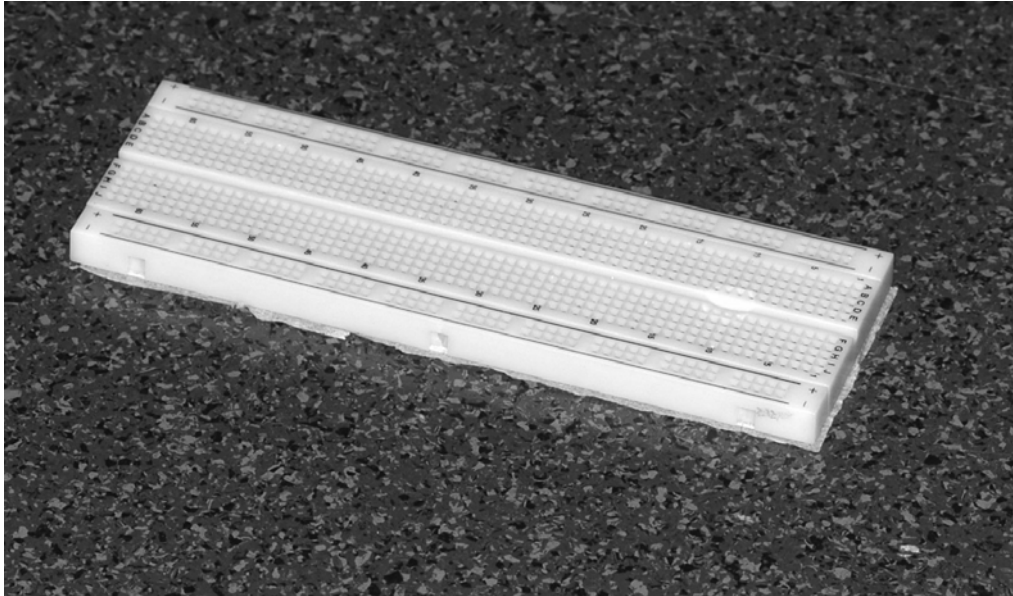


LAB 0 Answer Sheet

1. Introduction

2. Use an ohmmeter and a voltmeter to understand two different breadboards

a. "Small" protoboard continuity. Indicate which holes are continuous with which other holes.



b. Large protoboard connections

Look at the labeled points on the figure of the protoboard on the next page. What is the voltage between the following points:

Point A and point B _____
Point A and point C _____
Point A and point D _____
Point A and point E _____
Point A and point F _____

Point P and point U _____
Point R and point T _____
Point R and point W _____
Point R and point Y _____
Point Y and point α _____

Point B and point C _____
Point B and point E _____
Point B and point H _____

Point α and point τ _____
Point τ and point σ _____
Point σ and point ρ _____
Point β and point γ _____
Point β and point ϵ _____
Point γ and point δ _____

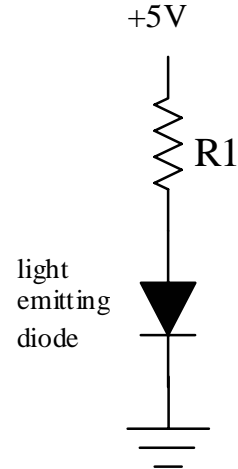
Point H and point M _____
Point H and point P _____

3. Light up a visible LED

- a. In the figure on the right assume that the voltage drop across the LED is 1 volt and that $R1 = 330$ ohms. Show all calculations and box your answers.

i. Calculate the current that runs through resistor R1.

ii. Calculate the voltage drop across R1



iii. Calculate the current that runs through the LED.

- b. Experimental measurements

i. What voltage drop do you measure across the LED? _____

ii. What voltage drop do you measure across R1? _____

iii. Using your measured voltage, calculate the current that runs through resistor R1.

iv. Using your measured voltage, calculate the current that runs through the LED

v. What happens if you switch the positions of R1 and the LED? Given that there is no resistor before the LED, will the LED burn out? Why or why not?

c. Measurements on the potentiometer

As you turn the knob, what resistance (or range of resistances) do you measure across the two ends of the pot?

As you turn the knob, what resistance (or range of resistances) do you measure between the wiper and one end of the pot?

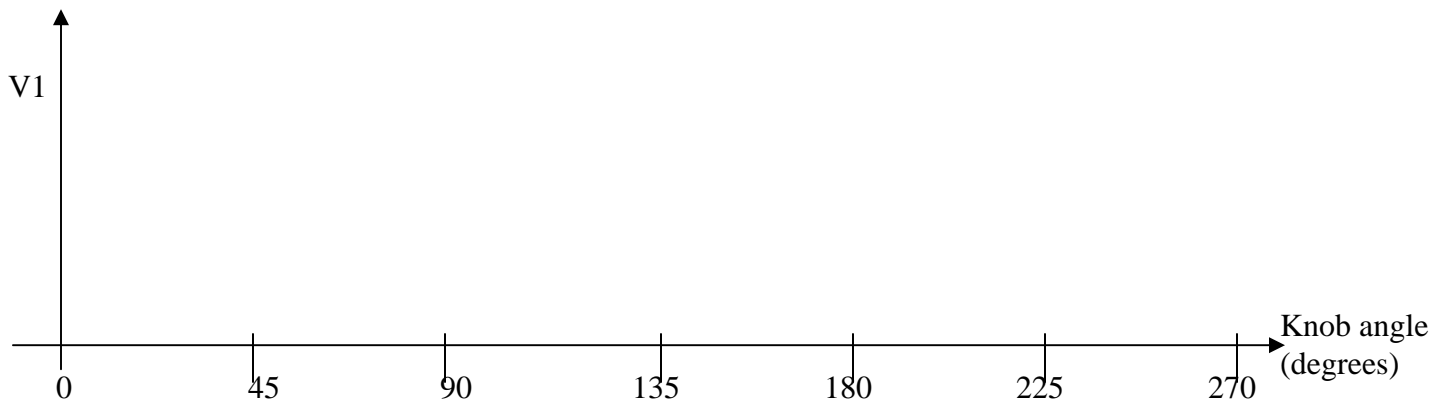
As you turn the knob, what resistance (or range of resistances) do you measure between the wiper and the other end of the pot?

How many turns does it take to go through the complete range of the pot?

If it took 10-turns to go through the range of the pot, we would call it a "10-turn pot." Given this information, what do you think we call the type of pot that you are working with?

d. Add the pot into the LED circuit

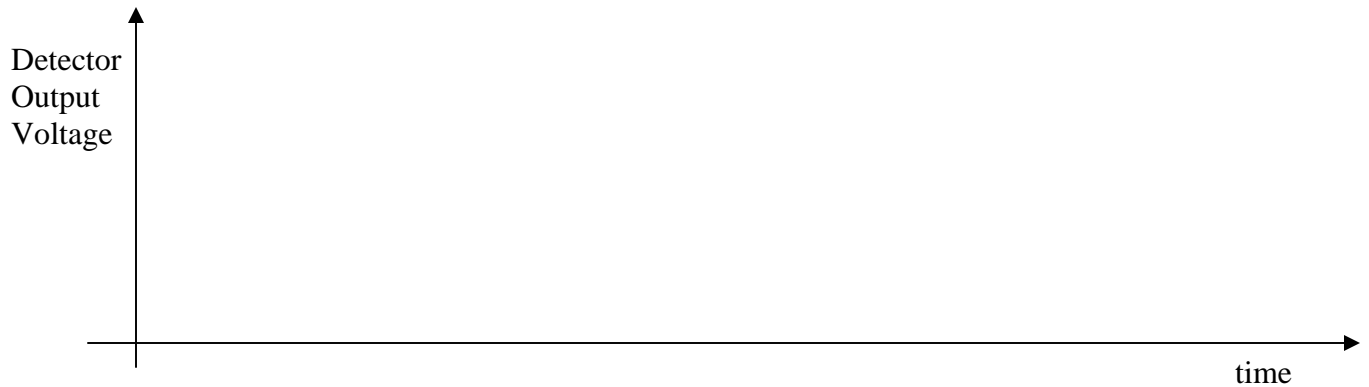
i. Draw a graph of the voltage V_1 as a function of potentiometer knob angle.



ii. Write one complete sentence that describes what happens as you turn the pot

4. Construct an infrared (IR) emitter/detector circuit

b. Use the oscilloscope to monitor the voltage across the detector. On your answer sheet, draw a graph of voltage versus time as you break the beam with your hand.



5. Use the output of the IR detector circuit to trigger a visual alarm when the beam is broken.

b. Use between one and three complete sentences to describe the behavior of the visible LED as you break the IR beam with your hand.

c. Use between one and three complete sentences to describe why the output of the detector isn't a very good signal to send to the visible LED.

d. Draw a graph of a signal that would be better to send to the visible LED.

