Experiment # 0

Properly Using Lab Equipment

EENG 275 - W01

Prepared for: M. Fakoor, Professor

New York Institute of Technology

Prepared by: V. Cavalcante, Student

Partnered with: B. Saks, Student

New York Institute of Technology

September 13th, 2019

Experiment Objectives

- Learn how to utilize the resistor color code
- Learn how to use digital multi-meter as an Ohmmeter, Voltmeter, and Current
- How to use and adjust a power supply
- Learn how to use a breadboard
- How to utilize a potentiometer
- Building a circuit on a breadboard

Equipment Used

1- NYIT supplied Lab Kit
1- Digital Multi-Meter (DMM)
1- 6.8 Ω Resistor
1- 100 Ω Resistor
1- 2.2 kΩ Resistor
1- 33 kΩ Resistor
1- 270 kΩ Resistor
1- 1MΩ Resistor
1- 1 kΩ Potentiometer
1- DC Power Supply
1 – Solder-less Breadboard

Results

With the use of a Digital Multi-Meter we were able to successfully identify each resistor based on the Ohmmeter reading. Sequentially, we identified the colors on the resistor and calculated its minimum and maximum value accordingly.

Table 1 – Associating a resistor's color code with a value and finding a range

Resistor	Color Bands – Color	Minimum Value	Maximum Value
6.8 Ω	Blue - Gray - Gold - Gold	7.14	6.46
100 Ω	Brown – Black – Brown – Gold	95	105
2.2 k Ω	Red – Red – Red – Gold	2.09	2.31
33 Ω	Orange – Orange - Orange – Gold	31.35	34.65
*270 k*Ω	Red – Violet – Yellow – Gold	256.5	283.5
*1M*Ω	Brown – Black – Green – Gold	.95	1.05

After measuring and identifying the resistance for each resistor, we have calculated the percentage error given the difference in the resistance measurements.

Table 2 – Comparing measured resistance with nominal value

Nominal Value	Ohmmeter Reading	Percentage Difference
6.8 Ω	6.7 Ω	1.47%
100 Ω	98.8 Ω	1.4%
2.2 k Ω	2.172 Ω	1.27%
33 Ω	33k Ω	0%
270 kΩ	272.2k Ω	0.4%
1MΩ	.994M Ω	0.6%

By measuring the resistance of a Potentiometer, we measured no change in resistance when measuring the total resistance at the outer terminals. But there was a change in resistance between the wiper and outer terminal.

Table 3 – Total resistance of a Potentiometer

Clockwise	Counterclockwise	Any Position
983Ω	983Ω	983Ω

Table 4 – Resistance between a wiper and outer terminal of a potentiometer

Clockwise	Counterclockwise	Any Position
983Ω	0.3 Ω	432 Ω

Sequentially, with the use of a DCC we were able to use it as a Voltmeter and measure the voltage reading when altering the voltage of the power supply.

Table 5 – Voltage Measurements with a DMM

Power Supply Voltage	DMM Voltage Reading
0.5 V	.452 VDC
2.0 V	2.018 VDC
5.0 V	5.02 VDC
15 V	15.30 VDC
20 V	20.35 VDC

Lastly, with the use of a DMM we are able to measure the current after completing a circuit as specified in figure 7 and 8. After completing the circuit we measured a current of 0.05A going through the current.

Conclusion

When identifying the resistors along with the color bands one could easily misidentify a color, but with the use of a DCC it was easy to identify which resistor correlated with the resistors stated on table 1.

The possible reason why the measurements for the resistance came off different when measuring the resistors individually, would be the possibility of noise interfering with our ability to have an accurate Ohm reading.

The lack of resistance variation when measuring the total resistance of a potentiometer would be that without the reading along with the wiper terminal, it would have no impact for it would not be included as a measuring component in the closed circuit when using a DCC.

The voltage measurements increased accordingly to the increase in the power supply voltage. This correlation is demonstrated in table 5.

Overall, I was able to familiarize myself with the equipment, understand the use of the resistor color code, and understand how to utilize the DCC as a measurement tool when needed as necessary.