

ME 461 LAB 0

Introduction to the Basic Concepts and Components

Group Name:

Names of attending group members

Date:

Objective:

This lab has couple of objectives. First of all you will be introduced with some very basic circuit elements and experiment with these elements to build a simple circuits on a breadboard. Second, a digital multimeter will be introduced and you will learn how to measure voltage, current, resistance, capacitance etc.

Pre-lab:

Make sure that you understand the very basic relationship between Voltage and Current over a resistor.

$$V = I.R \qquad \text{eq.1}$$

This equation tells us that the voltage drop over a resistor of value R is proportional to the current passing over this resistance.

Most of the time you will be working with digital circuits throughout this semester. Therefore, V will be either around 0V or 5V. However, currents passing over your circuits will vary and keeping them within certain limits will be extremely important. The ICs you will use do have certain current limits. And you will have to choose proper resistors for specific applications. In this case you should know how to read the color codes printed on the resistors. Following example illustrates this process in detail.

First make sure that you understand how the value of a resistor is read. Refer to the following URLs.

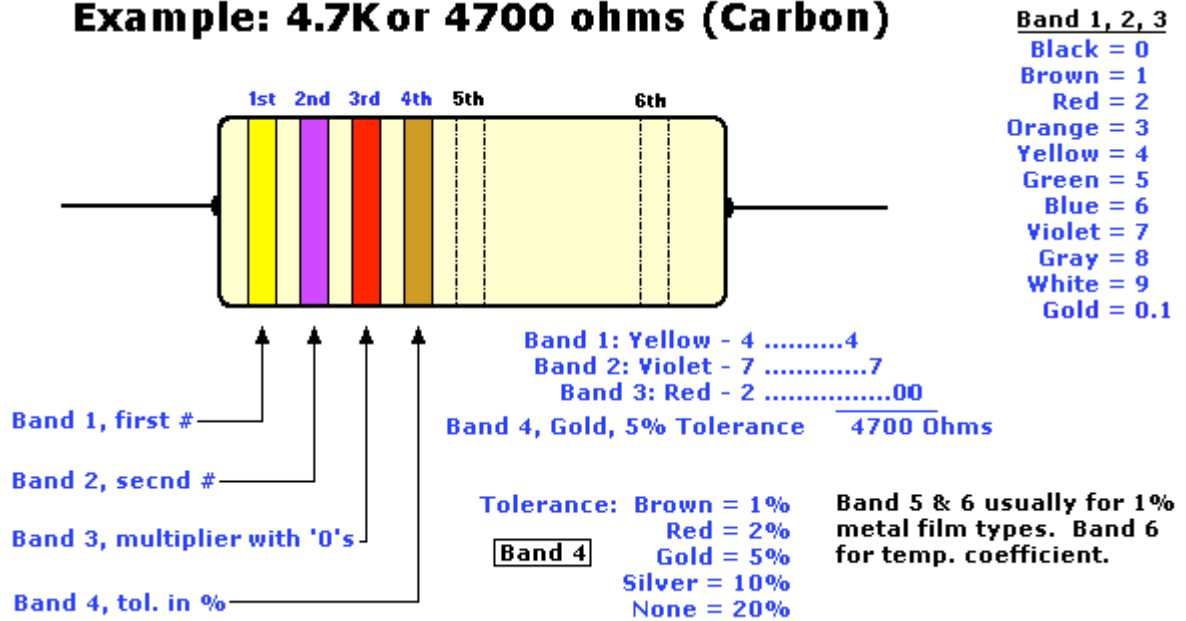
<http://www.uoguelph.ca/~antoon/gadgets/resistors/resistor.htm>

<http://xtronics.com/kits/rcode.htm>

http://www.elexp.com/t_resist.htm

The above URLs are not sorted based on any criteria. Many are listed just in case some sites are down by the time you check them.

Example: 4.7K or 4700 ohms (Carbon)



*The above example is taken from <http://www.uoguelph.ca/~antoon/gadgets/resistors/resistor.htm>

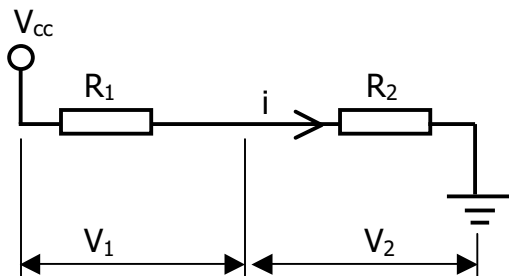
Lab:

During the lab, work on a printed version of this document.

Your TA will explain to you:

- how to measure voltage across a component
- how to measure current passing over a line (or wire)
- what a potentiometer, a LED are?
- how to place components on a breadboard
- the structure of a breadboard
- and anything necessary throughout the lab ☺

1.1



Choose 2 resistors R_1 and R_2 .

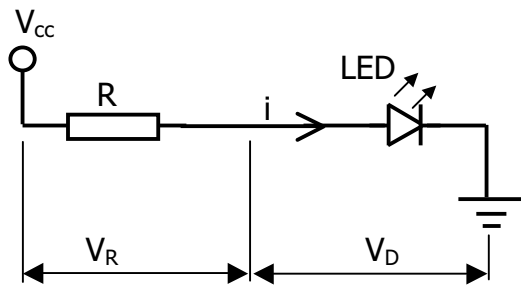
$R_1 =$

$R_2 =$

First compute the following values. Next, build the circuit and measure the actual values.

<u>Computed</u>	<u>Measured</u>
$i =$	$i =$
$V_1 =$	$V_1 =$
$V_2 =$	$V_2 =$

1.2

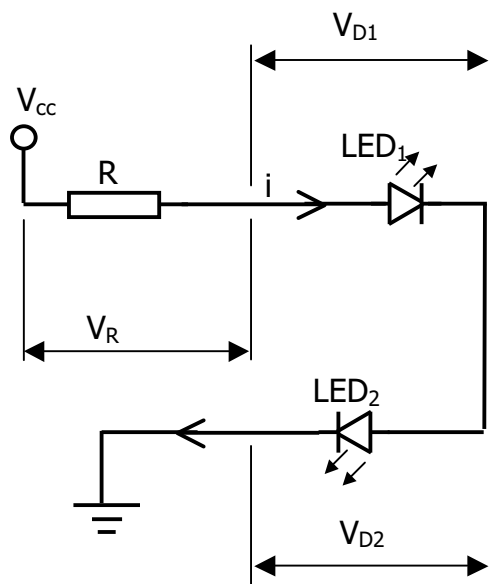


Choose one resistor R and an LED (light emitting diode). Try to choose R such that the value of ' i ' will be somewhere between 4-15 mA. First guess the following values. Next build the circuit and measure the actual values.

$R =$

<u>Gussed</u>	<u>Measured</u>
$i =$	$i =$
$V_R =$	$V_R =$
$V_D =$	$V_D =$

1.3

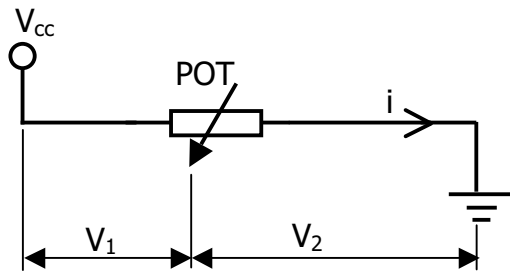


Choose one resistor R and two LEDs. Try to choose R such that the value of ' i ' will be somewhere between 4-15 mA. First guess the following values. Next build the circuit and measure the actual values.

$R =$

<u>Gussed</u>	<u>Measured</u>
$i =$	$i =$
$V_R =$	$V_R =$
$V_{D1} =$	$V_{D1} =$
$V_{D2} =$	$V_{D2} =$

1.4



Choose a potentiometer (POT). Compute the current that will be passing through the circuit. Play with the POT. For three different positions, measure R_1 and R_2 and the voltage across them.

Measured

$i =$

First position

$R_1^1 =$

$R_2^1 =$

$V_1^1 =$

$V_2^1 =$

Second position

$R_1^2 =$

$R_2^2 =$

$V_1^2 =$

$V_2^2 =$

Third position

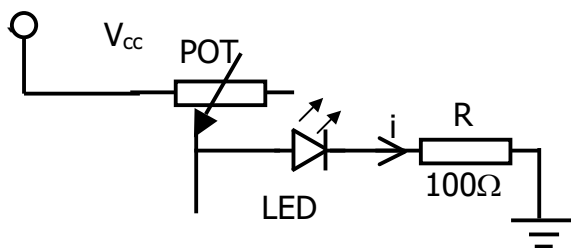
$R_1^3 =$

$R_2^3 =$

$V_1^3 =$

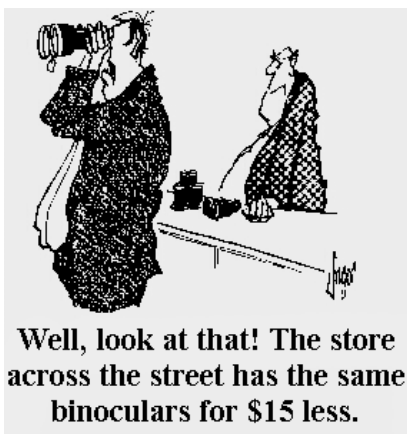
$V_2^3 =$

1.5



Just for fun, build this circuit, play with the POT and observe how the brightness of the LED changes as you play with the POT.

Explain briefly how the magnitude of the current relates to the brightness of the LED.



I hope that you folks had fun...

Date & time of completion