



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Carson A. Pope	Project Number J0915
Project Title Testing the Efficiency of a Joule Thief LED Light Circuit	
Abstract Objectives/Goals The purpose of my experiment is to see if making a Joule Thief circuit is more efficient and uses less voltage to light an LED light bulb than a simple circuit, and has the capability to access lower voltages in low voltage batteries and can light a LED bulb utilizing small amounts of energy (v). Methods/Materials I made a Joule Thief circuit (With the help of John Wrigley), and a simple circuit to test if a Joule Thief was more efficient and used less energy than a simple circuit; I also made a LED luminescence sensor to measure and match the luminescence of the Joule Thief and simple circuits so I could measure the mA#s used in both circuits. I put the luminescence sensor over the LED bulb in the simple circuit to measure the voltage read by the solar panel and to measure the amount of mA used. I did the same thing with the Joule Thief circuit but before I could measure the mA I had to use the potentiometer to adjust the luminescence of the LED in the Joule Thief circuit to match the luminescence of the simple circuit; then I measured and compared the mA used to determine the efficiency of the Joule Thief circuit. Results The Joule Thief circuit consistently had lower mA readings for each of the 6 different voltage categories than the simple circuit by an average of 0.57mA. At 1v and 1.5v the Joule Thief circuit lit the LED light bulb with 0.03 mA whereas the simple circuit could not light the LED. When converted to joules using the equation $\text{mA} \times \text{V} = \text{Power, Joules, or mW}$, the power usage of the Joule Thief circuit was less than the power used by the simple circuit. The Joule Thief circuit used 28.19% less power than the simple circuit which proves its efficiency. Conclusions/Discussion In conclusion, my hypothesis tested true; that a Joule Thief LED light circuit will be more efficient than a simple LED light circuit and can light a LED bulb utilizing small amounts of energy (v). I believe that using the Joule Thief circuit in electronics that use small amounts of voltage could greatly increase the batteries efficiency and save batteries from going to the landfill. The Joule Thief can access lower voltage in a battery that would not otherwise be accessible in a standard or simple circuit.	
Summary Statement Testing the power efficiency of a Joule Thief LED light circuit compared to a simple LED light circuit.	
Help Received Advisor helped with some wiring of joule thief circuit and father helped with testing the circuit.	