

Commercial Stun Gun Circuit

I bought a 100KV stun gun and opened it to examine the circuitry. Here is what I found and some explanation on how the circuit works:

A commercial stun gun circuit which produces about 100KV pulses from a 9V battery is shown in Figures 1-2. The heart of the circuit is a power oscillator built around Q1. When the switch S1 is closed, C1 is charged through 1K resistor and the feedback coil. Q1 turns ON and saturates rapidly when the voltage across C1 is about 1.3V ($V_{f_diode} + V_{BE}$). Now, Q1 pulls a large collector current through the primary coil and a large magnetic field is developed within the magnetic core of T1.

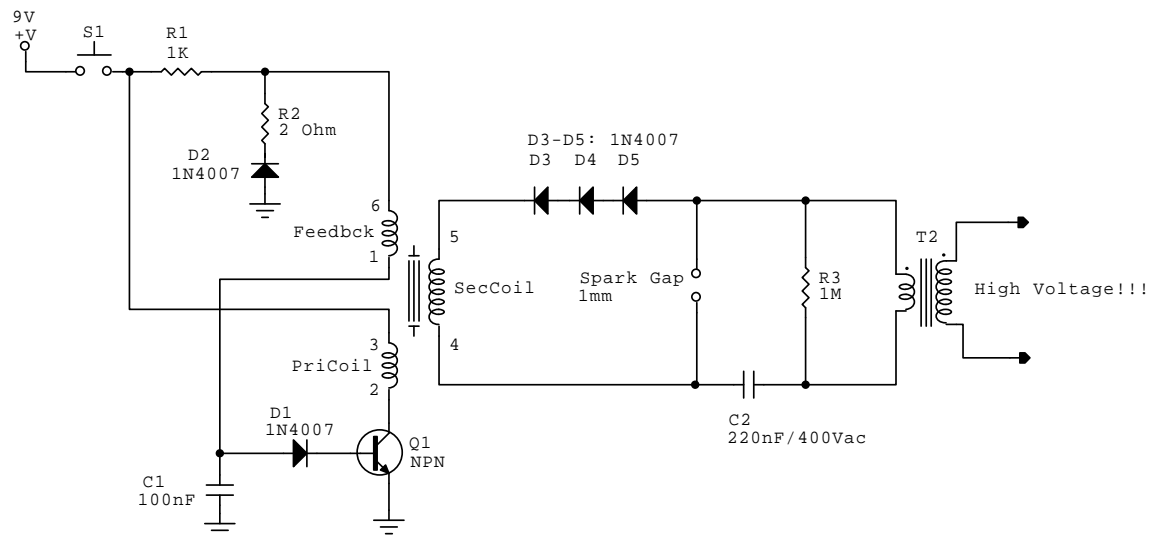


Fig. 1. The commercial stun gun circuit.

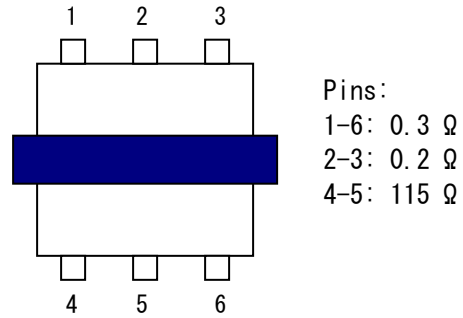
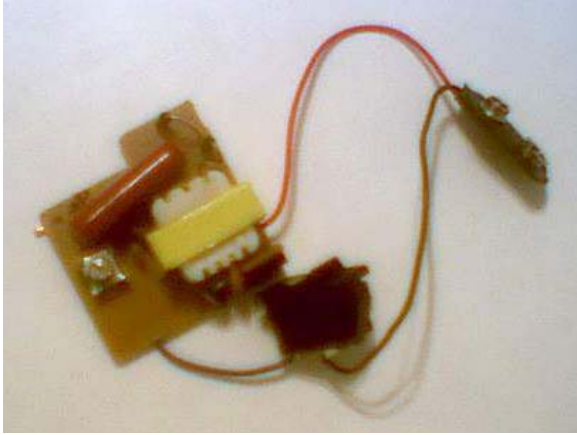


Fig. 2. Commercial stun gun circuit board and the transformer (T1) pins.

As the magnetic field increases due to increasing collector current, both feedback and secondary coils develop an opposing flux which results in negative EMF. This negative EMF is blocked by 1N4007 diodes in the secondary circuit. However, the negative EMF of the feedback coil is directly applied at C1 and forces D1 and Q1 to go into cut-off region.

As a result, collector current is cut and the magnetic field within the core collapses rapidly. Now, feedback and secondary coils develop an EMF which counteracts the decrease in flux. So a + EMF is applied at C1 by the feedback coil, and a + EMF is applied at 220nF capacitor (C2). Secondary path is now completed and C2 begins to charge through 1N4007 diodes and the primary of T2. As the voltage across C2 exceeds 3000V, spark gap fires and all the energy of C2 is damped on the primary of T2. The result is about 100KV pulsed HV output at the secondary of T2. 1M resistor is the bleeding resistor. Meanwhile, due to + EMF of the feedback coil, C1 charges again, and D1 and Q1 start conducting. D2 and R2 provide a current return path for the feedback coil during this cycle. And the whole cycle repeats...

Any feedback?

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