American University of Beirut

ECE312 Lab

MyDAQ Assignment 2

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20110****

Due on 08/12/2011

1. Description of the hardware setup:

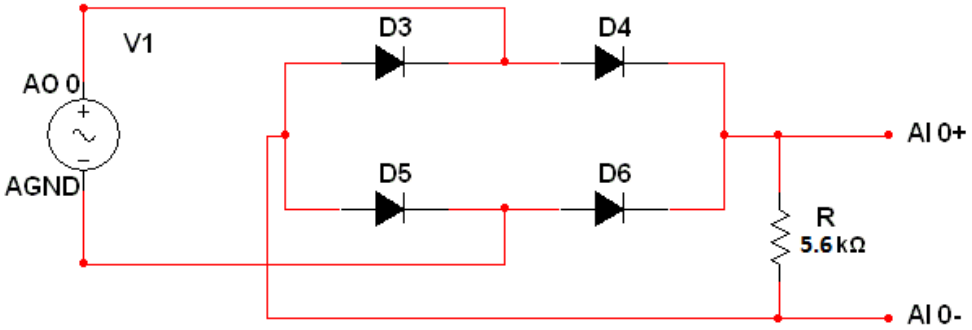
a. Circuit Connections :

1. Half-wave Rectifier:

In this first experiment, a diode was to be connected in series with a resistor and a voltage source. First off, a breadboard was used to connect the resistor and the diode in series. The two components were placed adjacent to each other with one terminal of each connected to a common node. Next was the introduction of a voltage source.

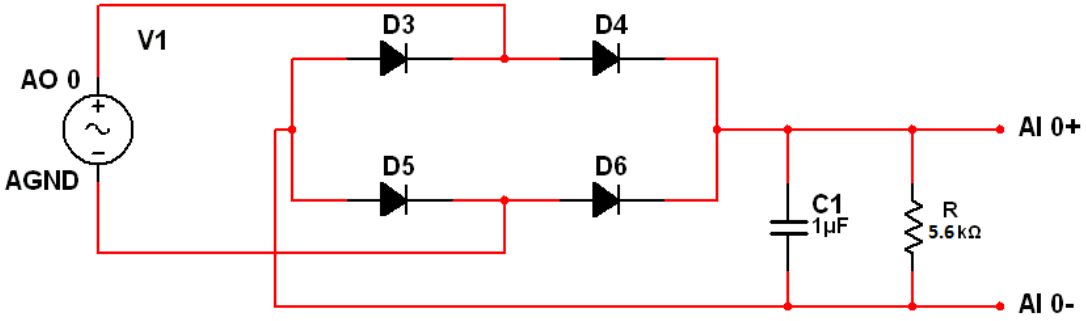
2. Bridge Full-wave Rectifier:

In this experiment, four diodes were connected to each other in bridge form. That is, each pair was connected to a common node, and the pairs were connected in parallel. In parallel with the diode pairs, we connected a resistor on the breadboard.



3. Bridge Full-wave Rectifier with Filter:

Same as the full-wave rectifier in addition to a capacitor in parallel to the resistor.



b. MyDAQ & Circuit Connections:

In our case, a MyDAQ was used as an AC supply. In order to obtain a closed circuit, the positive pole of the diode was connected to the AO0 (analog out) line of the DAQ while the free end of the resistor was connected to the AGND (ground). Finally, to study the resistor (output), its poles were connected to the AI 0+ and AI 0- input lines of the DAQ. When measuring the PIV of the diode, the input lines where connected to the diode itself.

c. Input & Output Lines used:

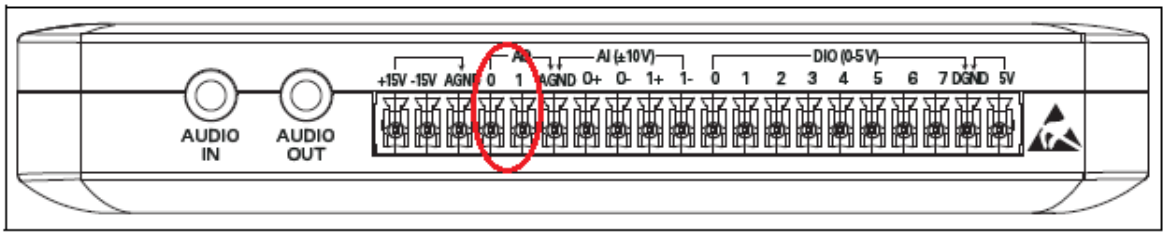
The AI0+ and AI0- are connected across the terminals of the resistor to find the output.

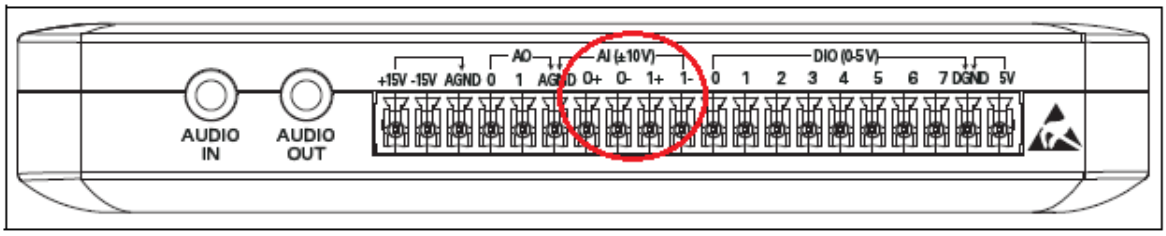
The AI0+ and Ai0- are connected across the terminals of a diode to measure the PIV.

The DMM is used to measure the mean voltage across the resistor.

AO0 is the voltage generator and AGND is its ground.

4 lines are used from the MyDAQ : AI0+, AI0-, AO0, & AGND

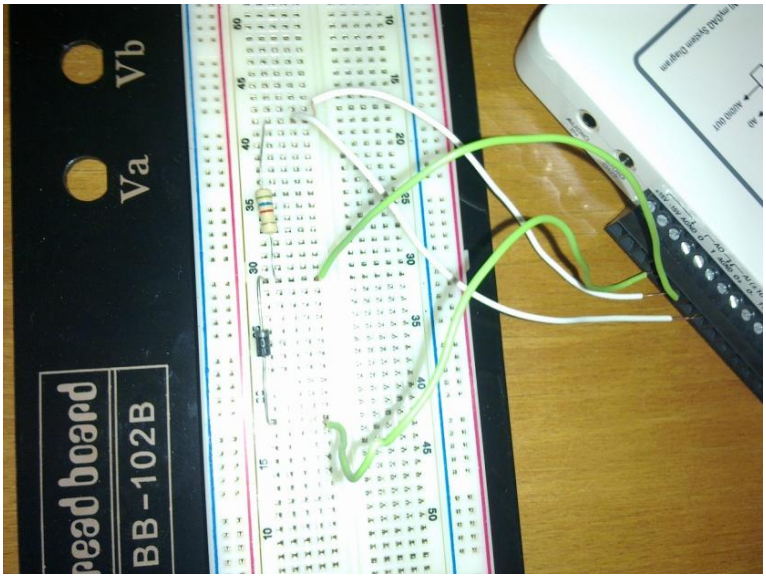




AO0 and AGND are the input lines used

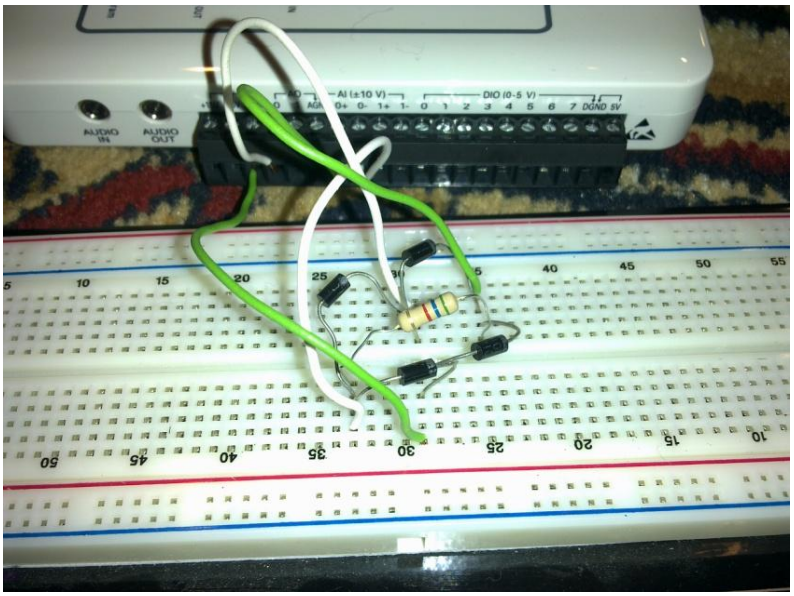
AI0+ and AI0- are the output lines used

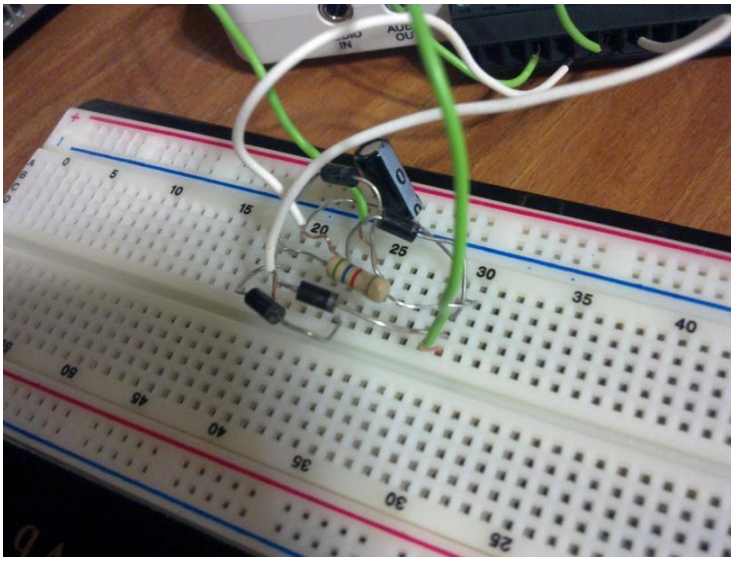
c. **Photos**:



1. Half-wave Rectifier

2. Full-wave Bridge Rectifier



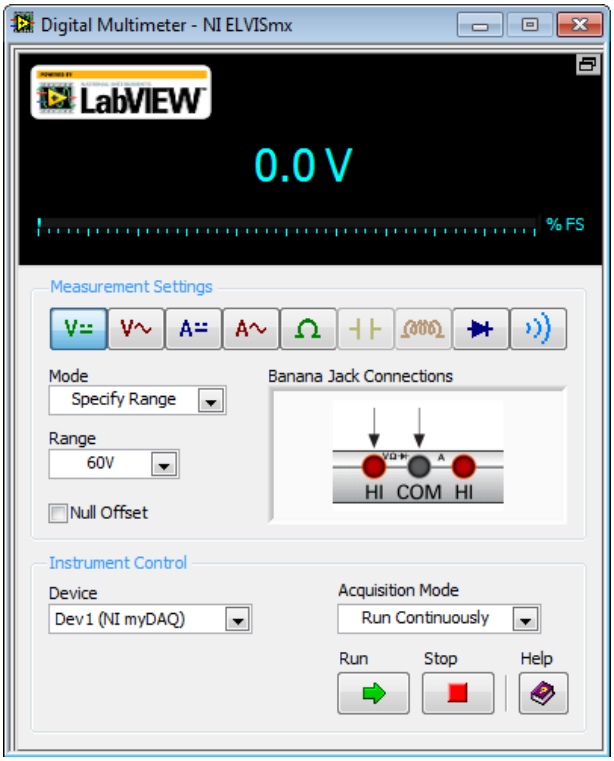


3. Full-wave Bridge Rectifier with Filter

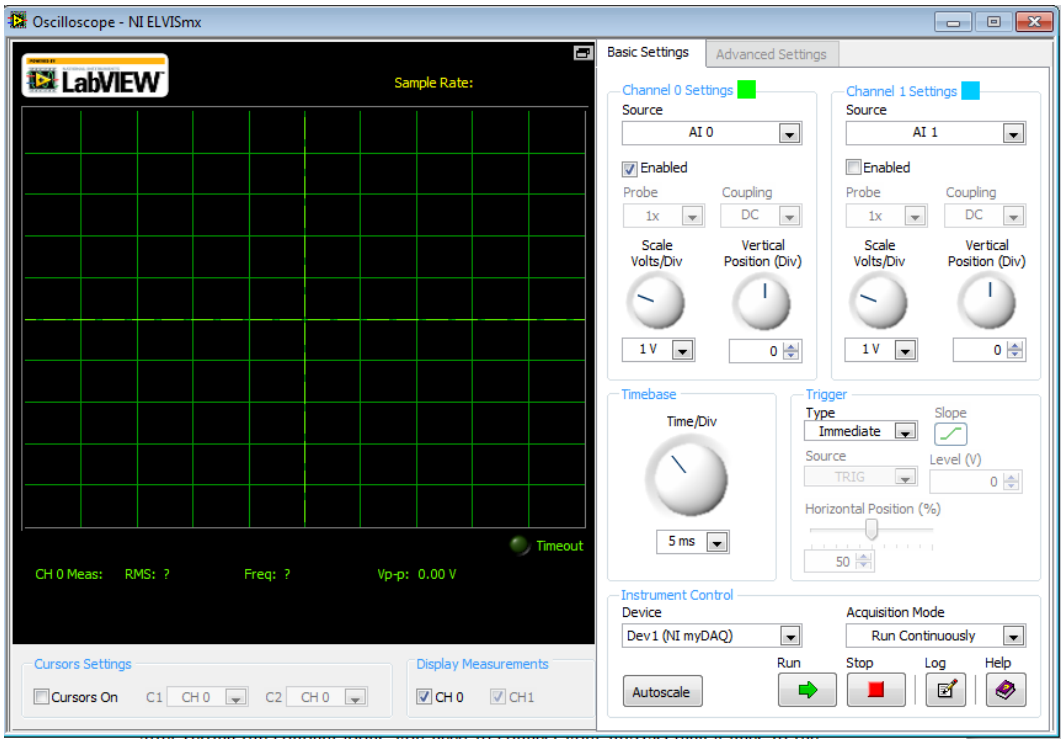
2. Description of the software setup:

(Modules and Configurations Used)

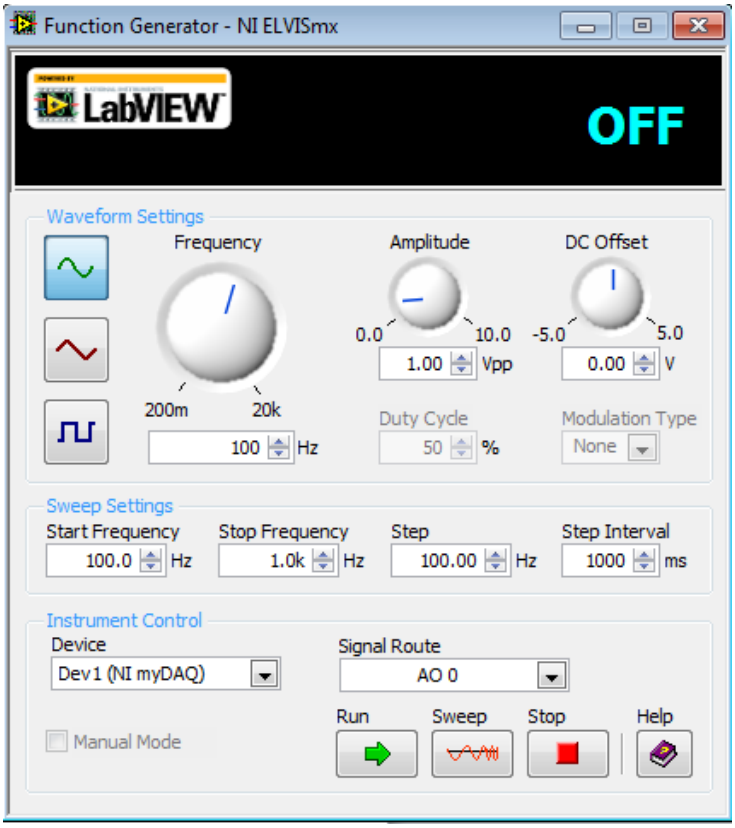
For this experiment, we were asked to measure the Pk-Pk voltage of the output using the oscilloscope module; the mean of the output using the DMM; the PIV of the diode using the oscilloscope. The function generator was used and programmed to provide a signal of amplitude 5V pk-pk and 1KHz's frequency. Before proceeding with the experiment, the value of the resistor was checked and found to be 5.54KOhms



DMM



Scope

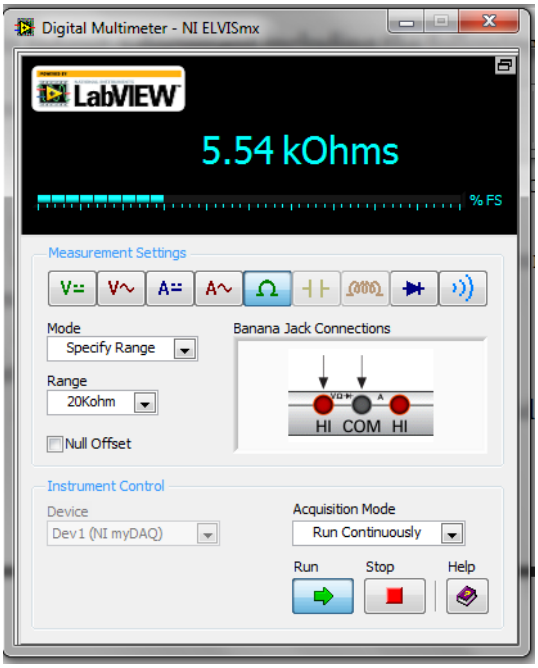


Function Generator

All these were chosen from the Instrument Launcher:

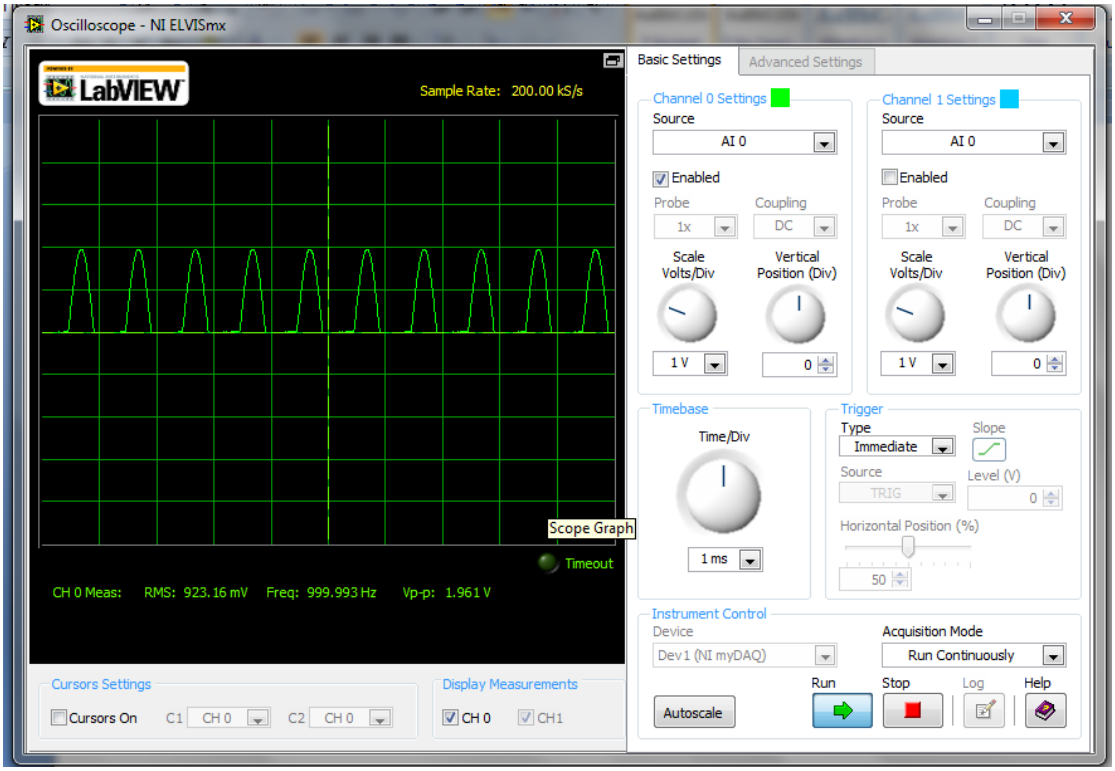
3. Testing:

a.

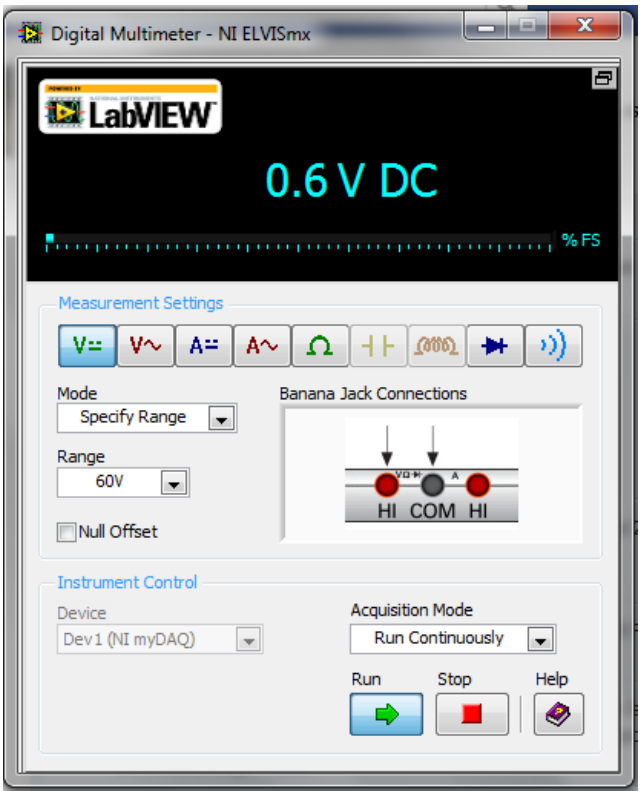


R = 5.54kOhms

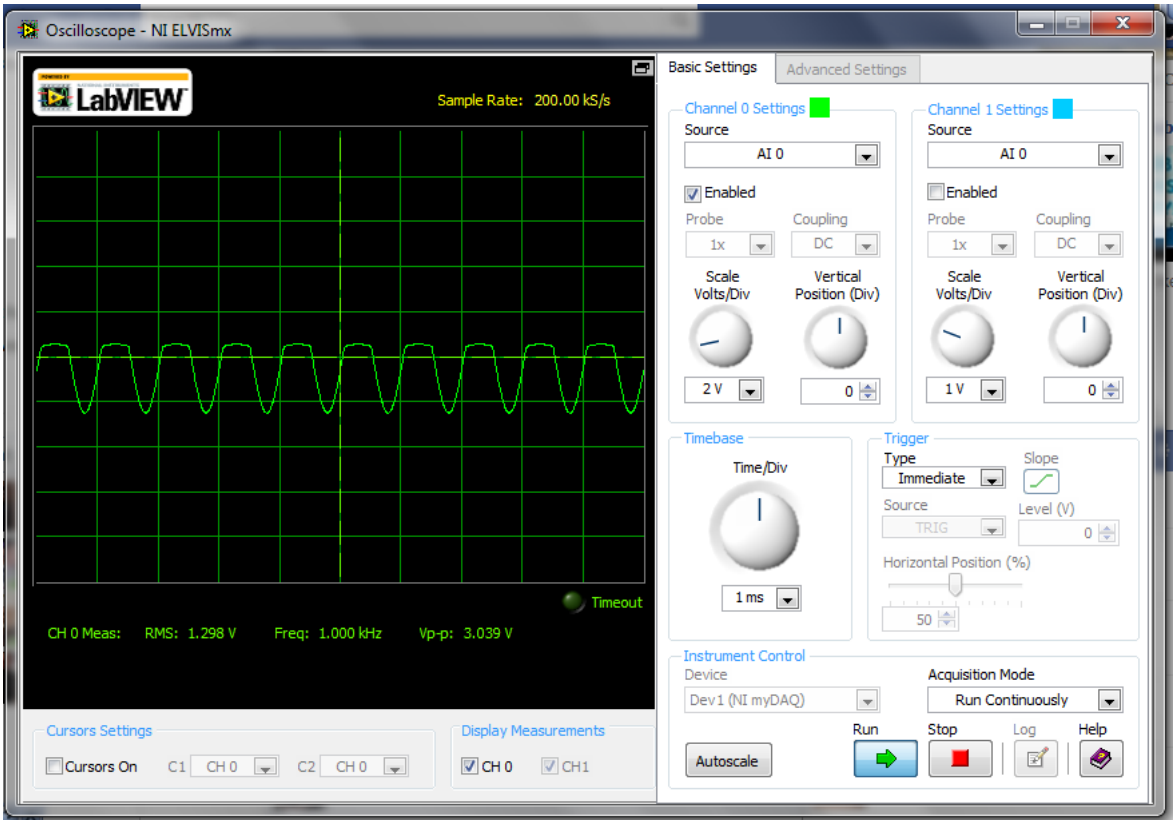
b. Half-wave Rectifier:



Vpk-pk = 1.956V

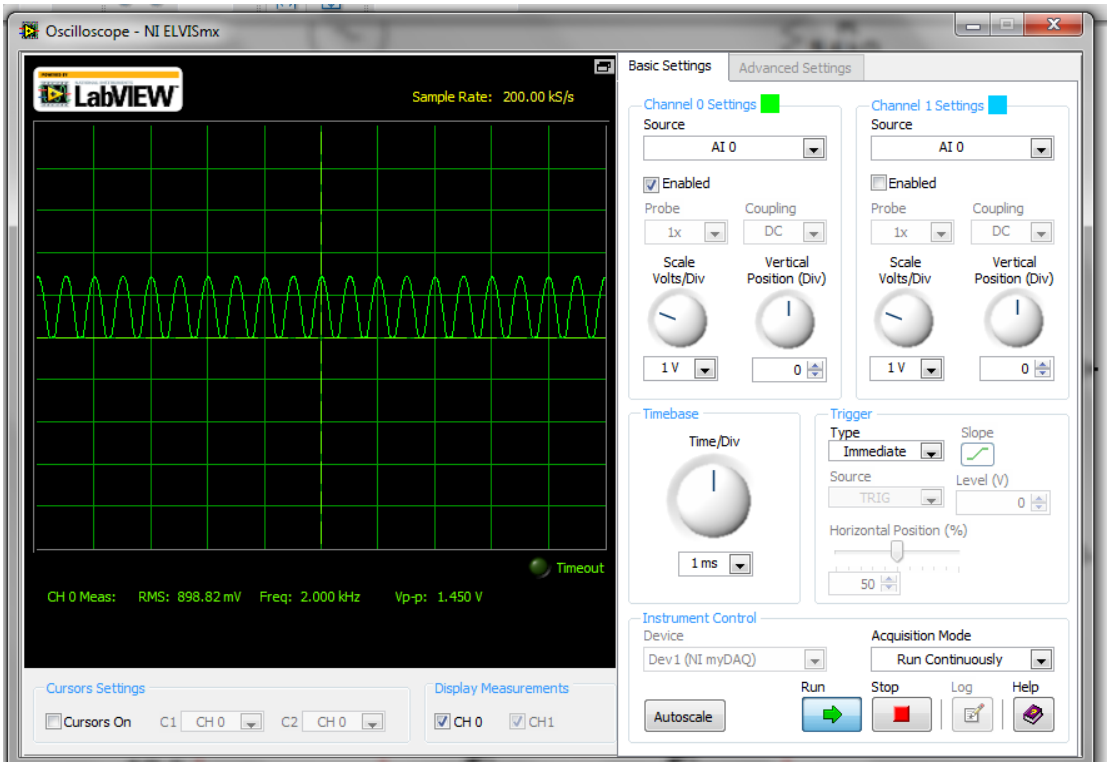


V_{DC}(Mean) = 0.6V

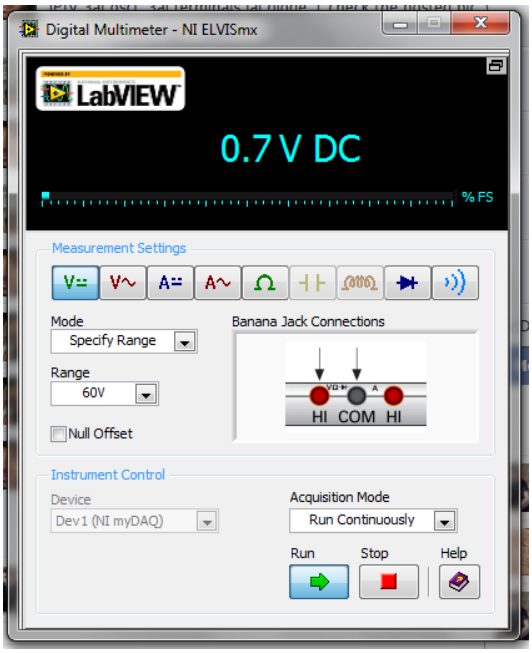


PIV = 2.5V

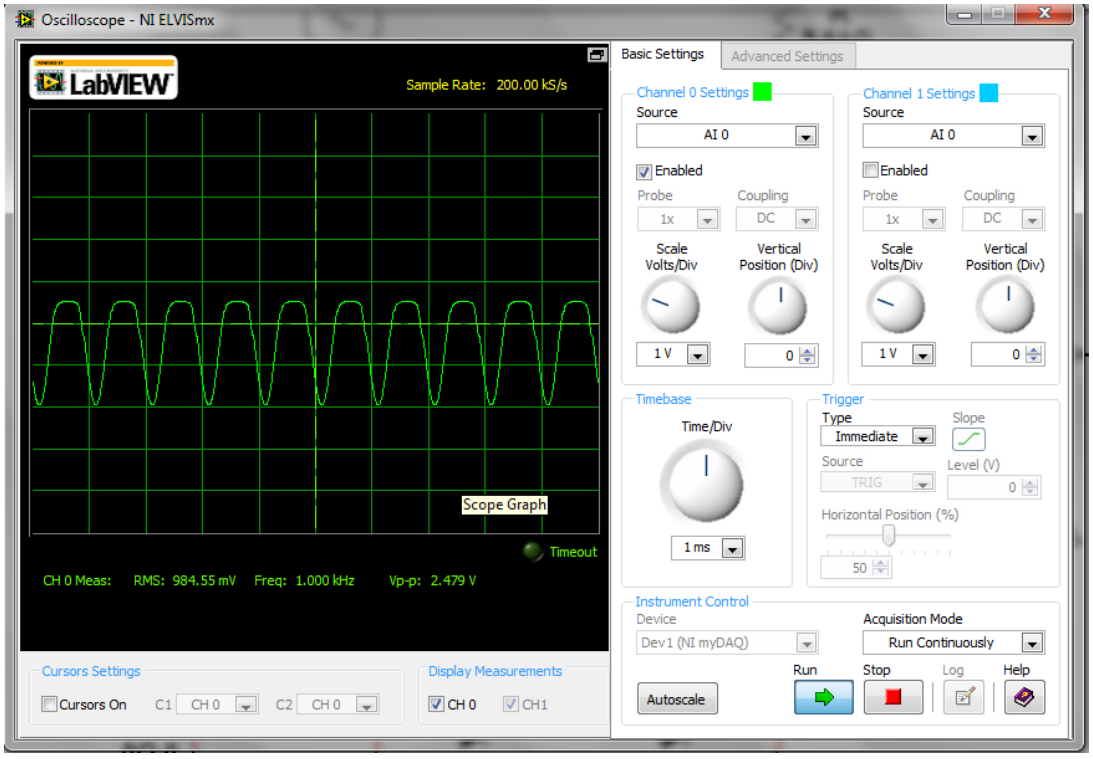
c. <u>Bridge Full-wave Rectifier</u>:



Vpk-pk = 1.45V

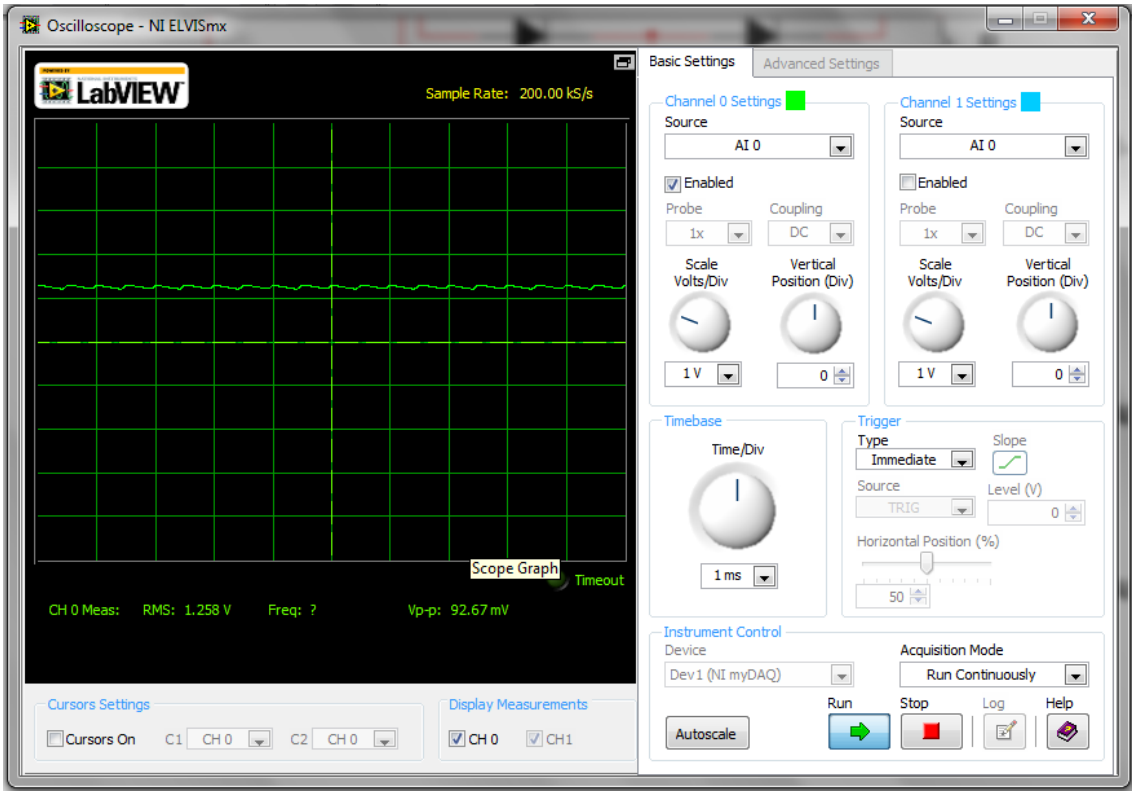


V_{DC}(Mean) = 0.7V

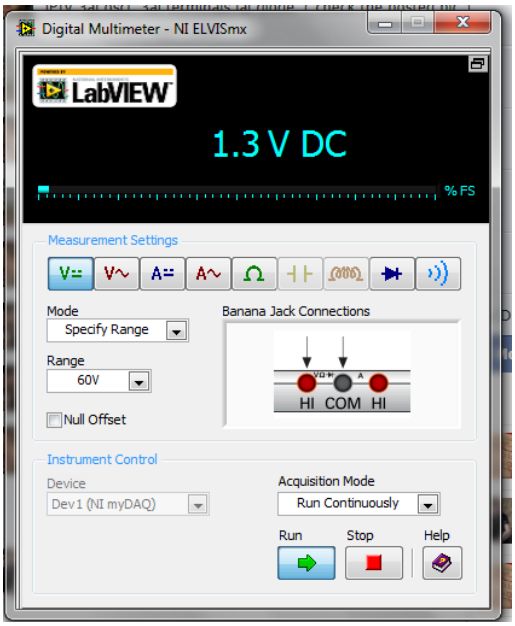


PIV = 2V

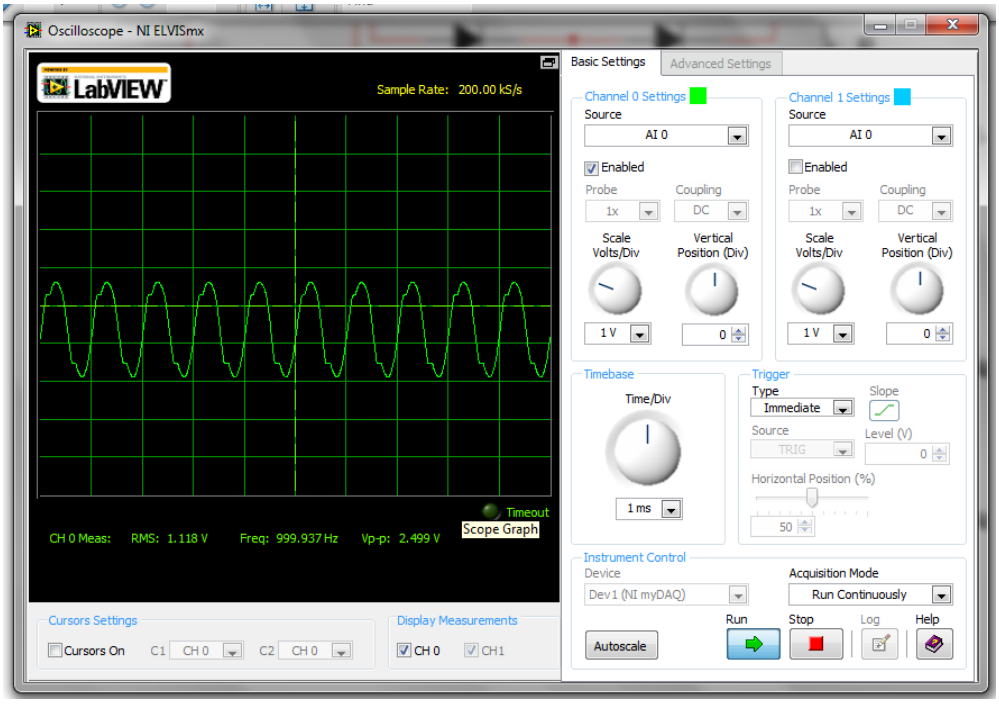
d. <u>Bridge Full-wave Rectifier with Filter</u>:



Vpk-pk = 92.67mV



V_{DC}(Mean) = 1.3V



PIV = 1.9V

e. The shape of the output in Exp.1 was a half wave. That is, a sinusoidal wave without its negative part. The shape can be described as a series of on-off “humps”. The pk-pk voltage was 1.956V.

For Exp.2, the shape was approximately a series of uninterrupted humps (fully rectified wave), with pk-pk voltage of 1.45V<1.956V

Finally, in Exp3, the shape of the wave was very close to a horizontal straight line with a pk-pk voltage of 92.67mV<1.45V<1.956V.

We thus conclude that the curve gets closer to a horizontal straight line as we cascade our three rectifiers since Vpk-pk gets less and less.

Concerning the mean, we notice that in experiment 1, the mean voltage is 0.6V. The mean voltage becomes 0.7V in Exp2 and finally reaches 1.3V in the final configuration. We deduce that the DC voltage we are trying to obtain will have a considerable high value.