

Big Tesla Coil

Written by Coyt Barringer

Tuesday, 21 December 2010 09:14 - Last Updated Thursday, 17 May 2012 17:41

X-Labs has recently built a huge Dual Resonant Solid State Tesla Coil! This type of large DRSSTC uses advanced power electronics which allow the coil to be very efficient, compact, and controllable. While the coil is still in development, we have already used it at the 2012 USF Engineering Expo at very low power (we ran it at 5 foot arcs off of a regular power outlet...YES... that is LOW power for this coil!). During the second day at EXPO, we even had it playing music!

Here are some more specific details:

Secondary: 1 foot diameter, 8 foot long pvc pipe wound with over a mile of 20awg magnet wire.

Primary: roughly 15 very wide turns of 5/8" copper tubing (the primary may be water cooled in the future as it will likely carry over 1000 Amps at several thousand Volts!!!!)

Tank Capacitor: a new capacitor is currently being built

Power Electronics: Full Bridge of CM600 IGBT's controlled with a Gate Drive Transformer

Power Supply: 240v Variac connected to a voltage doubler - this gives several hundred volts across the bridge. There are also large capacitors across the bridge to supply huge amounts of current on demand.

Control Electronics: [Steve Ward's](#) UD2.1 DRSSTC controller with Primary Current Feedback and Over Current Detection

Toroid: a new metal ring toroid is currently being built

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The coil can play music with the help of an external MIDI interrupter. The interrupter consists of an Arduino, Midi Shield from Spark fun, and a cheap USB to Midi cable from amazon. The interrupter signal is sent to the DRSSTC through a fiber optic cable. The signal is a simple square wave that is pulsed high to the frequency of the midi note that we want to play. Whenever the pulse is high, the coil is making an arc and thus making sound at the frequency of the note we want to play. This is how the coil plays music.

Once this big Tesla Coil is fully functional, it will be X-Labs most impressive demo yet!

This is X-labs after the secondary coil was wound:

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The Secondary Coil on it's completed base...this thing is MASSIVE!!!

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The 60 Hz Primary Coil sitting alone

top of the (base attached to the Sears Home depot). The 4

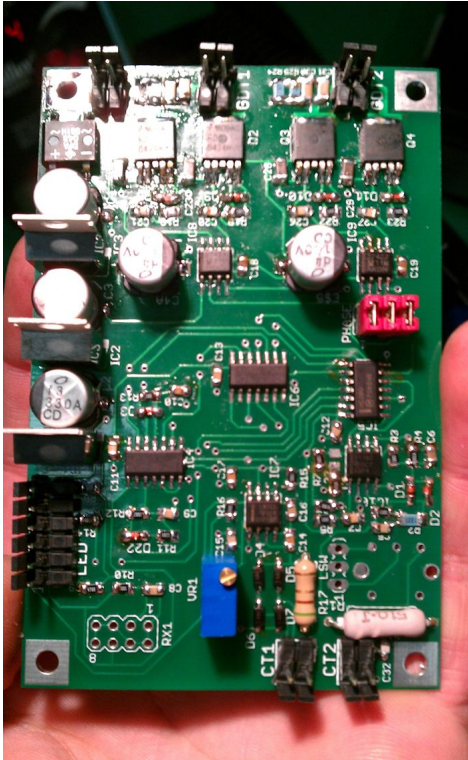


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Each of the two 100V 1000µF electrolytic capacitors (C1, C2) supply the gate drive (the

bridge of 4 60A 100V MOSFETs) and the 100V 1000µF electrolytic capacitors (C3, C4) supply the

charging circuit. The 100V 1000µF electrolytic capacitors (C5, C6) supply the gate drive (the

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overseas stay and could not find any it is a completed test! This is going to be EPIC, especially with music!