Dr. Bob Beck Magnetic Pulser

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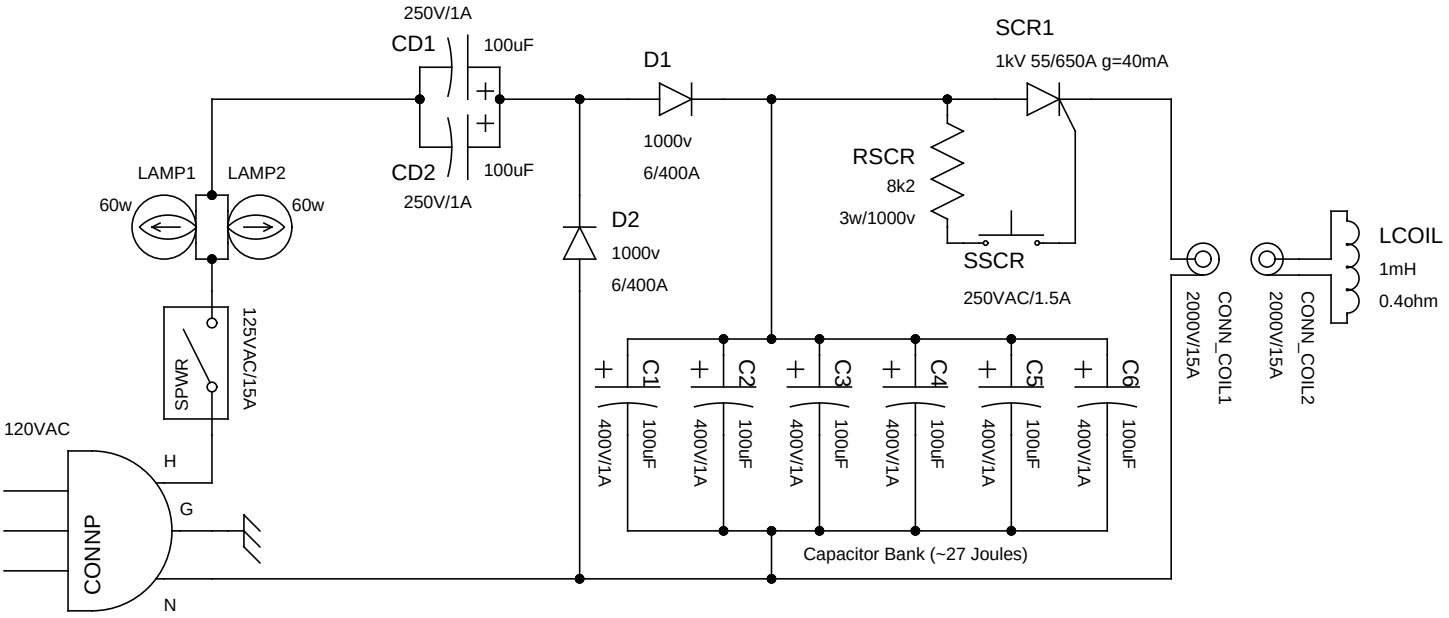

Original page: http://www.newmediaexplorer.org/chris/2003/08/19/build_a_low_cost_simple_magnetic_pulser.htm
This is a variation of Chris Gupta's pulser with some minor fixes. Be warned that there is no isolation transformer and that can be very dangerous if this circuit is improperly implemented. If the electrical outlet is wired wrong or backwards, the circuit could be blown. Adding an 1:1 4amp isolation transformer is easy and would go between the power switch and neutral wire of the power cord. Be sure all exposed wires are insulated.

D1+D2+CD1+CD2 form a voltage doubler. When 120VAC gets rectified, it will be close to 330V DC (doubling the voltage to the capacitor bank quadruples the energy). Parts need to be rated accordingly. Parts values can vary some, but they should be close to what is listed. The capacitor bank needs to be around 600uF. Use low ESR capacitors instead of the photo−flash capacitors listed in the original. Photo−flash don't quite contain the energy they should. The capacitor bank can be increased if desired. The capacitor bank energy can be calculated with W=(CE^2)/2. W is energy in Joules, C is capacitance in Farads, E is voltage across the capacitor bank. Keep in mind that raw power isn't everything when building a pulser. A weaker pulse that has a very high rise time (low nanoSecond range) is generally considered to be better.

A 220VAC version is possible by removing D2+CD1+CD2. Using a full diode bridge is also possible. It would start with D1 and go directly to the neutral pin of the power plug (effectively being between the lamps and capacitor bank).

LAMP1+LAMP2 is used for current limiting and simple circuit protection. LAMP1+LAMP2 can be a single 120w bulb, but these are usually larger. If the pulser is charging too fast and/or parts are over heating, only have a single 60w bulb. Parts with higher voltage and ampere rated parts also run cooler. The lamps will turn off when the capacitor bank is charged.

RSCR needs to provide 40mA to the gate of SCR1 in my version. Your SCR may differ and should be checked. When choosing an SCR, it needs to be at least 500V and 600amps pulse current. Higher is better and will run a little cooler. A small heat sink will probably be required.

The Beck Coil. Use an empty 1" center VHS tape reel and fill it completely with 14−16g enameled copper wire (around 130 turns, about 1.5pounds, 1milliHenry inductance, 0.4ohms resistance). There is no polarity concerns in a pulser. It is one polarity as the field rises and reverses as the field collapses. The coil connectors should be banana or similar with high surface area on the contact points of the plug. At least 18g wire or better should be used to handle the high pulse currents.