Mehmet Bayık
Introduction to Digital Oscilloscopes
21802166 / Sec 03
12.02.2021

Lab Experiment 1

1 – I compensated my oscilloscope probe by connecting Probe's BNC connector to Channel X end. Also I connected oscilloscope hook tip to demo 2 end and also ground output to ground end.

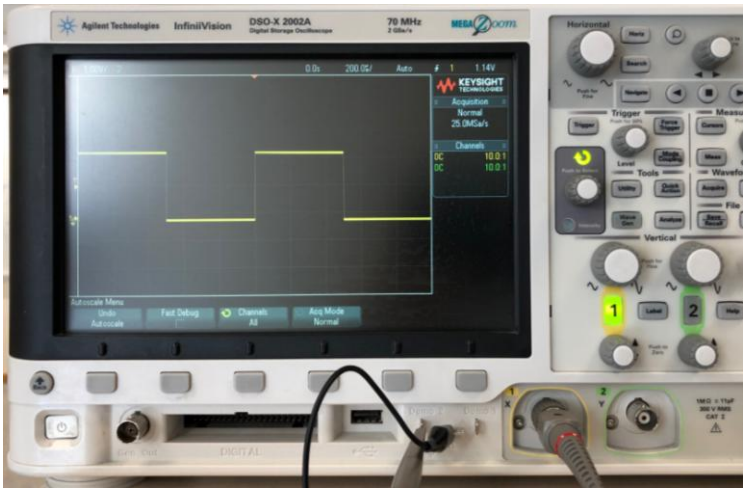

Figure1 – Probe compensation

2 – In positive edge triggering, trigger samples according to rising slope; in negative edge triggering, trigger samples data with falling slope. We can say that positive edge triggering is an example of positive sine wave and also negative edge triggering is an example of negative sine wave.

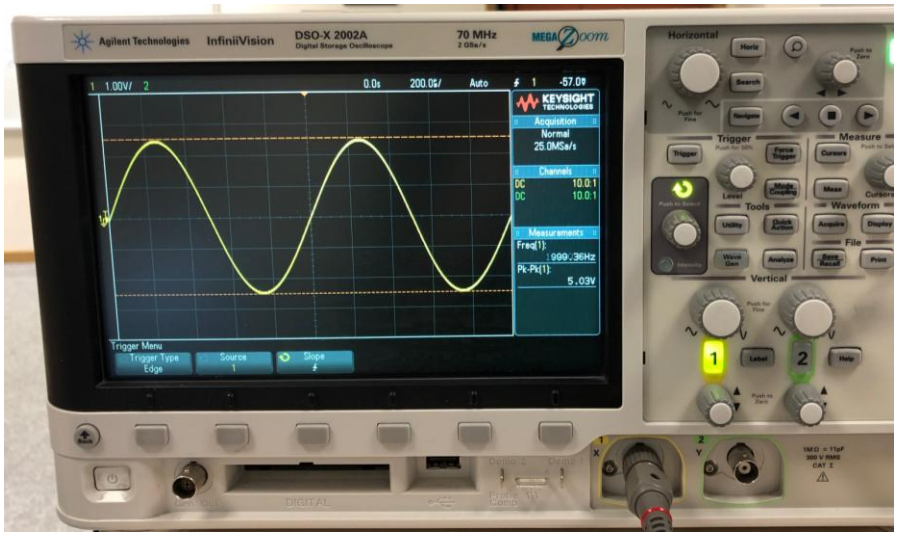

Figure2 – Positive Edge Triggering

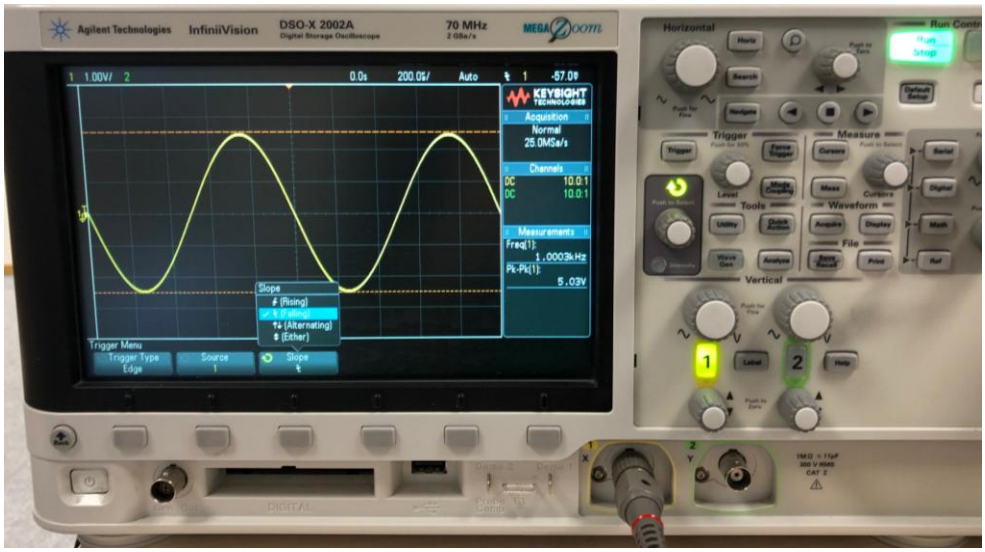

Figure3 – Negative Edge Triggering

3 – Oscilloscope's triggering function is very important to see clear signals. With using triggering, we can stabilize repetitive waveforms and observe stable signal. When we change trigger, signal slides to left or right unless trigger exceeds the wave. If trigger exceeds, signal will be meaningless.

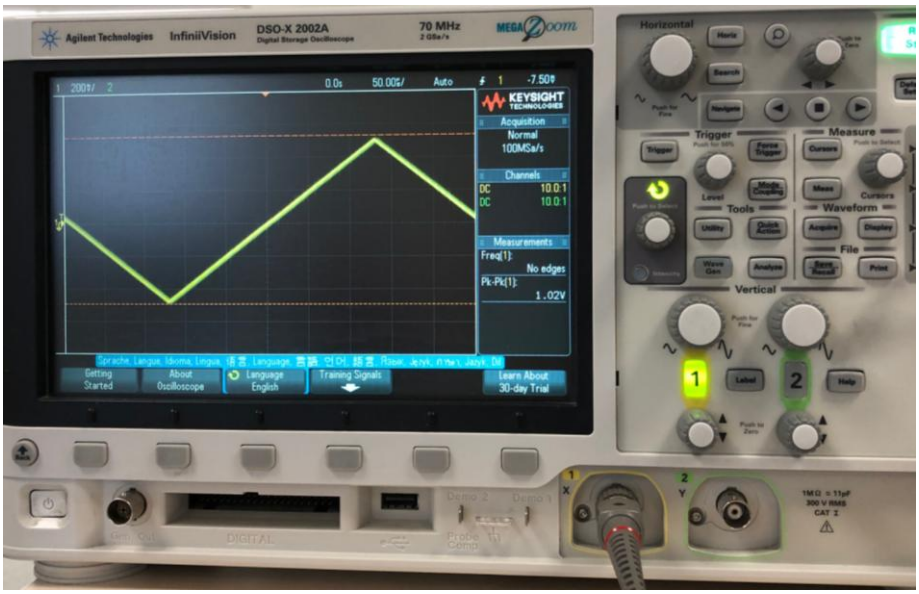

Figure4 – Original wave without triggering

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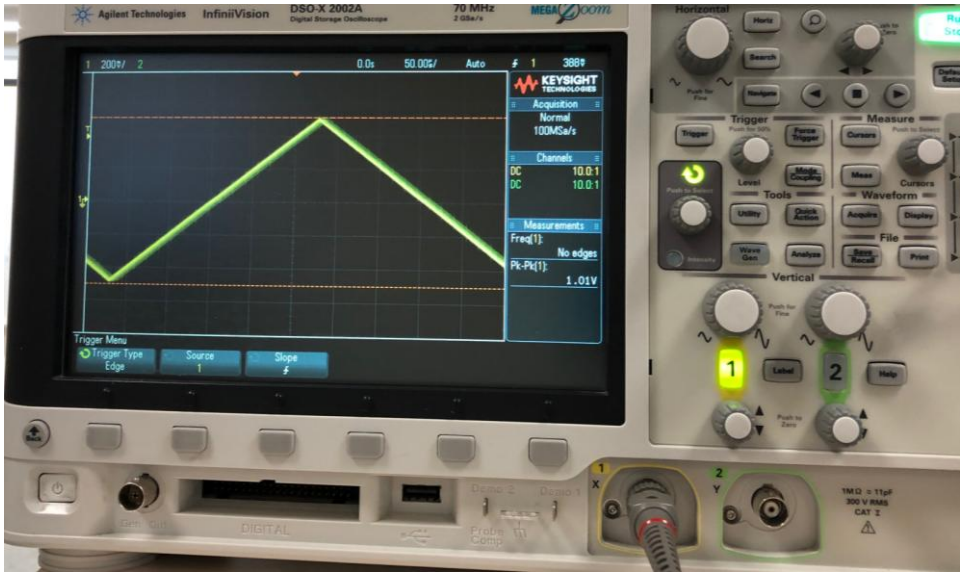

Figure5 – Trigger up

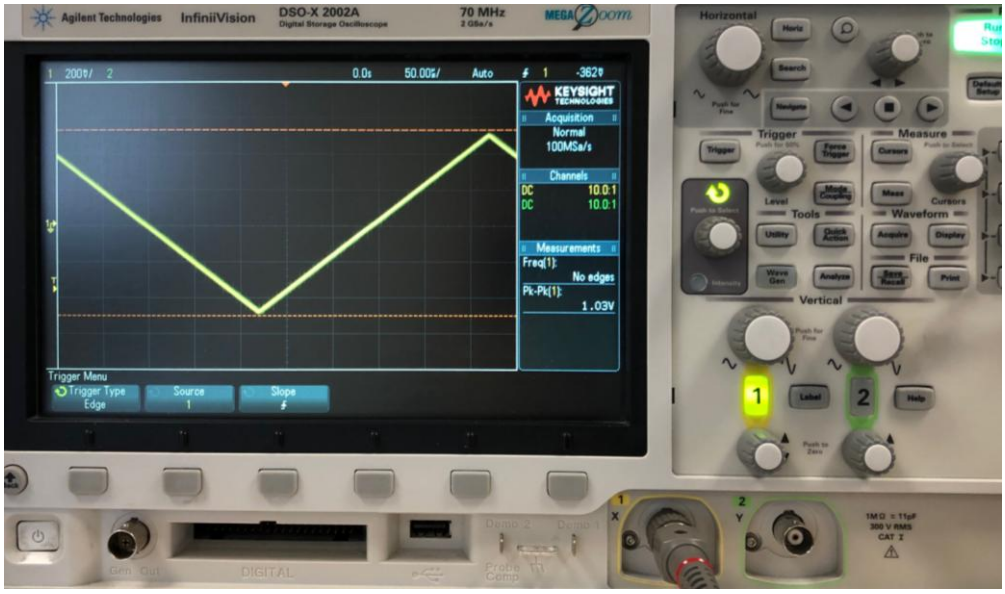

Figure6 – Trigger Down

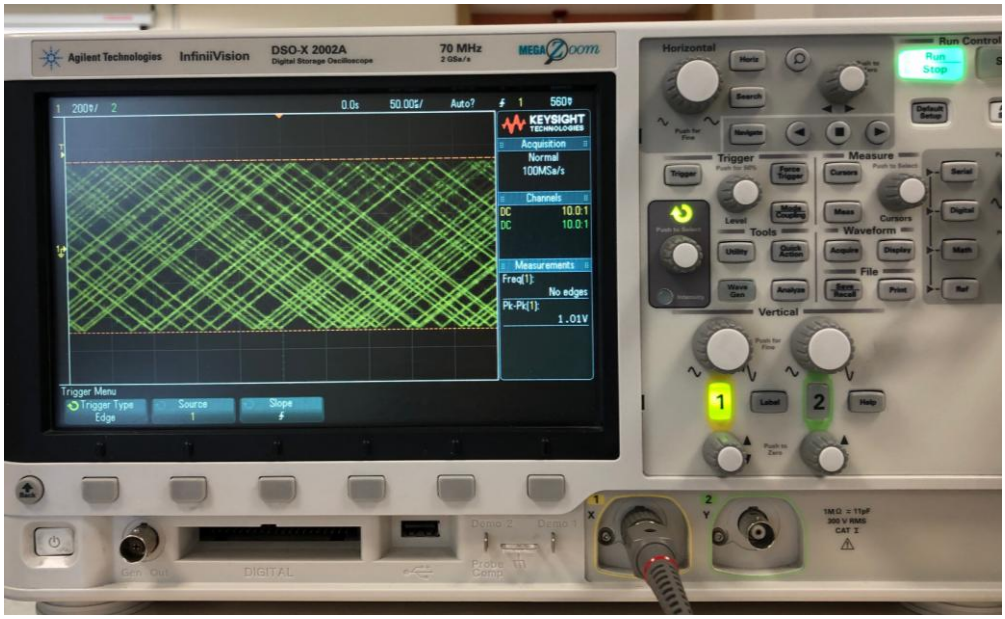

Figure7 – Trigger Exceeds

4 – Digital to analog converter basically converts digital signal to analog signal. Also analog to digital converter converts analog signal to digital signal. A digital oscilloscope uses Analog-to-digital converter (ADC). A digital oscilloscope samples the waveform and uses an analog-to-digital converter to convert the voltage into digital information. We use acquisition modes to see clear signals. There is not many difference between acquisition modes.

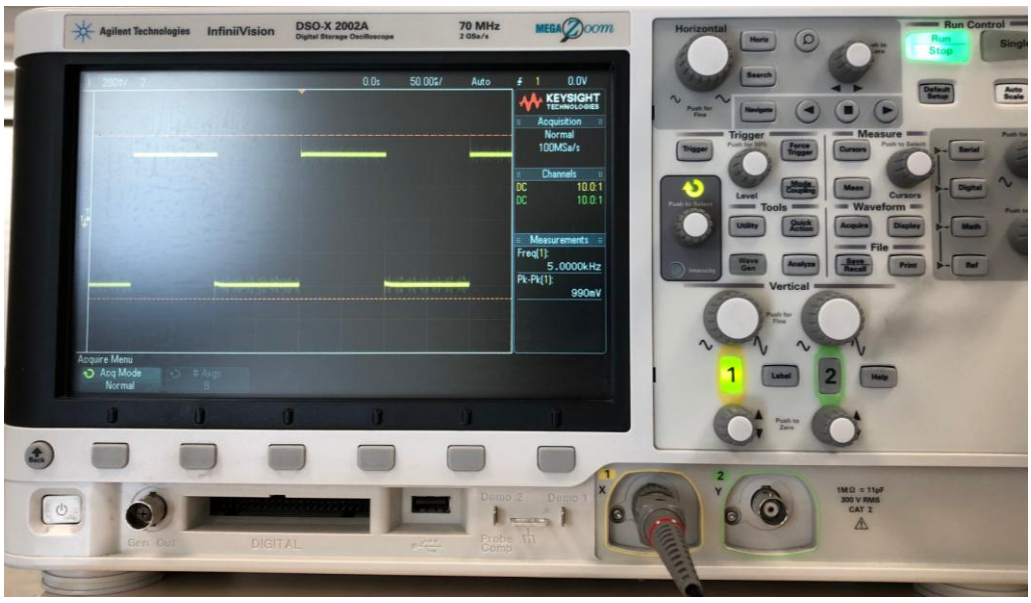

Figure8 – Sample (Normal Acquisition)

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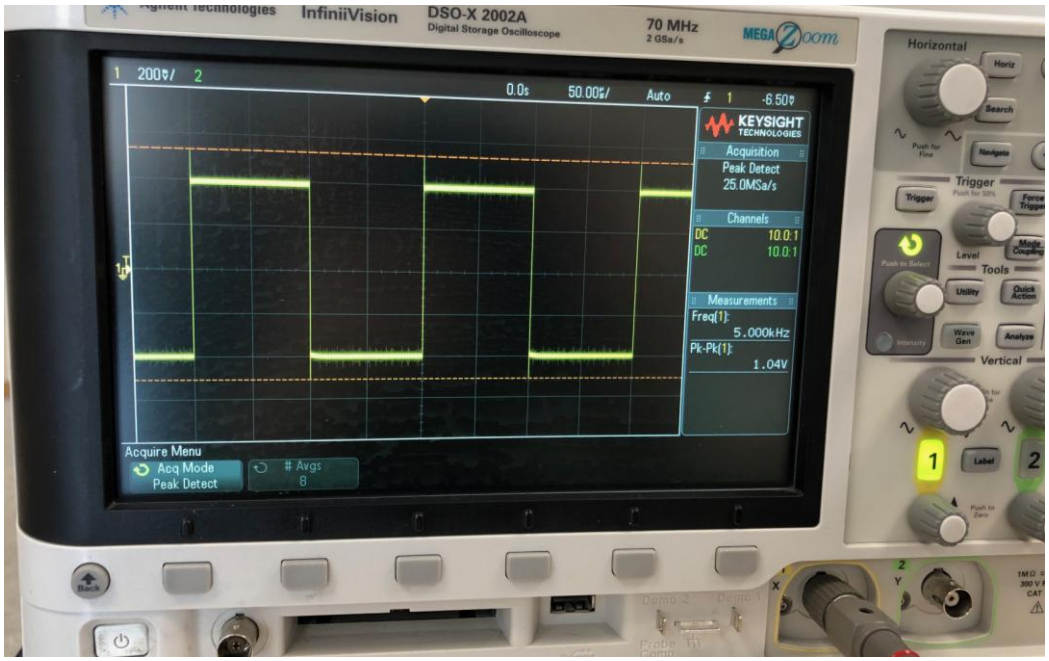

Figure9 – Peak Detect (Acq. Mode)

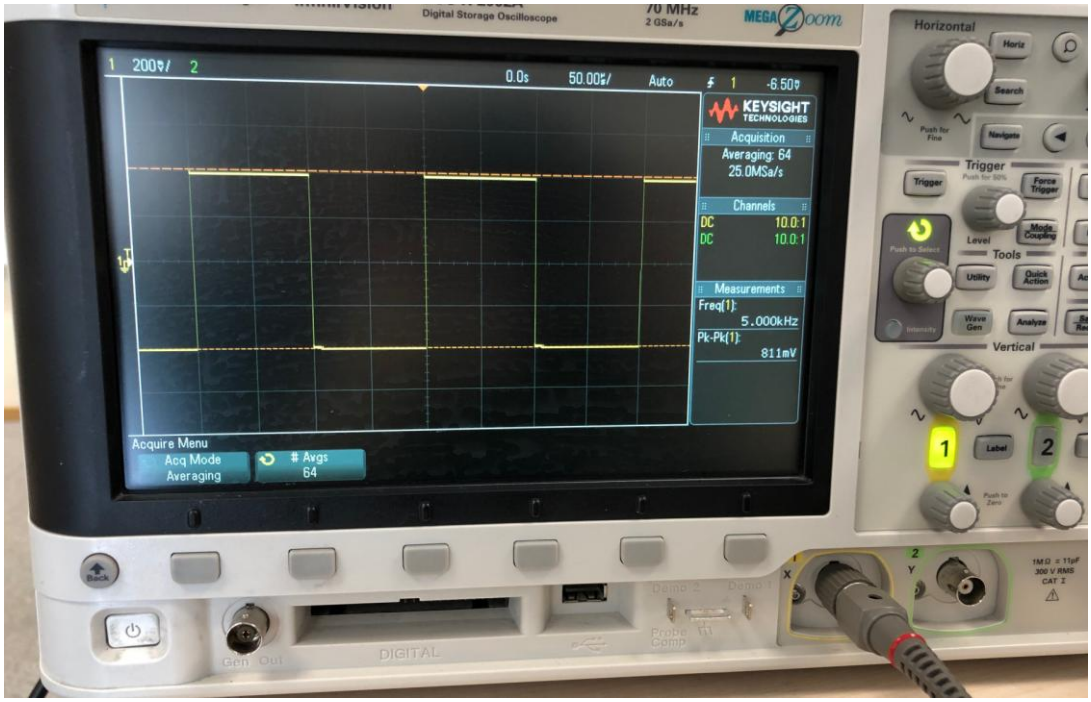

Figure10 – Average (64) (Acq. Mode)

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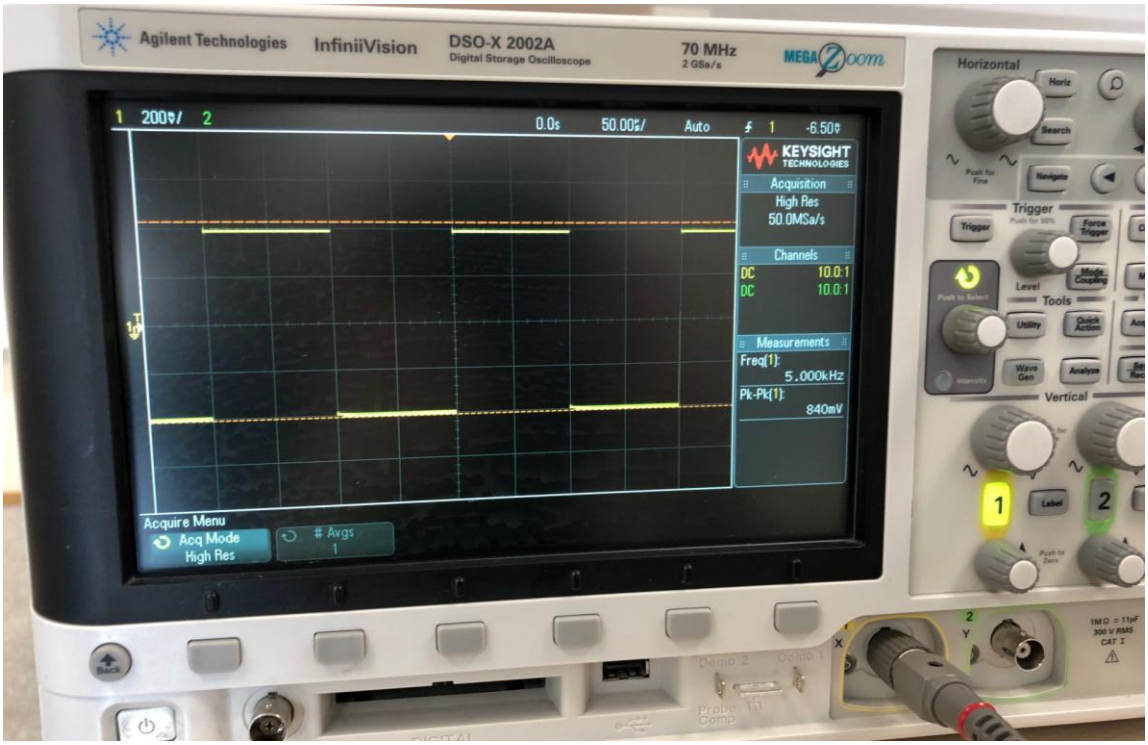

Figure11 – High Resolution (Acq. Mode)

5 – AC coupling deletes the direct DC voltage from signal. So, signal will slide down when we use AC coupling. If we use 1V DC offset, our signal will be at the center of screen.

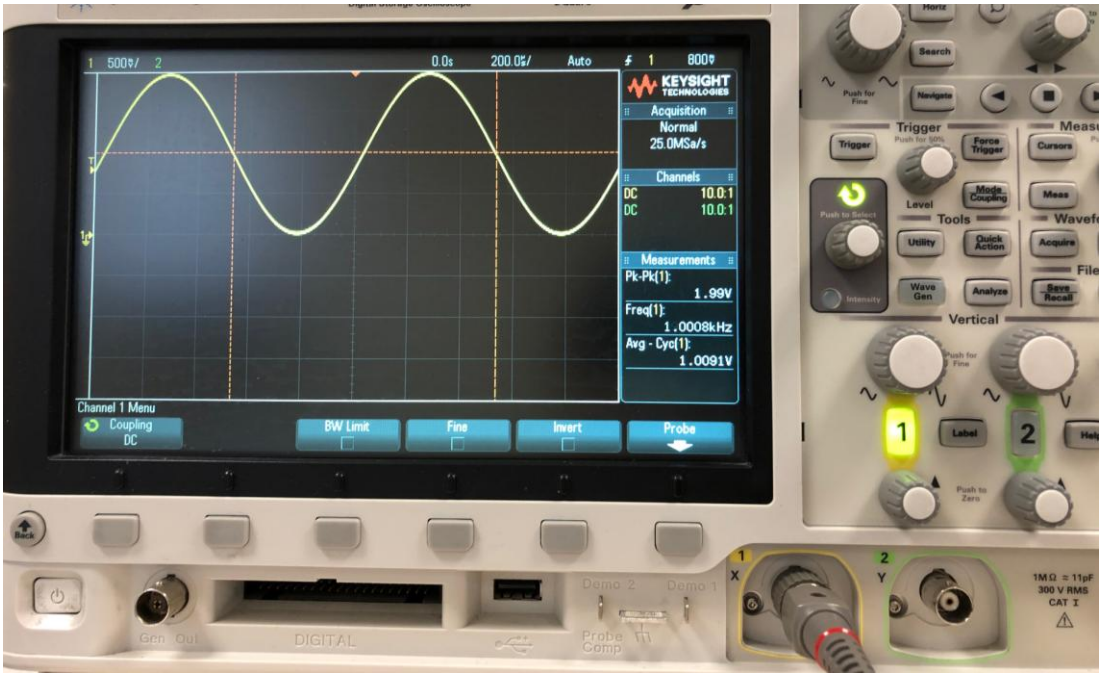

Figure12 – DC coupling (with 1V DC offset)

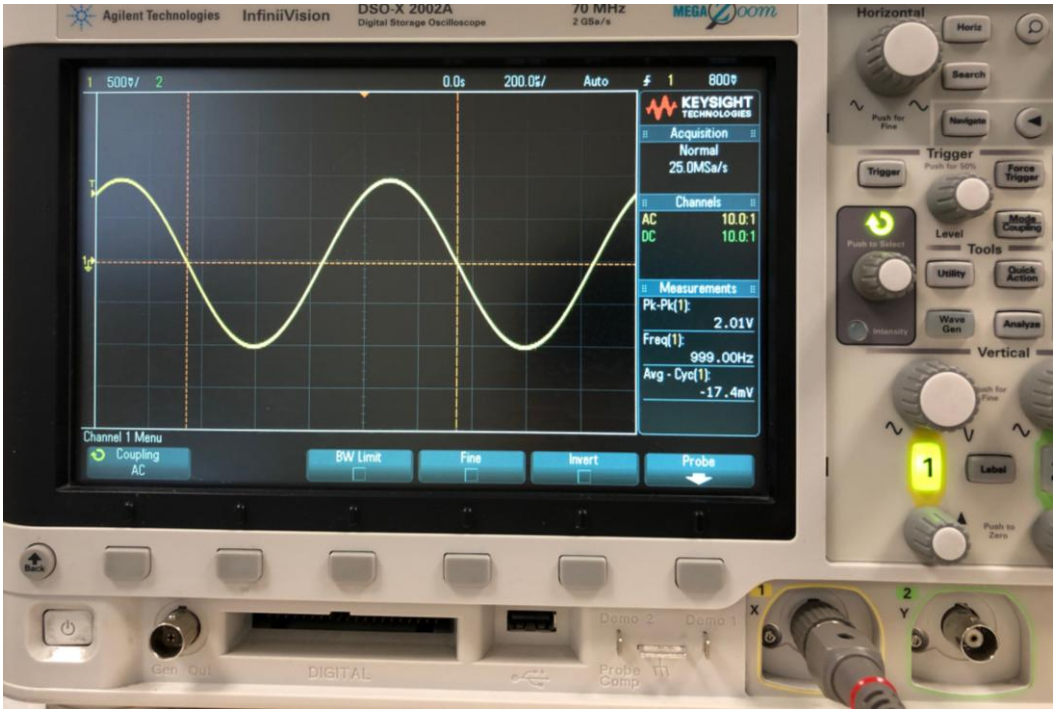

Figure13 – AC coupling (with 1V DC offset)

6 – Breadboard provides us a useful space to design circuits without using many cables.

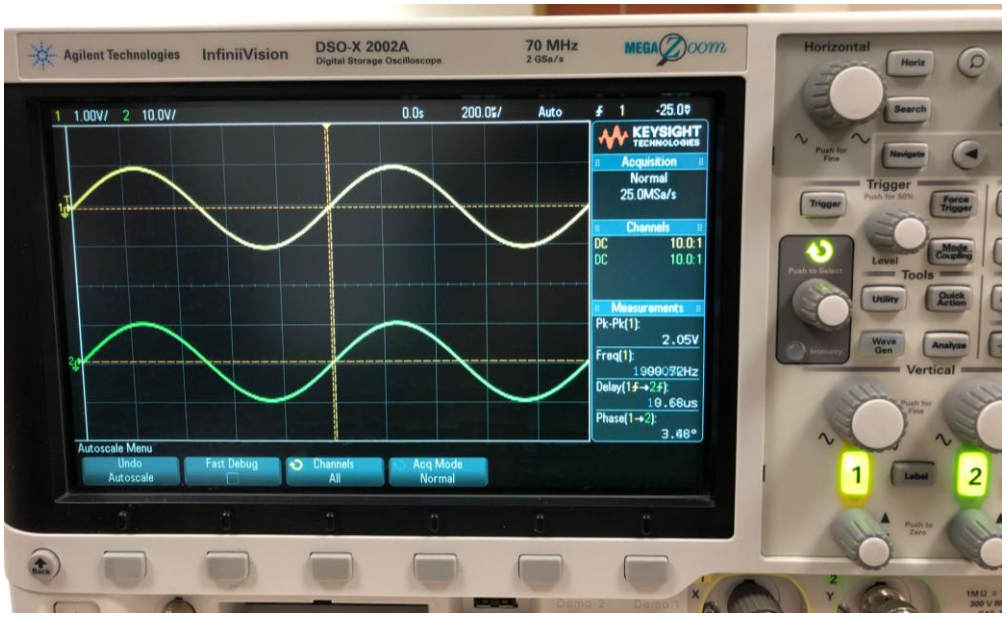

Figure14 – 1kHz Signals

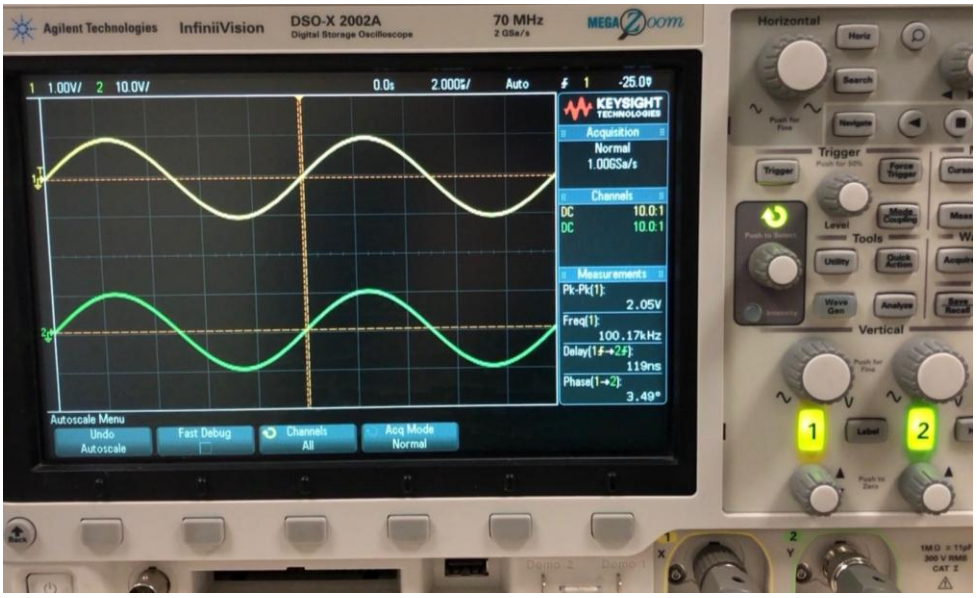

Figure15 – 100kHz Signals

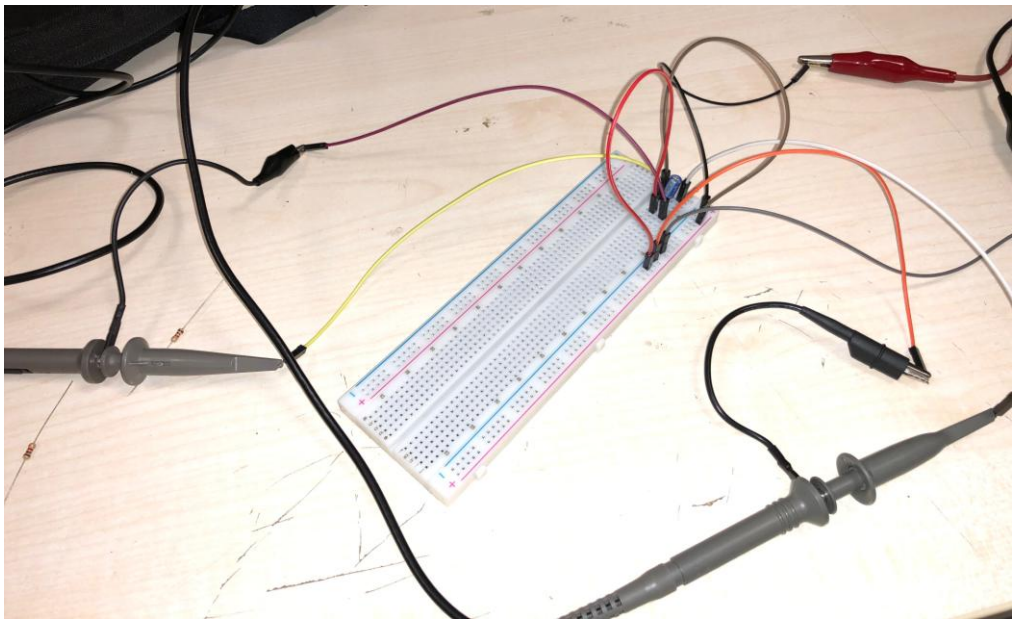

Figure16 – Breadboard Circuit

The difference between these two experiment stems from frequency. Also there are a lot of factors such as our equipments may not be ideal but main cause is frequency and lower frequency lead to bigger phase.