

Tesla Coil (Slayer Exciter)

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Introduction.

While browsing YouTube for home built Tesla coils, I found numerous references to kits that could be purchased on eBay for a few pounds.

After a quick check on the auction site, I found one that was reasonably priced, and I soon placed an order.

When it arrived a week or so later, I was pleasantly surprised, as all parts were present and of good quality, including a fibreglass double sided circuit board, that featured solder resist and printed legend showing the component placement.

In addition to the parts required to build the project, a wire ended neon was also included to assist with final testing and demonstration.

Strictly speaking, this project is not a Tesla Coil, but is a Slayer exciter, but nevertheless, it is a very impressive device for the price, and a great evening project.

Construction.

As the component count was low and the devices easy to identify, I simply placed the items in a plastic storage box (from my local takeaway) and I was then ready to start building.

In the usual manner, I assembled and soldered the components in ascending order of size until I reached the secondary winding of the actual Tesla coil.

I would, at this stage, point out that the ends of the coil are supplied taped back over the winding, and it is important that the ends are released and straightened before assembly, otherwise there would be arcing and a severe loss in performance.

The coil fixed in place using epoxy resin, and the adhesive allowed to set before finally soldering the earthy end of the coil to the board.

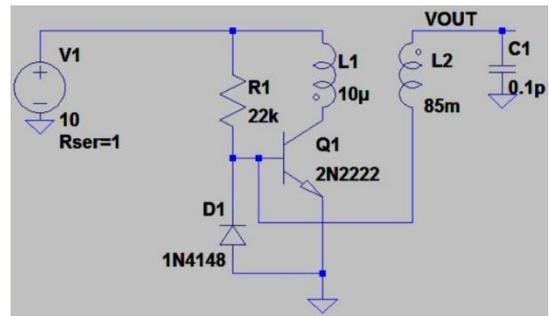
The final step was to assemble and solder the single turn primary winding.

This device employs a design that is referred to as a slayer exciter, which oscillates at the natural resonant frequency of the Tesla coil, by virtue of the feedback from the earthy end of the secondary winding.

Operation.

The oscillator works like this (from electroboom.com):

- * Turning the circuit on, R1 drives the base of the transistor Q1
- * Q1 turns on and drives current into the primary of the transformer. The current is limited by the limited available base current.
- * The created magnetic field drives the secondary of the transformer.
- * The secondary voltage wants to grow large. But the tiny stray capacitance on the output resists the change, although very small, against the rise of the output end and so in return the voltage on the other end of the transformer goes down, pulling the base of the transistor low.
- * Diode D1 prevents the base voltage to fall more than 0.7V below ground, which in return pushes the output end of the secondary high.
- * The transistor turns off and so the magnetic field starts to reduce.
- * The base voltage rises again and Q1 turns on and the cycle repeats.



Components.

The actual circuit diagram used in this kit is a modified version of the one described above, as it incorporates a feature where the oscillator can be modulated from an audio signal which produces sound.

