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Physics 222 Lab 8 Write-up

To create the reference voltage we used a voltage divider since the current draw was negligible and wouldn't cause too much change in the voltage. I saw that most people were using Ohm's law to find the resistor ratio and from there deciding what resistances to use based on what was easiest to build with the available resistors. Instead, I found a 640 Ohm resistor on the ground, decided it would be my throttle resistor (R2) and I'd calculate and build the proper R1 to get my voltage.

Knowing that .75 was my reference voltage, the throttle resistor would have to have a voltage drop of the same thing. This can be used with Ohm's law to determine the current which can then be used to find the other resistor value needed.

$V = I*R$
$.75 = I * 640$
$I = .75/640 = .001171875$ Amps

$(5-.75) = .001171875 * R$
$R = 4.25 / .001171875 = 3626.6667$

3626.67 precisely wouldn't be the easiest to build but I knew I could get close enough with a lot less resistors than what most people were stuck building.

3 1kOhm resistors got me up to three thousand.

Just another ~650 to go.

Two 1kOhms in parallel got me another 500 Ohms leaving only ~150 to go.

A 100 Ohm in series leaves on 50 to go.

That's easy to make with two 100 Ohm resistors in parallel.

3 x 1kOhm in series, 2 x 1kOhm in parallel, 100 Ohm in series, and two 100 Ohm in parallel.

In practice the resistance was actually a little low and was really close to the ideal 3626, but the battery voltage was a little higher than expected giving me a reference voltage of 0.76 volts. This was still within acceptable tolerance for this project.