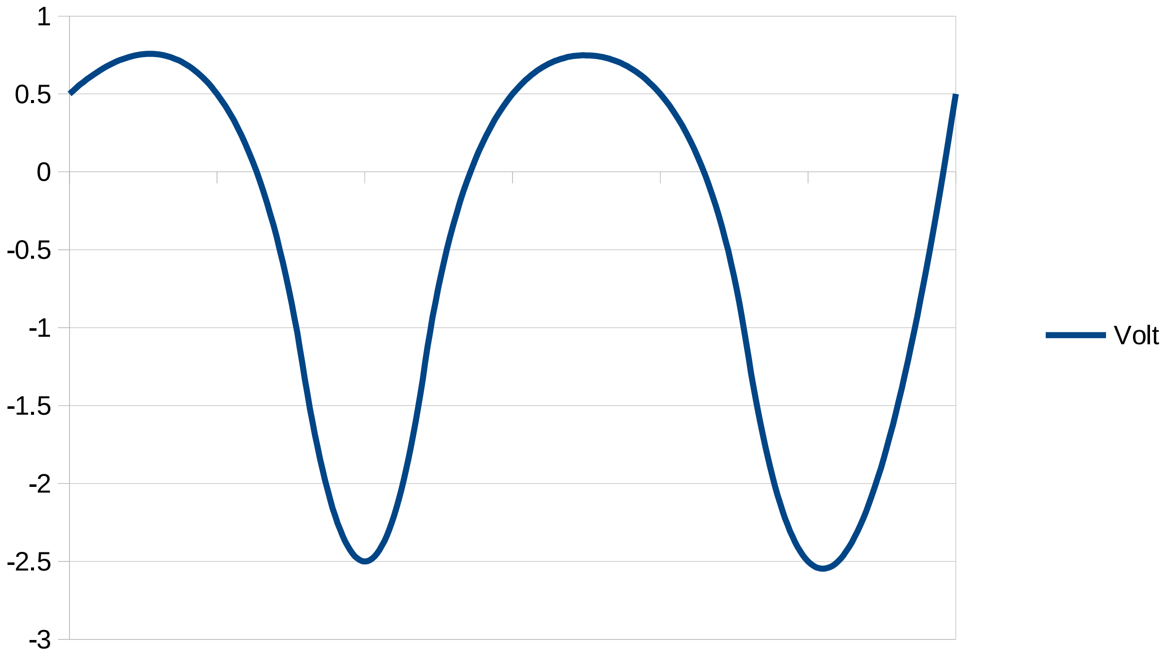


One of the diode is replaced with an LED and is in the same direction as the other diode. Meanwhile in the first loop containing the diode, there is now an DC power supply, giving out 3 volt. We are to plot the graph of the oscilloscope, first without the LED and then with the LED and to explain the results.

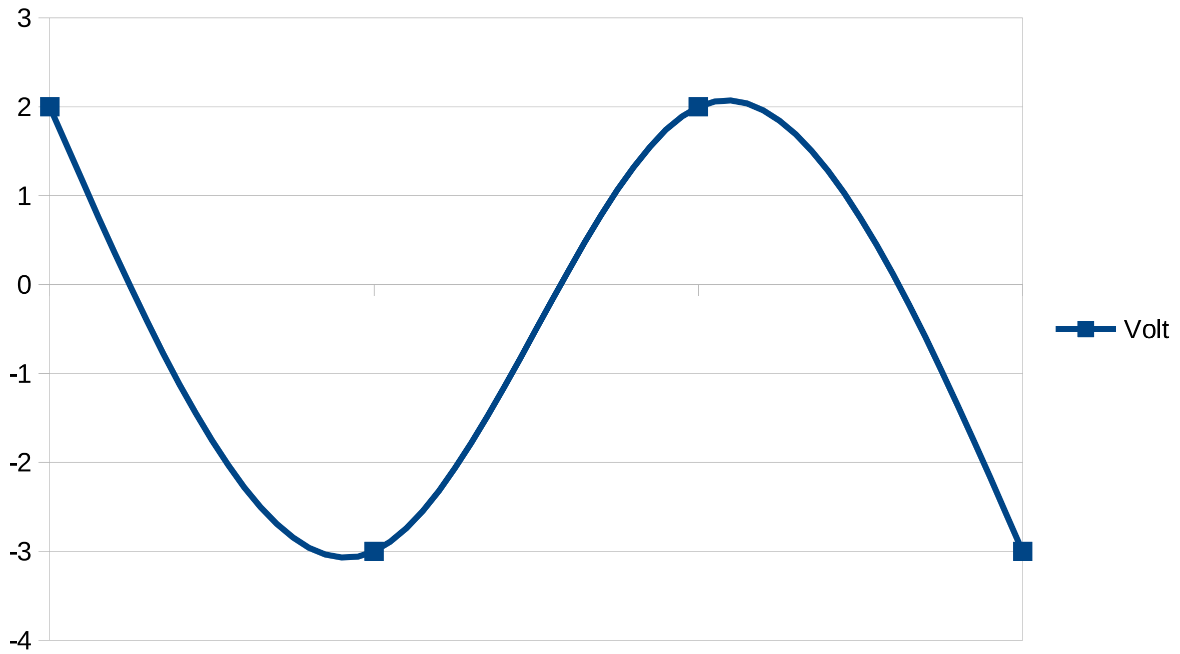
Without the LED, we can expect to measure a normal signal in reverse bias, as the current will just go through the empty wire. In forward bias, the DC power supply will interfere with the voltage drop. Since electrons leaving by the positive side of the AC power supply will go to the negative side of the DC power supply. That means we won't have a normal signal.

Data:

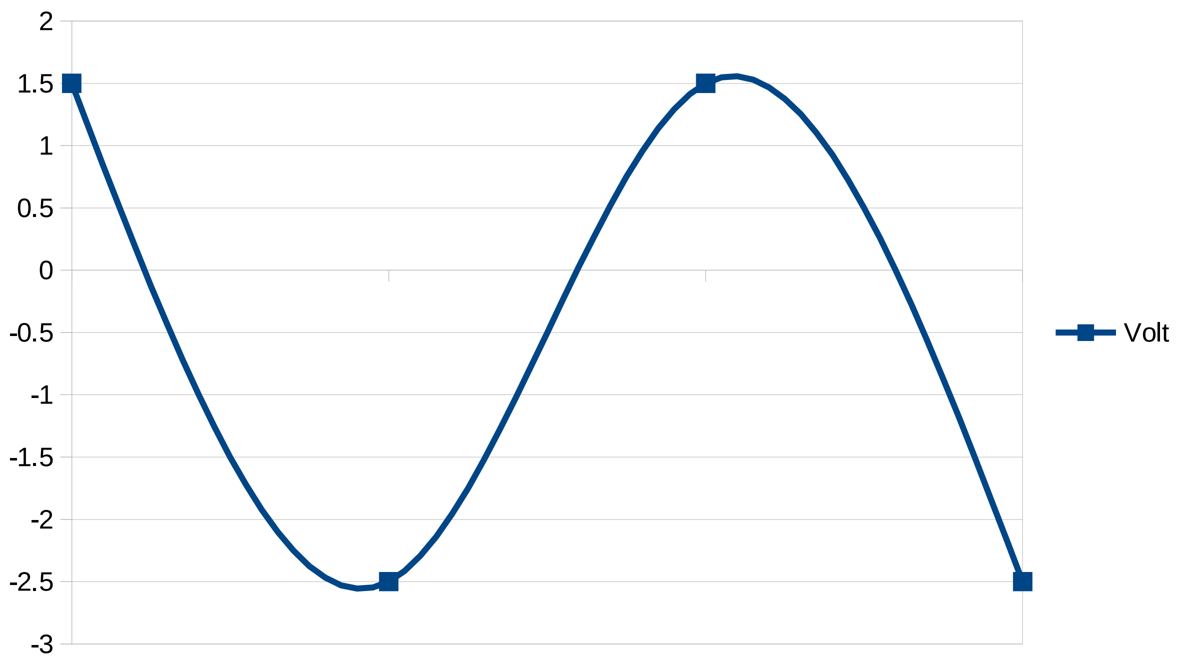
For the first part, the oscilloscope gave us:



For the second part, without the LED, we have:



For the second part, with the LED:



Data Analysis:

The oscilloscope was set at 1Volt/Div so each division on the screen was equal to 1 volt.

In the first part, the voltage varies between 0.5 V and -2.5V. In the second part, without the LED it varies between 2V and -3V, with the LED 1.5V and -2.5V.

From those values we can determine the cut in value of the diodes in the first part to be above 0.5V.
For the second part of the experiment we can see that with the LED, the maximum and minimum voltage have lower magnitude. The LED uses more energy.

Conclusion:

A lot of confusion concerning how the circuit is supposed to work and making sure the circuit is working properly. The problem was that we got wrong values from the oscilloscope and couldn't properly interpret our result. We didn't even realize the result were wrong because of a lack of comprehension of how the circuit works. Next time we need a more rigorous method.