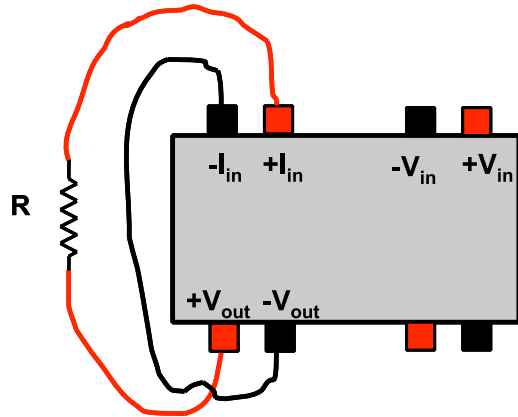


## PH 106: Current and Voltage

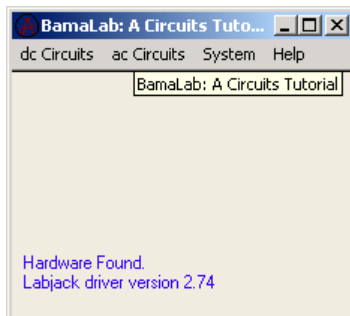
### 1. Resistor

a) Connect your 470  $\Omega$  resistor as shown below. We are applying a potential difference across the resistor and measure the current through the resistor by connecting an Ammeter in series.



Thus one end of the resistor goes to “+V<sub>out</sub>”, the other goes to “+I<sub>in</sub>”. Then “-I<sub>in</sub>” connects back to “-V<sub>out</sub>”.

Now start BamaLab:



Select “Multimeter” from the “dc Circuits” pull down menu.

b) In the “multimeter” window, select from the pull-down menus “Voltage Source” and “Current Measurement”

c) For several values of applied voltage, record the resulting current. Make a table of V, I, and V/I. What is the resistance value you get?

*On your report:*

Table of V, I, and ( $R=V/I$ ) (5 points or so)

### 2. LED

a) Connect the LED in the same way you just connected the resistor.

b) Increase the voltage until you see a clear glow. What is the minimum V needed for a clearly discernable glow? In case you do not see the LED glow at the maximum voltage: turn the LED around – i.e. the leg that was connected to +V<sub>out</sub> now connects to +I<sub>in</sub> and vice versa.

c) What happens to the current when the LED begins to glow? Once it starts to glow, increase the voltage and monitor current. Compare this behavior to what happens as you increase  $V$  for lower  $V$ , when there is no glow.

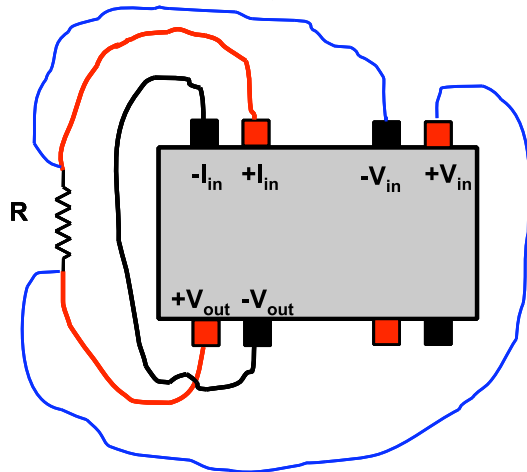
*On your report:*

Minimum  $V$  for observed glow, and resulting  $I$ .

What happens to  $I$  when the LED glows?

### **Current vs. Voltage graphs:**

Close the multimeter panel and open “Current vs. Voltage” from the “dc Circuits” menu. This program measures the voltage drop over the device under investigation thus we need two more wires, shown in blue in the diagram below:



Now you can graph the measured current versus voltage in real time, choose something like 100 points and the full voltage range for this. Try this for the LED and resistor.

Resistor plot OK: \_\_\_\_\_ (instructor initial)

LED plot OK: \_\_\_\_\_ (instructor initial)

Also try the following:

- Series combination of two  $470\ \Omega$  resistors
- Parallel combination of two  $470\ \Omega$  resistors
- LED in series with a  $470\ \Omega$  resistor
- LED in parallel with a  $470\ \Omega$  resistor (two orientations)

Explain your observations in your report.

### **When you are finished:**

- Turn the switch on the side of the box “off.”
- Close the Tutorial software.
- Straighten up your components and wires
- Turn in a hard copy of your report.