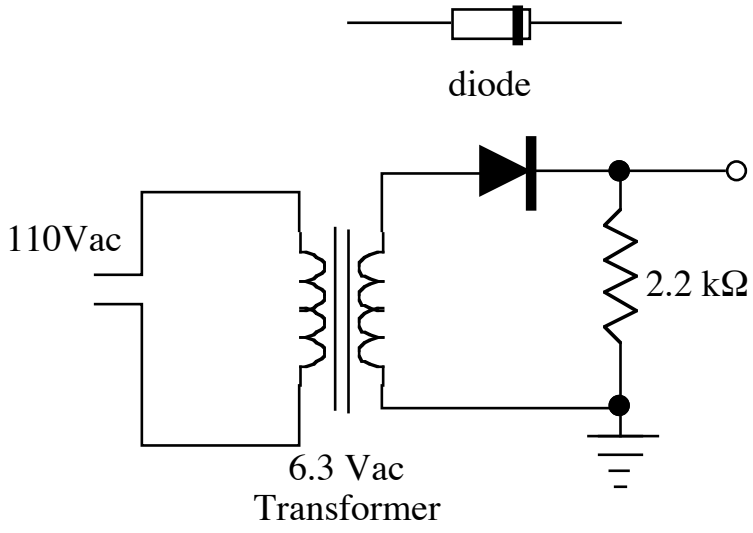
Part 1: Half-wave rectifier

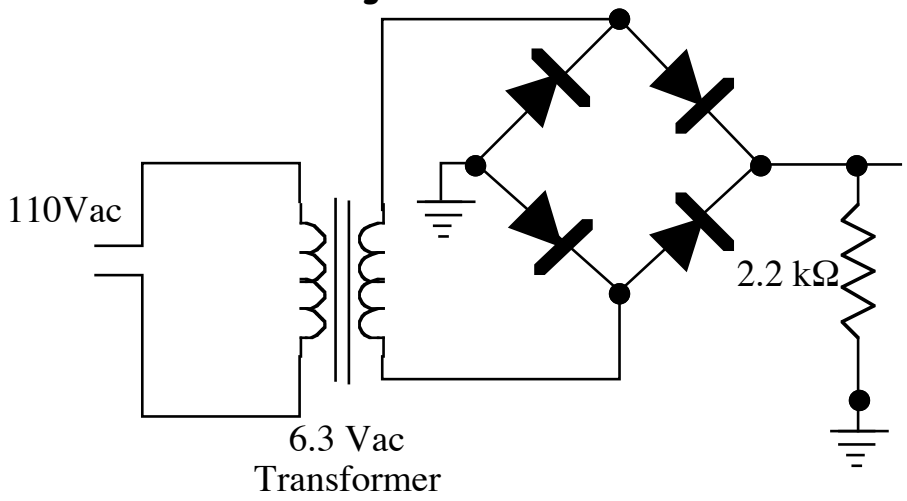
•construct the circuit shown on the right

•What does the input waveform look like? What does the output waveform look like? (draw them)

•What is the amplitude of the output waveform? What do you expect the amplitude to be (Remember diode drops).



Part 2: Full-wave bridge rectifier



•Read the following cautions and answer the questions **BEFORE** you construct the full-wave bridge rectifier shown above.

Caution:

Be careful about the polarities of your diodes. What would happen if you put in one diode backwards? Why?

•Do not attempt to look at the output waveform and the input waveform simultaneously! What would happen? Why? (hint:grounds)

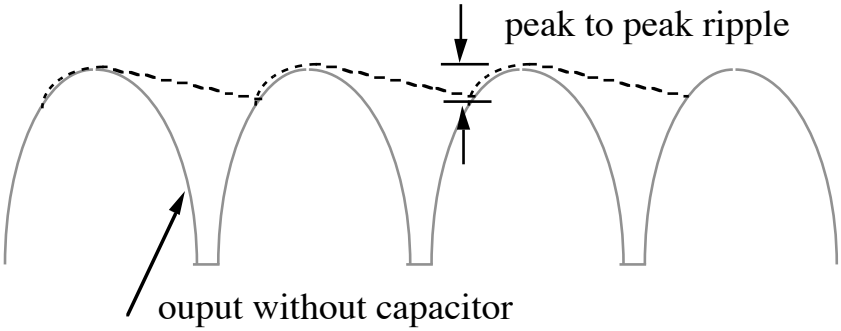
OK. On with the experiment

•construct the circuit as shown above, and look at the output waveform—draw it. Pay special attention to the waveform near zero volts. Why are there flat regions? Measure their duration in time. Explain

•How does the output amplitude of this circuit compare to the one above? How is it different and why? (remember, the input waveform should be the same).

Part 3: Ripple

Background Information



Ripple is the leftover ac voltage from the transformer after the output has been filtered by a capacitor. We can determine what value capacitor will give us the amount of ripple we desire using complicated equations, OR we can get some idea of the ripple using a simple calculation.

Recall for a capacitor:

$I=C\ dV/dt$

For I we can use the maximum desired current. The value dt can be estimated since we know that the frequency of the input is 60 Hz. Look at the above waveform. The time that the voltage takes to change values is approximately $\frac{1}{2}$ the period.

$dt = \frac{1}{2}\ 1/(60\ Hz) = ?$

dV is the ripple.

Experiment:

• Put a 15 μF capacitor across the output of the full-wave bridge rectifier. (Be careful! This type of capacitor is polarized. If you put it in backwards, it will explode.)

- •Measure the Ripple
- •Calculate the Ripple (How can you determine I?)
- Do these values agree?

•Replace the 15μF capacitor with a 500μF capacitor. (Be careful! This type of capacitor is polarized. If you put it in backwards, it will explode.)

- •What happened to the ripple? Measure it.
- •Calculate the ripple?
- •Do these values agree?