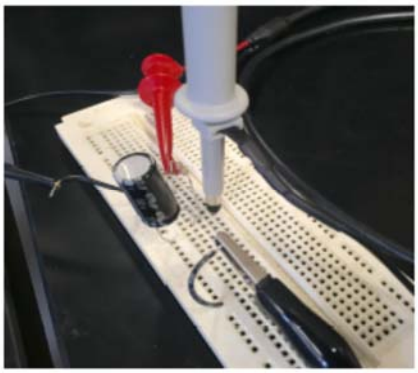
WaveForms is a virtual instrument software suite produced by Digilent Inc. You can use it as a PC-based oscilloscope, waveform generator, voltmeter, spectrum analyzer, etc. We have set up the hardware to use this for making Bode plots for Labs 4, 5, and 7.

Setting Up the Black-Box

There are two Bode plotter boxes that will normally be out on the back two benches in room 196; if they are not there, then a TA can get one out of the cabinet. The *WaveForms* software sets up signals in the black-box and reads back the response of your circuit through a USB link.

Connect a box to one of the workstation USB ports. Wire your circuit to the two BNC ports on the box. Connect the BNC port labeled 'Vin' to the input of your circuit (it is the source of the test signal) and the 'Vout' port to your output (it is the sensing port). If you use this setup for lab 5 BE SURE TO USE A 10X PROBE BETWEEN YOUR CIRCUIT AND THE BOX. (In that lab, your circuit puts out up to 80 volts and that is enough to damage the box.)

These pictures illustrate connecting the box to the workstation and to a simple RC low pass filter.



To Access the Software:

Go to the Windows start menu for the action: Start > All Programs > Electrical > Digilent > WaveForms. If the USB port has recognized the plotter, you will now have access to a set of virtual instruments implemented in the box.

To Run a Test:

1. When the software opens, it will offer sofbuttons for Analog, Digital, and More Instruments. Choose "More Instruments" and then "Network Analyzer."

2. There is a plotting area on the Network Analyzer page with a set of drop-down lists at the top. Use these lists to set the start frequency, stop frequency, number of measurement steps, etc. set these to match the requirements of the particular lab:
    - The Amplitude list sets the test signal voltage in volts peak so pick a value that will still give an output within the linear range of your circuit.
    - Max Gain sets the sensing amplifier so it will not overload on your output signal, so choose the lowest value that will be bigger than the highest output of your circuit.
    - Take at least 25 steps per decade.
3. Hit the single-shot Run soft button on the upper left of the screen to take data.
4. You can export data from the Files/Export menu as comma separated or tab separated values compatible with Excel or MATLAB ".csv" or ".tab" formats.