Lab 2:  Experiment 4

Kirchoff’s Laws
Circuits to be Constructed

Circuit from Lab Manual

Circuit from Instructions

DC = 9V
Trim Potentiometers

• Trim pots, for short
  – A resistor whose values depends on the position of the wiper (middle terminal – Pin 2).
    • Used as a voltage divider
      – All three terminals are connected in the circuit.
    • Used as a variable resistor
      – Either pins 1 and 2 or 2 and 3 are connected in the circuit.
Pinout

• Pins 1 and 3 are labeled on the top surface of the trim pot.
  – The resistance between pins 1 and 3 is the maximum resistance of the trim pot ($R_{pot}$).

• The middle pin (2) is connected to the wiper.
  – The resistance between pins 1 and 2 is $x R_{pot}$, where $x$ is the fraction of the total number of turns of the knob.
  – The resistance between pins 2 and 3 is $(1 - x) R_{pot}$, where $x$ is the fraction of the total number of turns of the knob.
  – There may be a notation on the top surface about the direction that the knob should be turned [Clockwise (CW) or Counterclockwise (CCW)] to increase the value of the resistance between pins 1 and 2 and decrease the value of the resistance between pins 2 and 3.

http://www.solarbotics.com/assets/images/rt1k_t/rt10k-t-dscn3762_pl.JPG
Reading the Value of Your Trim Pot

• On one surface of the pot are markings
  – The maximum resistance of the trim pot
  – The part number
    • The value of the resistance is calculated as follows:
      – The first two digits of the three digit number is the number that is then multiplied by 10 raised to the third digit.
      » For example: 102 = 10 \times 10^2 = 1 \, k\Omega
Pspice Symbol

POT:
Trim Pot

R_Var:
Variable Resistor
PSpice Simulations

Bias Point and DC Sweeps
Bias Point

• Single calculation of the steady-state currents and voltages in the circuit.
  – If only d.c. sources are present, then the values are the d.c. currents and voltages.
  – If only a.c. sinusoidal sources are present, then the values are the average a.c. currents and voltages (i.e., 0A and 0V since the average of sinusoid is zero).
DC Sweep

• Calculations of voltages and currents as the value of one or more components are varied.
  – The component can be a voltage or current source, a resistor, a parameter within a device model, or the ambient temperature, which causes changes in all temperature sensitive components.
  – Plots of voltages and currents as a function of the changing value of the component are automatically made when voltage or current markers are placed on the schematic.