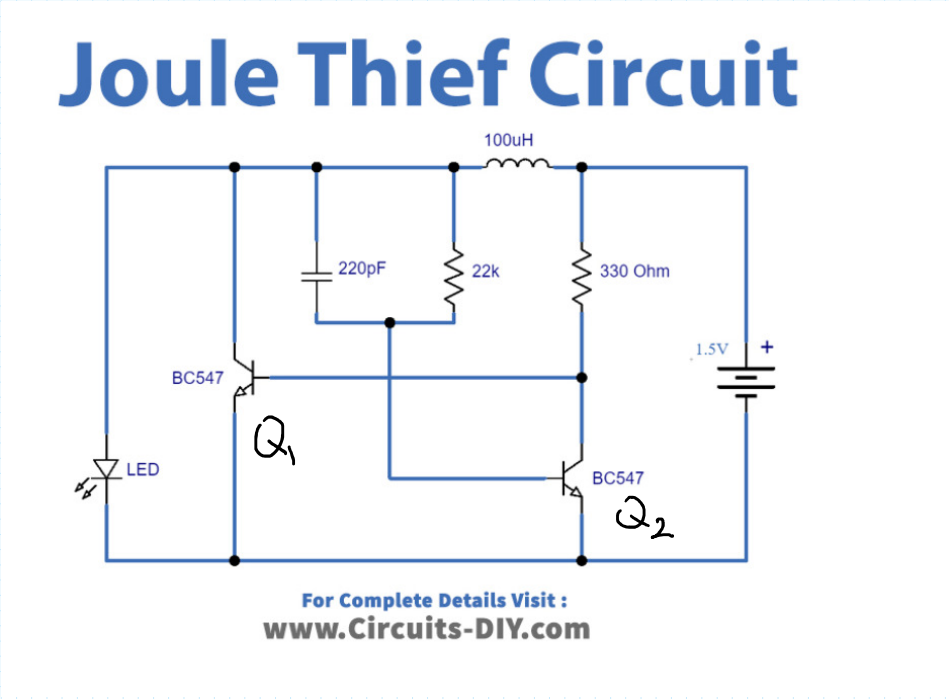
Casper circuit (F. Ursino)

Tuesday, November 1, 2022 11:35 AM



Components:

L=86uH
C=102nF
R=389Ohms
R=20kOhms
2 x NPN= 2N2222A
Battery AA Energizer 1.5V

At the starting the transistors are not biased and therefore open.

As soon the small battery is connected, the base of the transistor Q1 will rise in potential causing Q1 to behave as a closed circuit, the base current of Q1 will be equal to (1.5V-0.6V)/330Ohms.

This Base current will cause a collector current in Q1 which is responsible of the building magnetic field inside the inductor. We are now charging the inductor, the inductor in such condition will be shunted to GND via the transistor Q1.

On the same time the top plate of the capacitor will be positively charged and the lower plate of the capacitor for induced voltage will be negatively charged.

This difference of potential across the capacitor is reflected in a current in the 22k Ohms which is biassing the base of the transistor Q2.

This will cause the transistor Q2 to close and the collector of Q2 will be therefore come close to GND potential.

Since the collector of Q2 is connected to the base of Q1, once the collector of Q2 is at GND (or close to GND) will switch OFF the transistor Q1 which will turn from a closed circuit to an open circuit and it is here that the magic starts!

We know the inductor will keep trying pushing the current in the same direction which was flowing via Q1 to GND, now with Q1 opening the inductor will force the current by increasing the potential at the upper plate of the capacitor. This is possible because the inductor is and was charged with magnetic field.

This rising of potential will come to a point where the top plate of the capacitor will be at a voltage larger than the forward voltage of the LED causing the LED to glow.

As soon the LED will glow the inductor energy stored will dissipate via the LED until will be exhausted.

At this point the lower plate of the capacitor is not anymore at low potential and therefore the base of Q2 will become alive again repeating the process.