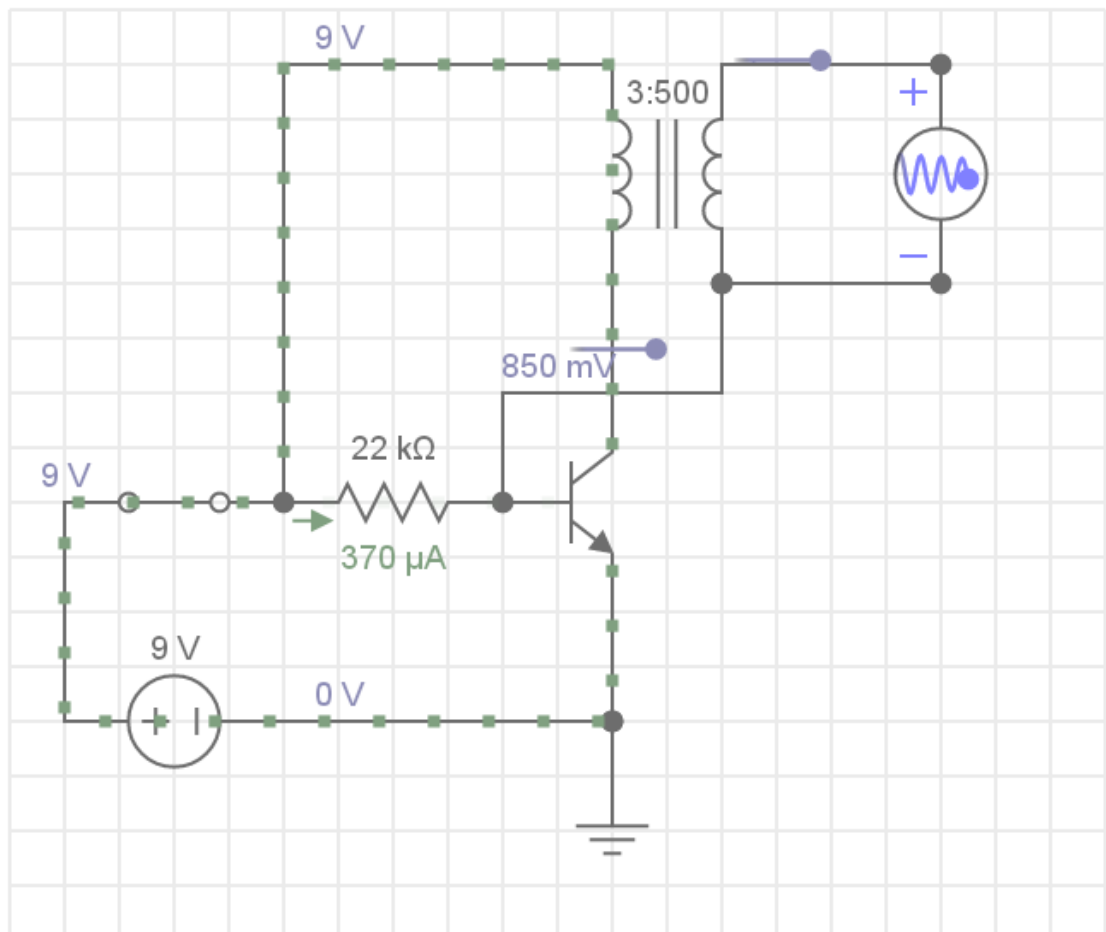


## Parts Lists

- NPN BJT Transistor
- $22\text{k}\Omega$  Resistor
- switch
- 9V Battery
- Copper wire

## The Circuit



When the switch in this circuit is closed, current flows to the base of the transistor turning the transistor on. This allows for current to flow through the collector which

draws current away from the base, turning the transistor off. This behavior results in an oscillating signal in the primary winding. The large ratio in the number of turns between the primary and secondary windings steps the voltage up, outputting a very high voltage AC current from the secondary coil.

The design comes from a Youtube video posted by Easy Experiments, How to Make A Mini Tesla Coil. I chose to use a different transistor than the one used in the video and I built my circuit on a breadboard instead of using solder.

My initial idea for building a Tesla Coil came from a more complicated set of instructions that dealt with a higher voltage, I decided that a smaller version of this would be more suitable for this project. I looked into two options, one that used an AC input and one that used DC. I was able to output a higher voltage using the DC input.

I tested the circuit using an oscilloscope and a voltmeter because I couldn't reliably use the light bulb to test. The oscilloscope displayed a sine wave with an amplitude of 250V, and the voltmeter peaks at the beginning around 100V and then decays, settling at around 50V for a while. In order to get better results I used a stronger power source, switching out the 9V battery for a 15V power supply. I also removed one turn from the primary coil, making the ratio 3:500 instead of 4:500. I was now able to get the coil to steadily output around 90V.

A problem that came up in many of the examples from my research was that the resistor overheats and can burst if more voltage goes through the container than it was intended for. I made sure to use a high voltage transistor, TIP142, and I was ready to turn off the circuit if I noticed the transistor getting too hot.

I was only able to successfully light up a fluorescent light bulb with the coil once during my testing but luckily I got a picture of it.

