

Analog Discovery 2 Tutorial – Part 1

This tutorial is based around [Analog Discovery 2 Quick-Start Guide](#) video series on YouTube:

Goal 1: *Become familiar with the Analog Discovery 2 hardware*

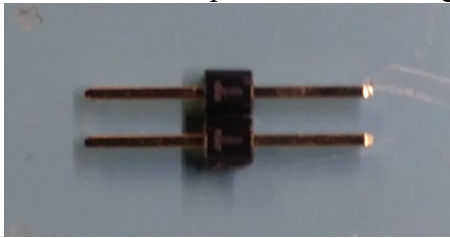
- Watch from 0:00 to 2:14 and from 5:14 to 8:30 of the introduction video: [Introduction](#)

Goal 2: *Install the software to control the hardware (WaveForms)*

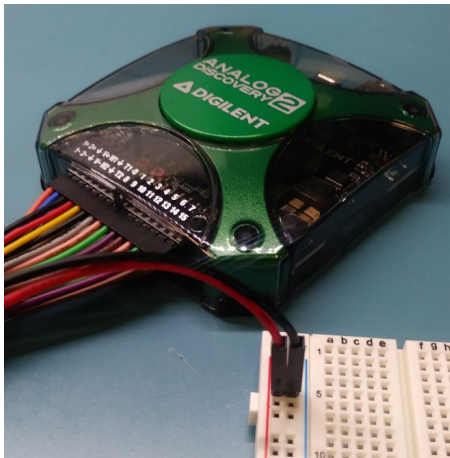
- Watch the installation guide for your particular OS.
 - [Windows](#)
 - [Mac](#)
 - [Linux](#)
- Visit the following Digilent Webpage: [WaveForms](#)
- Use the “Latest Installers for All Operating Systems” link on the right side of the page to download the latest version of WaveForms.
- Install WaveForms on your OS.

Goal 3: *Learn to use the programmable positive power supply*

- Watch the following video on setting/adjusting the power supply: [Power Supply](#)
- With the Analog Discovery 2 module disconnected from your computer, insert the 30-pin wire breakout into the 30-pin connector of the Analog Discovery 2 module.
- Break off two header pins for connecting the black and red wires to your breadboard.



- Using the two header pins, connect the red and black wires to your breadboard. Be certain you understand how breadboards are connected internally so you do not short the two wires.



- Use the USB cable to connect the Analog Discovery 2 module to your computer.
- Open WaveForms.
- Open the Supplies tab.

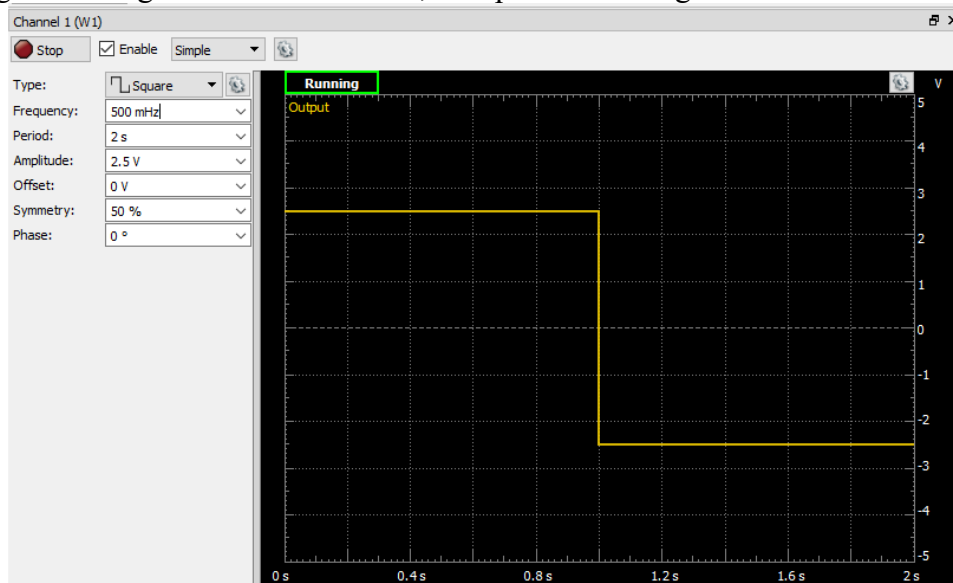
- Attach wires to your DMM leads. Insert the wires into the breadboard so you can measure the output voltage of positive supply of the Analog Discovery 2 module.
- On the Supplies tab, practice enabling/disabling and adjusting the positive power supply voltage. Practice measuring the voltage with your DMM.

Analog Discovery 2 Tutorial – Part 2

This tutorial is based around [Analog Discovery 2 Quick-Start Guide](#) video series on YouTube.

Goal 1: *Learn to use the function (waveform) generator*

- Watch from 0:00 to 4:50 of the waveform generator video: [Waveform Generator](#)
 - Don't worry too much about triggering and other more advanced features for now. We're primarily interested in generating basic waveforms.
- Using the Wavegen tab of Waveforms, set up the following waveform on channel 1:



- This is 5V peak-to-peak square wave (note that the amplitude setting is for peak voltage) with a two second period.
- Use your DMM to verify that the waveform generator is working.
 - Set your DMM to measure DC volts.
 - Connector your DMM's black lead to one of the black wires (ground) of the Analog Discovery 2 breakout harness.
 - Likewise, connect your DMM's red lead to the yellow harness wire (waveform generator 1).
 - Your DMM's display should be alternating between +2.5V to -2.5V every second. If you're not seeing anything, make sure the waveform generator is enabled and running.
- Note that a DMM is not the proper tool to measure most waveforms. (An oscilloscope is the correct tool). But a DMM is fine for measuring very slow square waves.
- On your own:
 - Set-up and measure a 3V peak-to-peak square wave with a four second period.
 - Make the square-wave go from 0V to 3V, not -1.5V to 1.5V. To achieve this you'll need to enter an offset.

Analog Discovery 2 Tutorial – Part 3

This tutorial is based around [Analog Discovery 2 Quick-Start Guide](#) video series on YouTube.

Goal 1: *Learn to use the oscilloscope*

- Oscilloscopes are complicated pieces of equipment that take a long time to master. But a beginner, if properly directed, can quickly become proficient at using an oscilloscope to measure basic periodic waveforms. All that is to say, don't be discouraged if you feel overwhelmed while trying to learn the oscilloscope. For the purposes of this class, we are only interested in a small portion of their capabilities. Take your time and slowly build on what you learn.
- I think the best approach for learning how to use oscilloscopes remotely is to first watch several videos of professionals giving introductory lessons. Hopefully a mixture of teaching styles and approaches will help clear away the mystery. Links to such YouTube videos are below. When watching these videos, don't worry about catching every detail, but try to get a good understanding of the following fundamentals:
 - Vertical scaling (volts/division)
 - Horizontal scaling (seconds/division)
 - Triggering (We're mostly just concerned with rising edge falling-edge triggering methods.)
 - Being able to set up an oscilloscope to see/measure a basic periodic waveform (sine wave, square wave, etc.)
- Introductory oscilloscope videos:
 - <https://www.youtube.com/watch?v=Iq4QlfH-oqk>
 - <https://www.youtube.com/watch?v=CzY2abWCVTY>
 - https://www.youtube.com/watch?v=ISHAE_Y6snc
- Now watch the following video which covers the oscilloscope function of the Analog Discovery 2 module.
 - https://www.youtube.com/watch?v=ln1ETnKmKk8&list=PLSTiCUiN_BoLtf_bWtNzhh3VUP-KDvv91&index=8&t=0s
- As an example, use a 10k resistor and a .1uF (100nF) capacitor to form a series RC circuit. Go back to the 8:20 mark of the previous video and follow along. Try to mimic her actions. Note that you are using different R and C values, so your time constant will be different.
- On your own:
 - Set the function (waveform) generator tool of the Analog Discovery 2 module to a waveform of your choice. Use the oscilloscope tool to measure and verify the output of the function generator.