

School of Engineering

Department of Electrical and Computer Engineering

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| **ENG 142** | **Fundamental Engineering Design** | **Prof Jesson** |

**Lab # 1: Breadboard Basics and Measuring Electrical Quantities**

**Part I: Breadboard Basics**

A breadboard is a construction base for prototyping of electronics. The term is commonly used to refer to solderless breadboard. Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units (CPUs) [1].

Figure 1 shows a typical small breadboard which is suitable for building simple circuits. Breadboards have many tiny sockets (called 'holes') arranged on a 0.1" grid. The leads of most components can be pushed straight into the holes. ICs are inserted across the central gap with their notch or dot to the left. Wire links can be made with single-core plastic-coated wire of 0.6mm diameter (the standard size). Stranded wire is not suitable because it will crumple when pushed into a hole and it may damage the board if strands break off.

The top and bottom rows are linked horizontally all the way across as shown by the red and black lines on the diagram. The power supply is connected to these rows, + at the top and 0V (zero volts) at the bottom [2].



Figure 1. Typical Breadboard with Socket Interconnections.

Read and follow instructions for handout, Experiment 1: Breadboard Basics.

* You need to complete steps 1 through 9 in the Procedure Section from the handout and fill out the below table.
* Download the breadboard diagram from the class website and use it for your report.

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| **Points** | **Resistance** | **Points** | **Resistance** |
|  |  |  |  |
|  |  |  |  |
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**Part II: Measuring Electrical quantities**



Figure 2. Circuit Diagram.

Identify and find the components of the circuit as shown in Figure 2. Wire the circuit using wires and the breadboard provided. Measure the resistance of R1 using the multimeter. Write your measurement in the lab notebook. Measure the voltage of R1 and V1 (the power supply). Write your measurements. Measure the current (I) flowing through the circuit. Write your measurement.

Discuss and answer following questions in the lab report.

* Describe how resistance, voltage, and current are measured in a circuit.
* Is the measured resistance of R1 within tolerance, , (Remember Gold = 5%, Silver = 10%)
* Is the measured value of the voltage across R1 (VR1) within 10% tolerance if the ideal value of VR1 is 5V?
* What relationship, if any, exists between the voltages V1 and VR1?

**\* Attach this handout at the end of your lab report.**

**Your Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part I: Breadboard Basics**

Lab Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Check by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lab Partner(s): **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part II: Measuring Electrical Quantities**

Lab Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Check by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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[1] Wikipedia, available at: <http://www.widipedia.org>

[2] The electronics club, available at: <http://www.kpsec.freeuk.com/breadb.htm>