

How the STEAP TPU runs© 2022

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At the start C4 and C5 are charged to at least 70v DC, these capacitors hold the start energy and should be of sufficient size to start the sequence. I have used 6800uF, 250vDC power capacitors in parallel with C4 and C5 (the C5 start capacitor is not shown as it depends the the size of your C4 and C5 to start with).

The start sequence for the mosfet switches is C = ON, B = OFF and A = ON. The means for creating this is a latching NAND gate IC, this has a certain hysteresis between the switching at the start but is adjusted by tuning the frequency between the B and C drivers in relation to the fixed A frequency. Once the frequencies have been corrected, the correct running sequence will repeat every X pulses of the A frequency, whatever the A frequency is as long as you use the following formula.

The start frequencies are with $C = A \times 2.1$, $B = A \times 3.2$. The A frequency is a decimal of the natural resonant frequency of the toroid. Any LC resonant circuit will resonate at its F_r (resonant frequency) whatever "lower" decimal frequency DC pulse is injected. This comes from the two constant current sources that are injected at c1 and c on the schematic. Because the mosfets are running at a 50% duty cycle, the lower frequency switching mosfet "A" needs to be running at a frequency sufficiently high so as not to cause excessive heating. In any case the "A" mosfet requires a good heat sink in relation to the "B" and "C" mosfets.

The "B" circuit is the means of collection and injecting of the current within the "A", "C" circuits, and the "B" mosfet is the switching ON and OFF of the plasma. The timing is important, but also the timing of the A and C. At the start I said there is hysteresis, but when "C" is tuned so that every X number of cycles, "A" and "C" switch OFF and discharge at the same time, along with "B" switching ON, this is the high kick of power into the toroid that is required to keep it boosted.

At the centre of the coils there is no ferro magnetic core, only several turns of insulated tin coated copper wire, which is perpendicular to the coils wound over the top. The loop of wire in the centre of the coils, along with the "b" coils, and (C2, C3 the starter), form a capacitance which becomes highly charged forming a dielectric barrier discharge (DBD) within the toroid, this is a plasma which carries a high moving current which in turn produces a magnetic field. This magnetic field moves with the polarity changes of the "A" and "C" coils, the primary of a transformer, with the "b" coils as the secondary.

With the correct timing, what normally would be CEMF within the "transformer", does not affect the transformer action or the same current direction, in the primaries A and C, towards the outputs. This current is a DC pulse always moving from the input to the output. The whole toroid is resonant, it is highly capacitive, and together with the solenoids creates an LC resonant circuit. The resulting sine waves (many) are running with the DC pulse bias. It is this high frequency resonance that creates the plasma within the coils, it is the reason to have resonance to create the high voltage.

PLASMA

Quote:- It contains a significant portion of charged particles – ions and/or electrons. The presence of these charged particles is what primarily sets plasma apart from the other fundamental states of matter. It is the most abundant form of ordinary matter in the universe being mostly associated with stars, including the Sun. End quote. Plasma has a large current and associated magnetic field.

The transport of electrons from thermionic filaments such as the heaters in electronic valves, was one of Steven Mark's liked topics of trying to explain an inter-reaction with the magnetic field of the Earth (the kick of the filament). It could very well be, I do not have the means of proving this like him, but one positive to this theory, "maybe", if the toroid is turned upside down it will stop working, at 45° the output reduces. The toroid is wound and run anti-clock-wise, if you view this from the bottom it runs one way and from the top, the other way, then turn it over and you have the reverse, they are mirror images with the sky and Earth. Does this prove the theory of magnetic lines of the Earth, or, the capacitive inter-reaction between the ionosphere and the Earth!!

IMPORTANT THINGS

All coils and loops are made of multi stranded, tinned copper wire with a 200°C silicon insulation. The size is subject to the current carrying capability, I have used both 12awg and 14awg, the latter for the coils and the former for the loops, but the size is not important apart from current capability.

The size of the toroid does not really matter, what does matter, and is very important, is that each coil wound on top of the other, and in the same direction, must have the same NUMBER OF TURNS, wire length does not matter.

The toroid runs CCW, you need to think about that when you wind it (right hand rule).

The coils must be wound neatly, this affects the capacitance and inductance, the unit runs with ratios of inductance and capacitance between the three sets of coils. A nylon wire can be used as a former along with the loops, and then wind the coils over this. Do not use any material that can be modified by the plasma, this is why Tin coated copper and silicon insulation are used.

A coils first, then B coils and finally C coils. A and C are primaries and B the secondary of a transformer.

Any possibility of bare connections which are connected near other "plates/coils" of the plasma "electrodes" must be avoided.

The toroid is not really a toroid, it has a gap between the two ends to avoid any possible arc-over.

A few turns of wire as a loop are wound around (perpendicular) the outside and connected to the ground, this is only to collect radiated interference from the plasma (like a fluorescent tube). When top and bottom toroids are used, place between them on the outside.

My work on the STEAP TPU for now is finished.