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ECE 2280  
2/1/16

## Lab #2

### Objectives

- Understand the basic operation and characteristics of a diode.
- Understand basic circuits containing a diode.

### Parts

- 4x silicon diodes (ex. 1N4001, 1N4004\*, etc.)
- 10k $\Omega$  potentiometer, single turn(trim pot) (any size from 5k $\Omega$  to 100k $\Omega$  will do)
- A couple capacitors (low value, medium value, large value)
- At least: 2-0.1MF, 0.01MF ceramic capacitors (values not critical)
- 2-100 $\mu$ F electrolytic or tantalum capacitors
- Resistors: 2k $\Omega$ , 200k $\Omega$
- Condenser microphone
- 2N3904 and 2N3906 transistors
- Speaker
- Some op-amps: LM741, TL084, LF353\*, or similar.

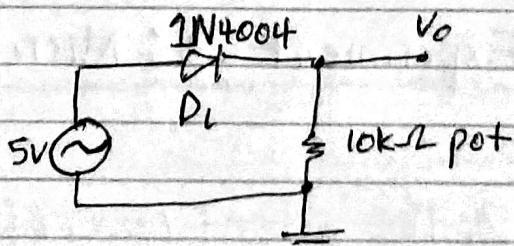
### Experiment 1: Half Wave Rectifier

1a)

1st diode: 565 $\Omega$

2nd diode: 560 $\Omega$

3rd diode: 593 $\Omega$



1B)  $V_{in} = 1.03 \text{ V}$     $V_o = 480 \text{ mV}$

~~Max Input Voltage~~

$$V_{imax} = 500 \text{ mV} - 440 \text{ mV} = 60 \text{ mV drop}$$
$$V_{o\max} = 440 \text{ mV}$$

- with the potentiometer all the way down  
I get  $V_{i,\max} = 520\text{mV}$  to  $540\text{mV}$  and  $V_{o,\max} = 450\text{mV}$  to  $470\text{mV}$   
and  $V_{i,\text{pk}} = 1.03$  to  $1.05\text{V}$  and  $V_{o,\text{pk}} = 480\text{mV}$  to  $500\text{mV}$

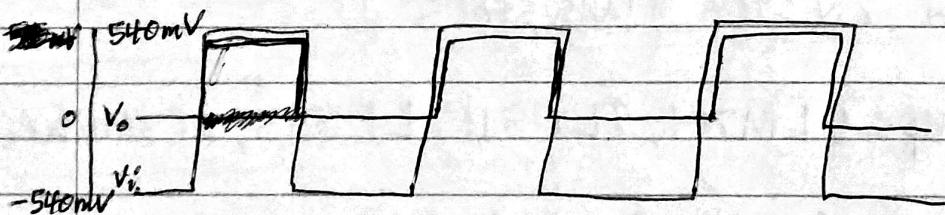
- with it all the way up:

$$V_{i,\max} = 120\text{mV} \quad V_{o,\max} = 1.7\text{mV}$$

$$V_{i,\text{pk}} = 620\text{mV} \quad V_{o,\text{pk}} = 2.8\text{mV}$$

The input cuts off at its max, making a square/sine wave.

The resistor increases voltage when low, and decreases voltage when high, as expected.



### Experiment 3: Microphone and Speaker Circuit

2. The potentiometer controls the amount of gain allowed through to the emitters that go to the speaker. The higher the resistance, the less amplification. The lower the higher.

3. It seems the maximum current draw is about 100mA. There was quite a bit of feedback but it seems everyone was having that problem.

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