



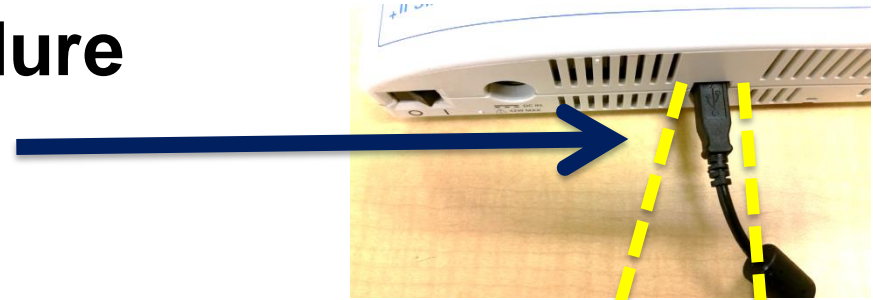
## ELVIS II Orientation

- **ELVIS II Prototype Board**
  - Software access & location
  - Grid layout, features we will use, and Run/Stop functions
    - **DMM** = Digital Multi-Meter (Modes = Volts, Amps, Ohms)
    - **VPS** = Variable Power Supply (**Stacked, Dual-Output**)
    - **Function Generator** and **Oscilloscope** discussed in Testing ELVIS
  - Connections and power up / power down procedures



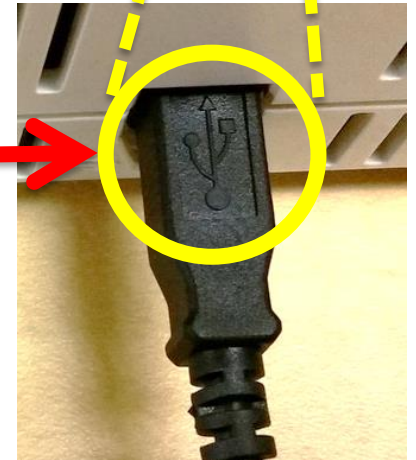
## Power-Up Procedure

1. Connect one end of the USB cable to the back of the board, and the other end to the PC workstation.

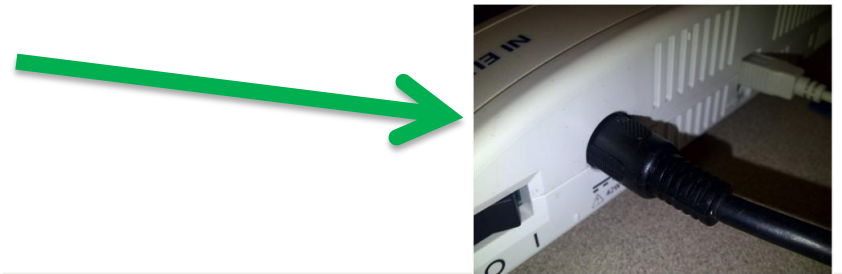


**ATTENTION!!!**

Make sure that the USB symbol on the connector is **facing up!**  
Connecting the cable the wrong way **WILL** damage the board!



2. Connect one end of the power supply cable to the back of the board, and the other end to the 120V AC outlet.





## Power-Up Procedure (cont'd)

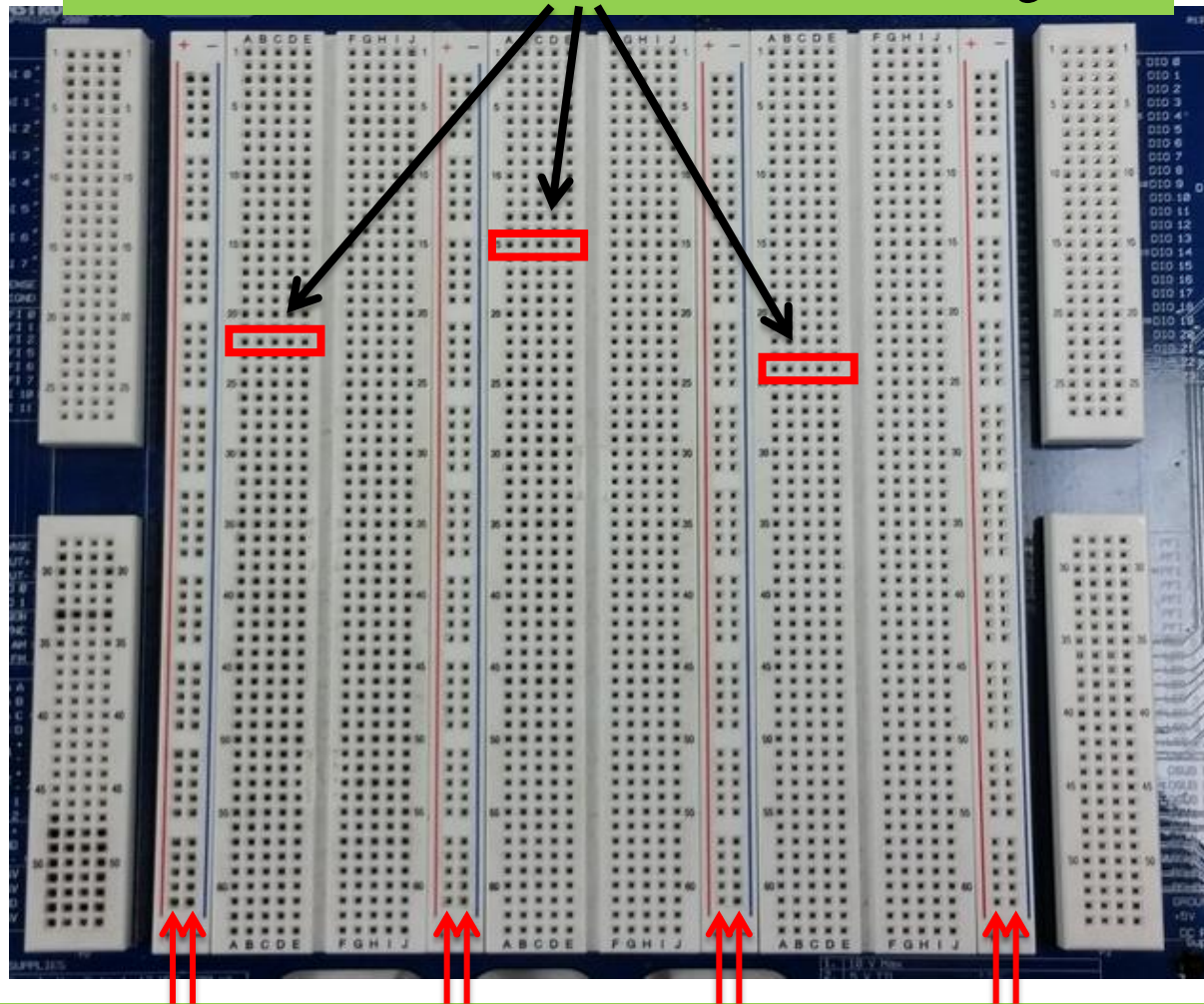
3. Turn on the power switch on the back side of the board.
4. Wait until the “**Ready**” LED light turns on. That should not take longer than several seconds. If the “**Ready**” light remains off, inform your TA.
5. Prototyping board power switch for FGEN, VPS, Oscilloscope, +/-15V, etc.
6. Start the NI ELVIS Instrument Launcher from the Windows Start menu
  - The easiest way to find it is by typing “Elvis” in the start menu.





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Each of these five-set of contacts are tied together

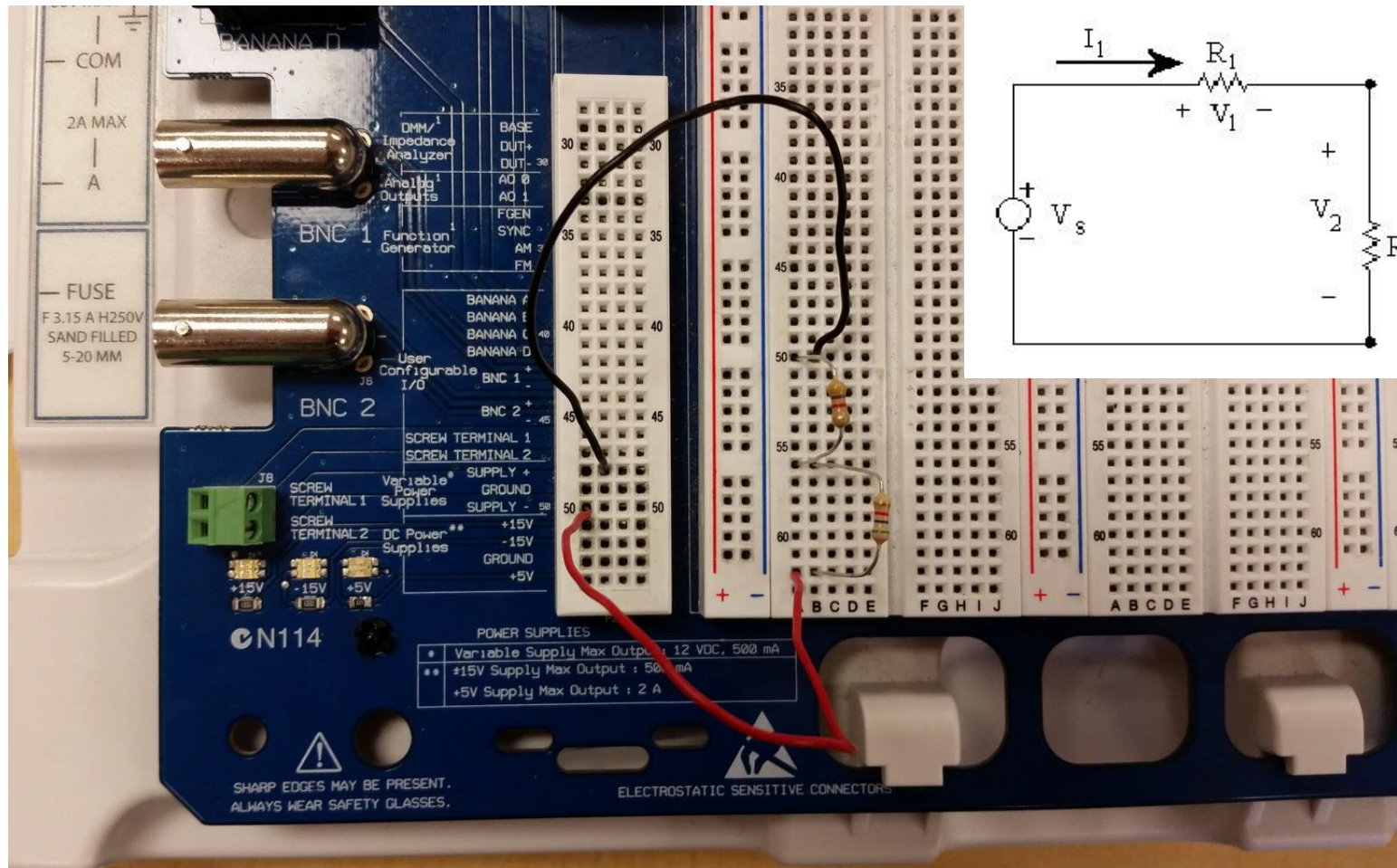


All pins on each of these columns are connected together.  
So the user can use “+” for DC power supply and “-” for ground



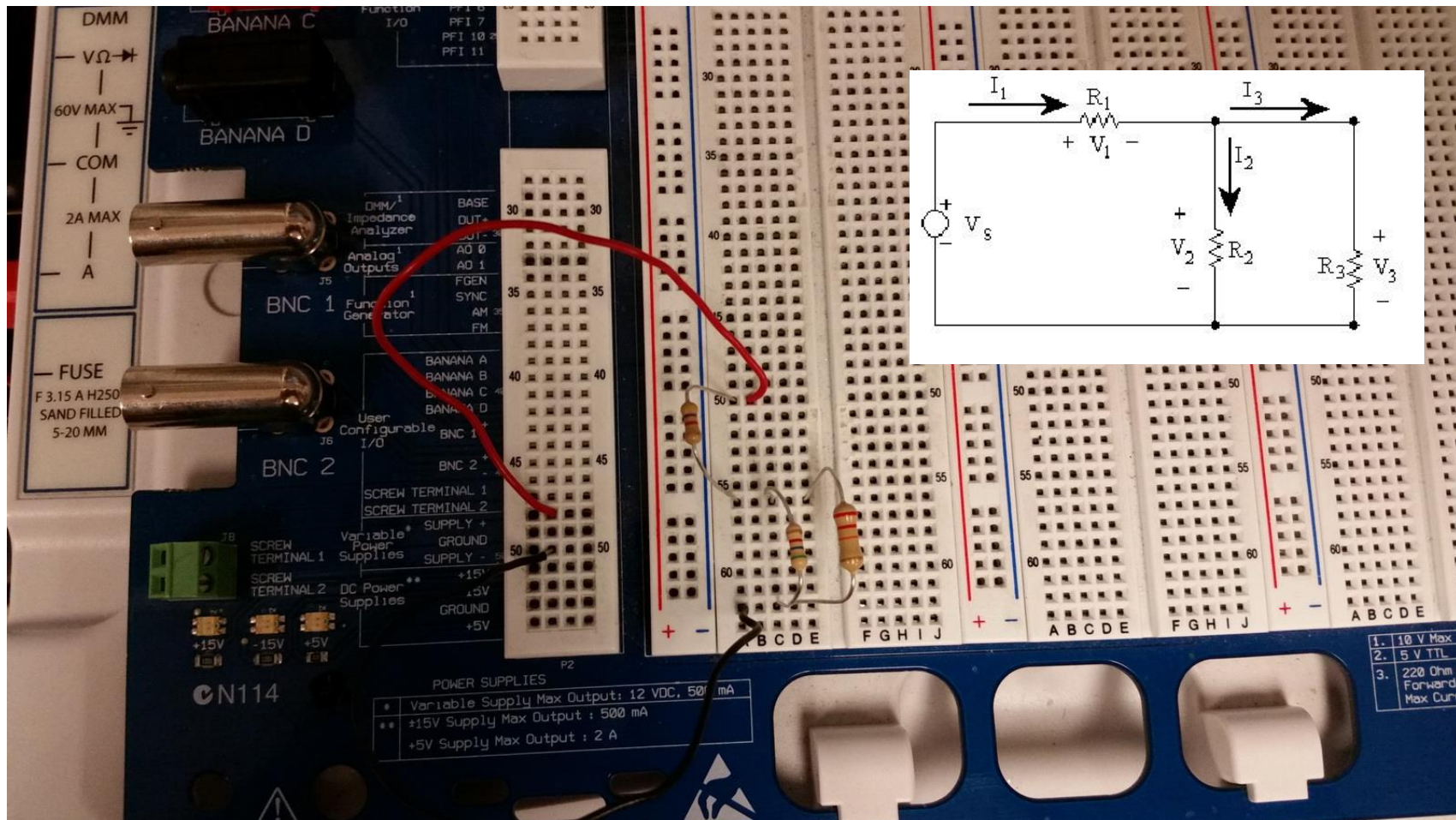


## Voltage Divider





## Voltage Divider with a Current Divider





## Before taking measurements:

- **Null** the voltage / current meters **before** taking measurements.
- Measure **all** component values and record them. That includes resistors, capacitors, inductors, etc.
- Measure **all** source voltages with the DMM. That includes the VPS, +/-15 DC sources, etc.





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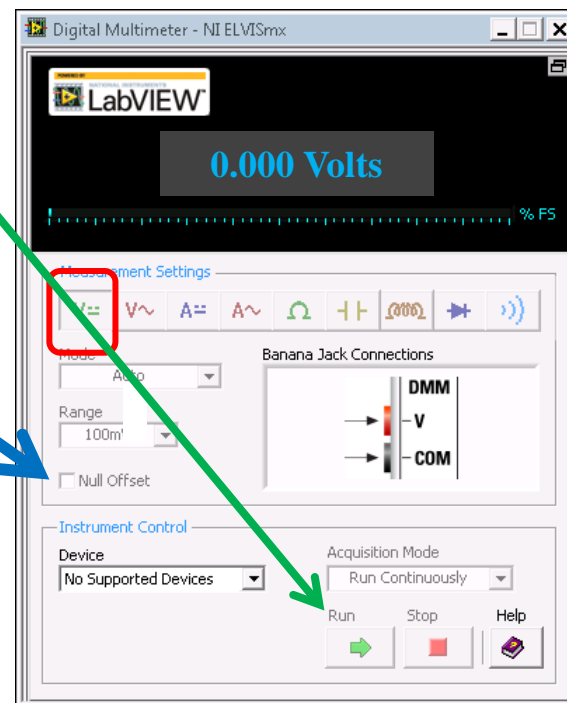
## Nulling the voltage meter

**1. Short the two probes**

**2. Open the DC voltmeter and run it.**

**3. Check “Null Offset” and leave it checked!**  
**The meter should now read exactly zero volts.**

**4. You are now ready to measure voltage!**







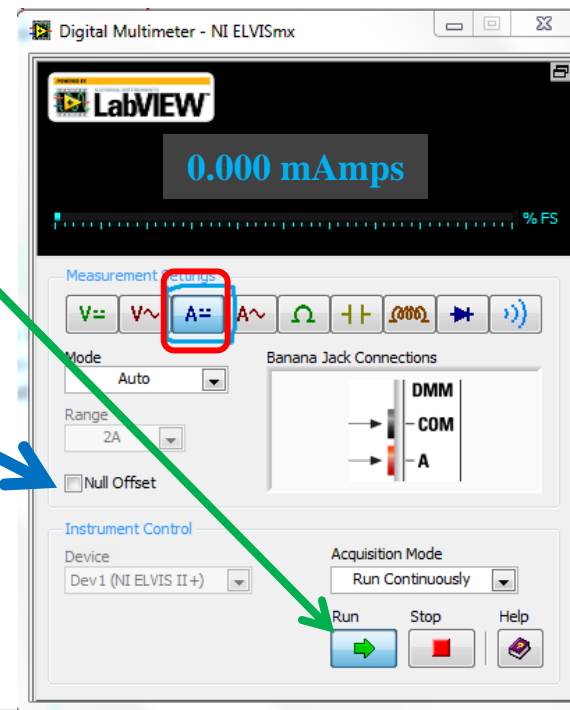
## Nulling the current meter

1. Disconnect the two probes (open ckt)

2. Open the DC ammeter and run it.

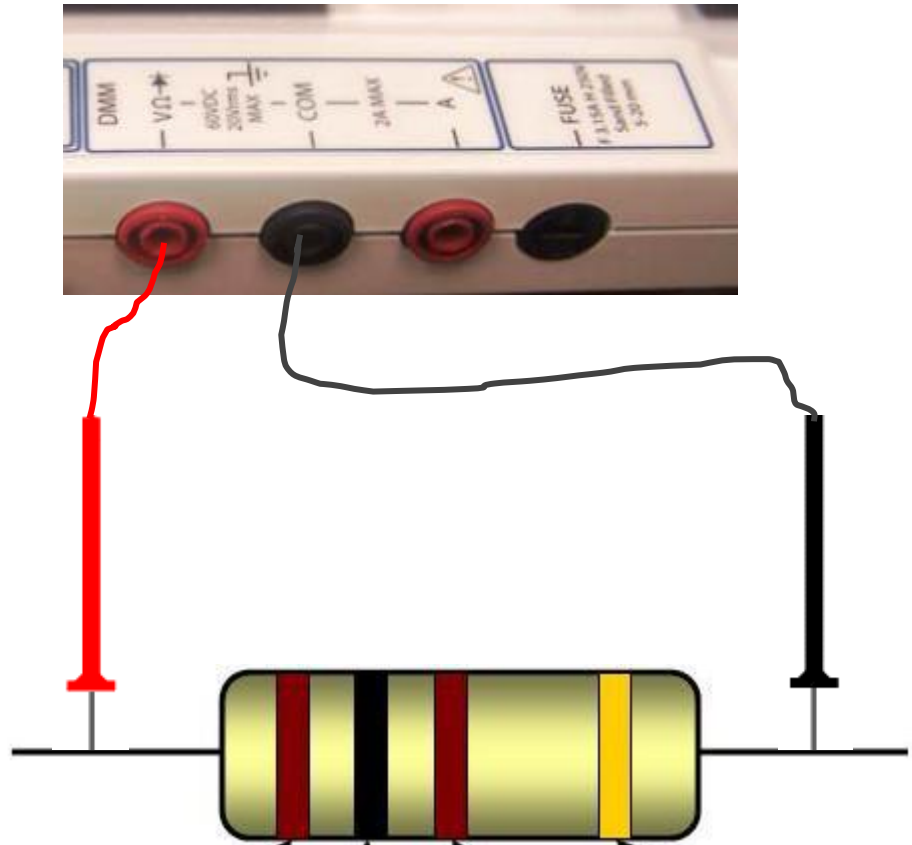
3. Check “Null Offset” and leave it checked!  
The meter should now read exactly zero Amps.

4. You are now ready to measure current!



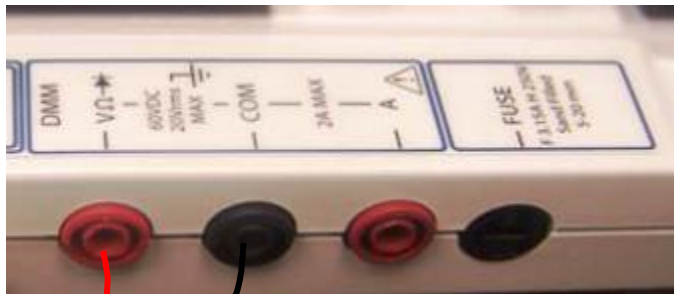


## DMM Measurements (Ohms)



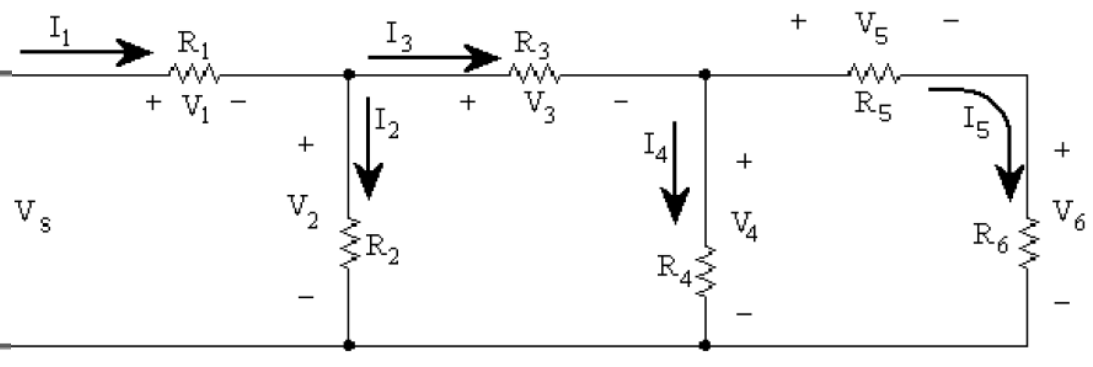
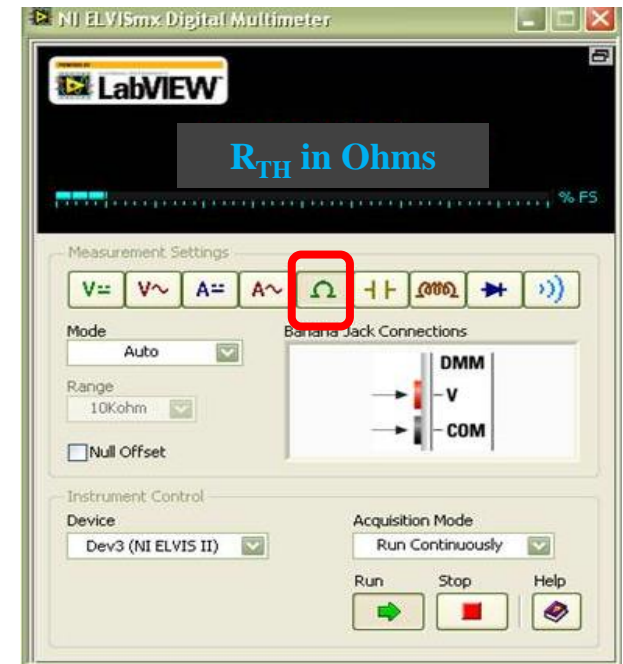


## Measuring $R_{TH}$



Connect the  
Ohm meter

Disconnect  
VPS's





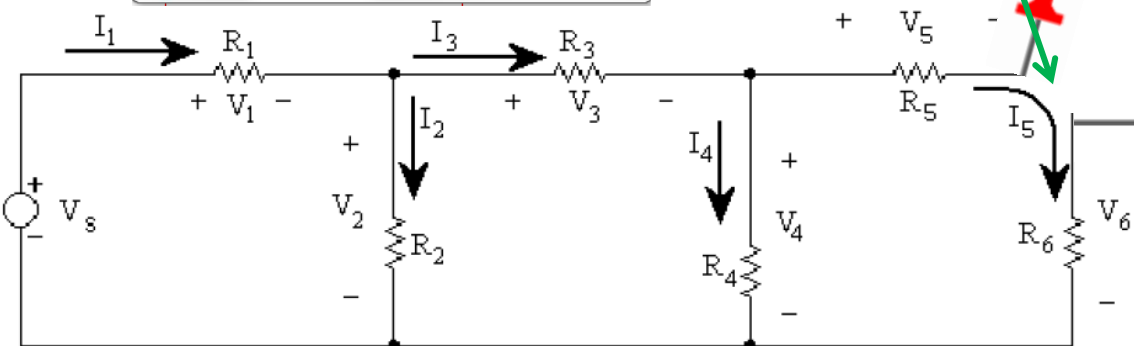
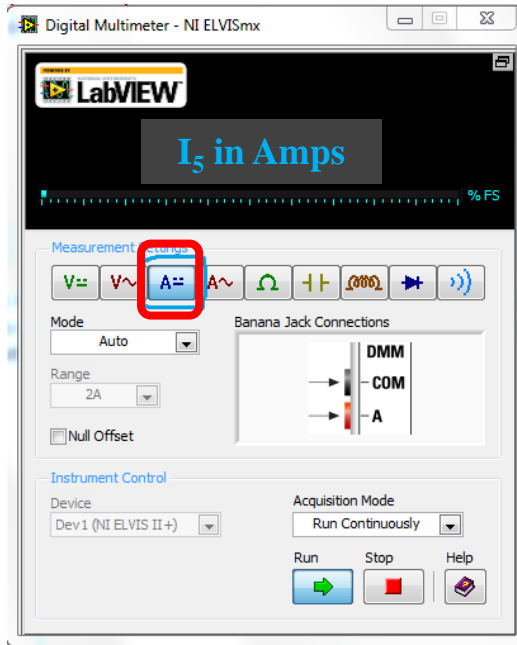




## DMM Measurements (Amps)

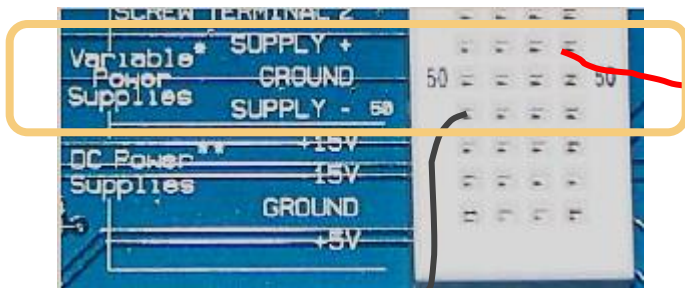
Complete the circuit with the current meter

Open the circuit

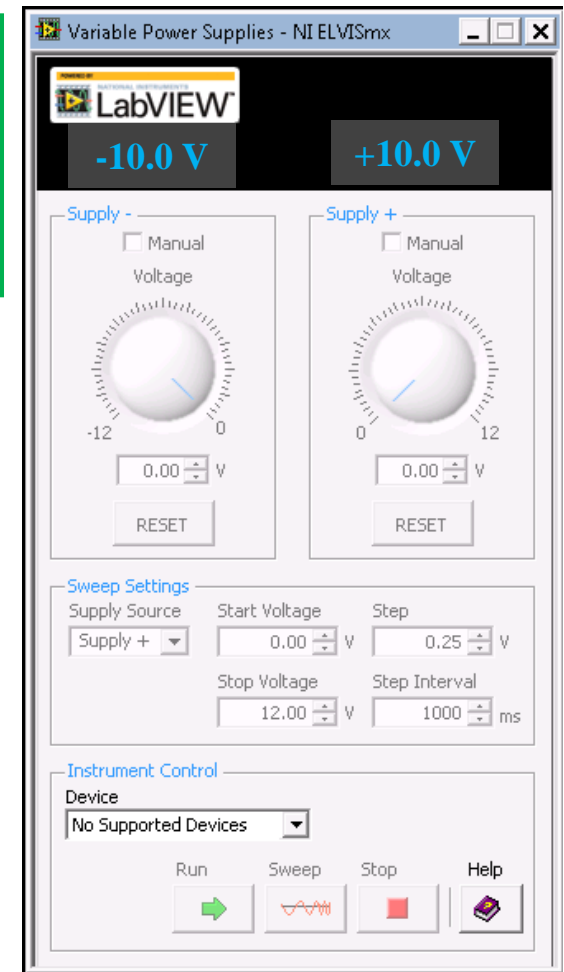




## VPS => Dual Configuration



Turn on the  
Prototyping Board  
Power Switch to  
enable VPS's





## % Difference = Relative change \* 100

- Reference link

[http://en.wikipedia.org/wiki/Relative\\_change\\_and\\_difference](http://en.wikipedia.org/wiki/Relative_change_and_difference)

The absolute difference between two values is not always a good way to compare the numbers. For instance, the absolute difference of 1 between 6 and 5 is more significant than the same absolute difference between 100,000,001 and 100,000,000. We can adjust the comparison to take into account the "size" of the quantities involved, by defining, for positive values of  $x_{reference}$ :

$$\text{Relative change}(x, x_{reference}) = \frac{\text{Actual change}}{x_{reference}} = \frac{\Delta}{x_{reference}} = \frac{x - x_{reference}}{x_{reference}}.$$

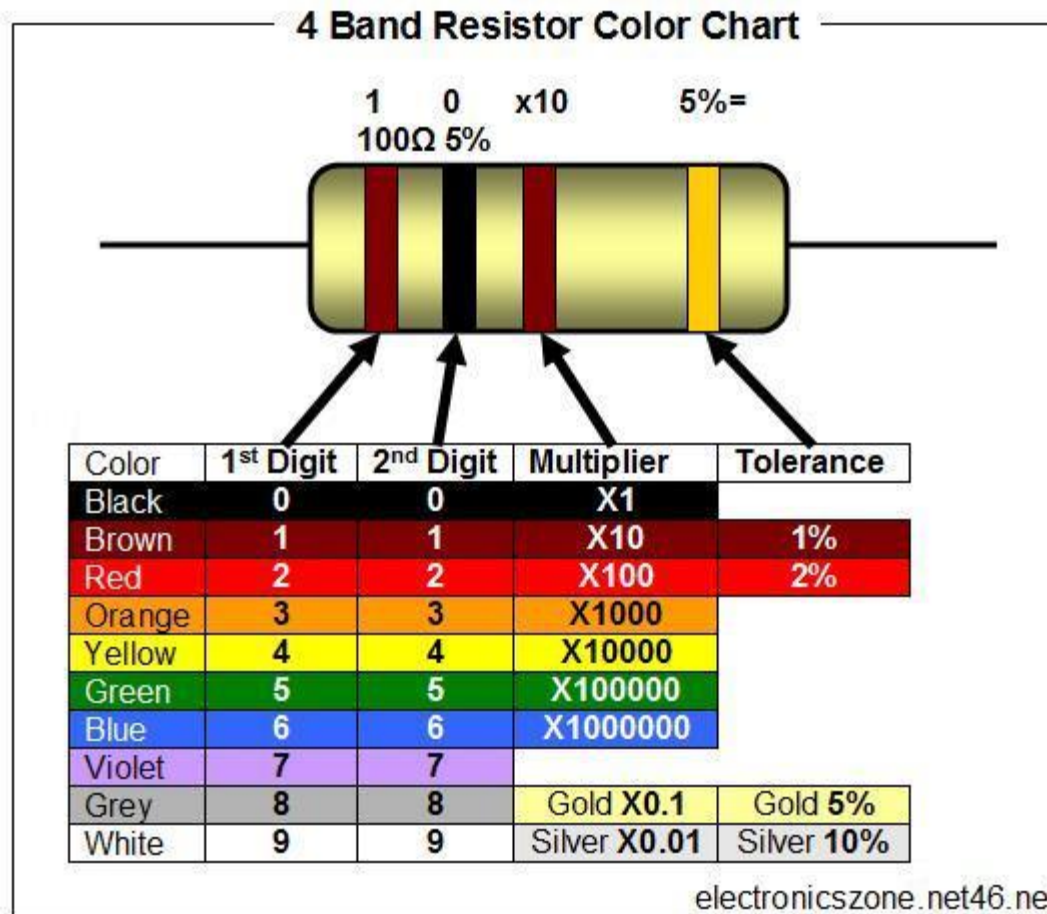
The relative change is not defined if the reference value ( $x_{reference}$ ) is zero.

For values greater than the reference value, the relative change should be a positive number and for values that are smaller, the relative change should be negative. The formula given above behaves in this way only if  $x_{reference}$  is positive, and reverses this behavior if  $x_{reference}$  is negative. For example, if we are calibrating a thermometer which reads  $-6^{\circ}\text{C}$  when it should read  $-10^{\circ}\text{C}$ , this formula for relative change (which would be called *relative error* in this application) gives  $((-6) - (-10)) / (-10) = 4/-10 = -0.4$ , yet the reading is too high. To fix this problem we alter the definition of relative change so that it works correctly for all nonzero values of  $x_{reference}$ :

$$\text{Relative change}(x, x_{reference}) = \frac{\text{Actual change}}{|x_{reference}|} = \frac{\Delta}{|x_{reference}|} = \frac{x - x_{reference}}{|x_{reference}|}.$$



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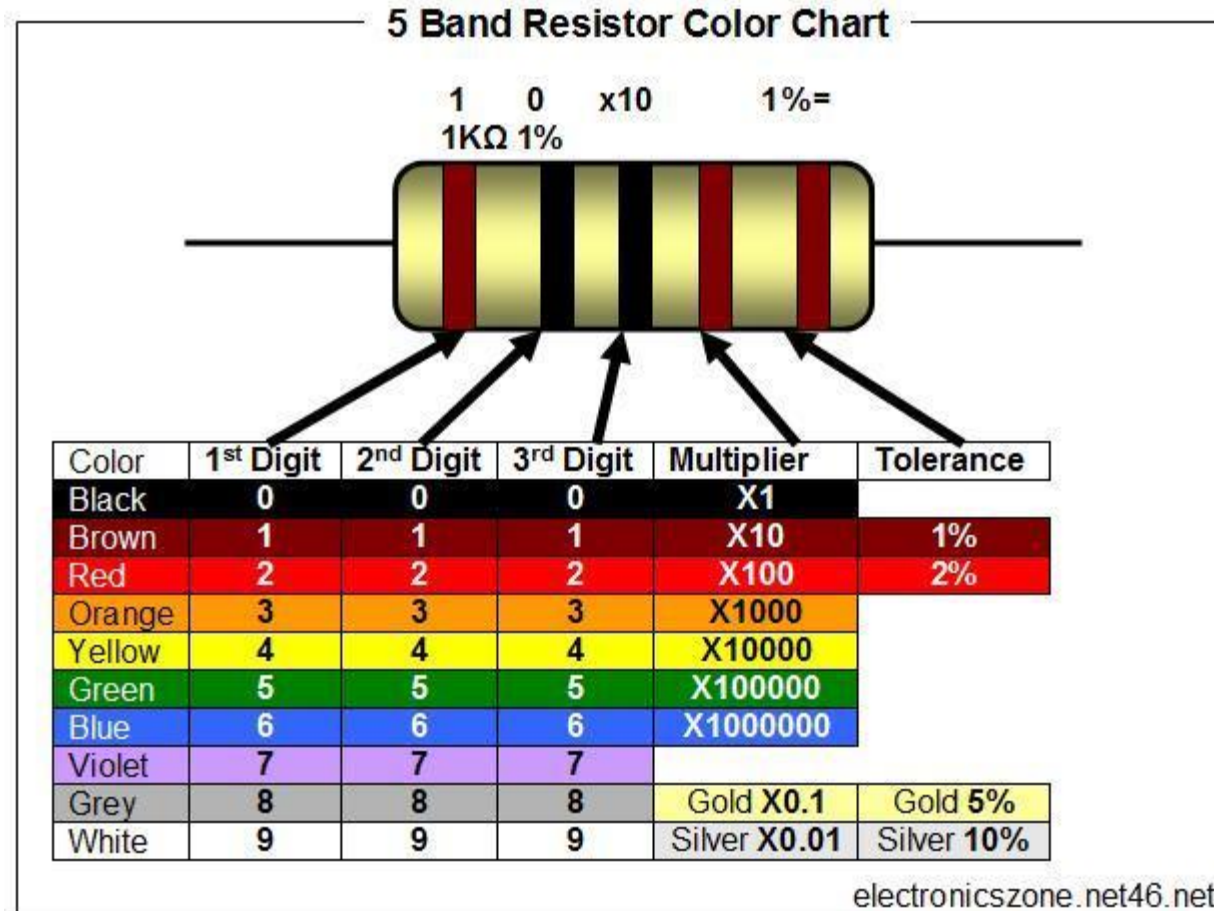


Source: <http://electronicszone.net46.net/articles/how-read-resistors>





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