

# ETEC1120 ELECTROPRINCIPLES I

## EXPERIMENT #1

### LAB EQUIPMENT & RESISTANCE MEASUREMENTS

#### PURPOSE

To properly use an analog volt-ohm meter (VOM) and a digital multimeter (DMM) to measure resistance.

#### EQUIPMENT

##### LAB SUPPLIED PARTS

Digital Multimeter (DMM)  
 Volt-Ohm Meter (VOM)

##### SERIAL NUMBERS

\_\_\_\_\_  
 \_\_\_\_\_

##### PARTS KIT PARTS

Meter Leads  
 Various resistors from your first year kit.

#### PROCEDURE PART 1 RESISTOR COLOUR CODES

- 1) Refer to the resistor values shown in the table below and determine the corresponding colour code for each.

**Table 1 - Colour Codes**

Resistance and Tolerance	Colour Codes
<b>10 Ω ± 5%</b>	
<b>82 Ω ± 5%</b>	
<b>330 Ω ± 5%</b>	
<b>1 kΩ ± 5%</b>	
<b>4.7 kΩ ± 5%</b>	
<b>2.2 MΩ ± 5%</b>	

- 2) The tolerance of a resistor is a specification indicating a range of possible values in which the actual resistance of the component will occur. For example:

$$\text{Tolerance} = (5\%)(10 \text{ k}\Omega) = 0.5 \text{ k}\Omega = 500 \text{ ohms}$$

- This means that the actual value of the resistor occurs between 9.5 k ohms and 10.5 k ohms.

Calculate the expected maximum and minimum values for the resistors in Table 1 and record the results in Table 2.

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Table 2 - Resistor Tolerance

Value (from colour codes)	Minimum Resistance	Maximum Resistance
10 $\Omega$		
82 $\Omega$		
330 $\Omega$		
1k $\Omega$		
4.7k $\Omega$		
2.2 M $\Omega$		

## PROCEDURE Part 2 - Using the VOM as an Ohmmeter

When measuring resistance with an ohmmeter, some important steps must be followed.

- \* Power supplies and other sources must be disconnected from the circuit. Failure to do so may damage the meter.*
  - \* It is necessary to isolate the component from the rest of the circuit. This is done by disconnecting at least one terminal of the component from the circuit.*
  - \* When using a moving coil meter such as a VOM to measure resistance, the meter must be zero set on each range. (Notice the 0  $\Omega$  is to the extreme right on the scale for resistance.)*
- \* Note that the ohmmeter must be zero set each time you change the range.
- \* To zero set the ohmmeter, touch the two probes together and adjust the ZERO OHMS ( $\Omega$ ) dial near the top right corner of the face plate.*
  - \* Select a range that is most appropriate for the measurement being taken. An analog meter movement is usually most accurate when the pointer is at approximately mid-scale. Make sure the meter is laying flat and avoid jarring the meter when taking a measurement.*

When storing an ohmmeter or VOM, **make sure the switch is returned to the OFF position.** The internal battery source in the meter may be drained if it is left ON.

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**PROCEDURE Part 3 - Measurements**

1) Use the VOM to measure the actual resistance values and record the results in Table 3.

**Table 3 - Resistance Measurements**

Nominal Value	VOM	DMM	LCR Meter

3) Use the DMM and LCR meter to complete Table 3.

**Conclusions Part 4 - Questions**

1) Explain how an ohmmeter can be used to check a fuse.

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2) Complete the table below giving the resistor value and its corresponding tolerance expressed as a percentage.

Colour Codes	Resistance and Tolerance
Brown Red Yellow Gold	
Orange White Gold Gold	
Blue Gray Green Silver	
Yellow Orange Brown Silver	
Brown Green Orange	