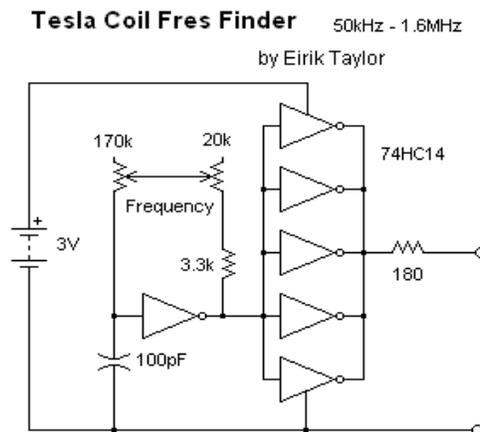


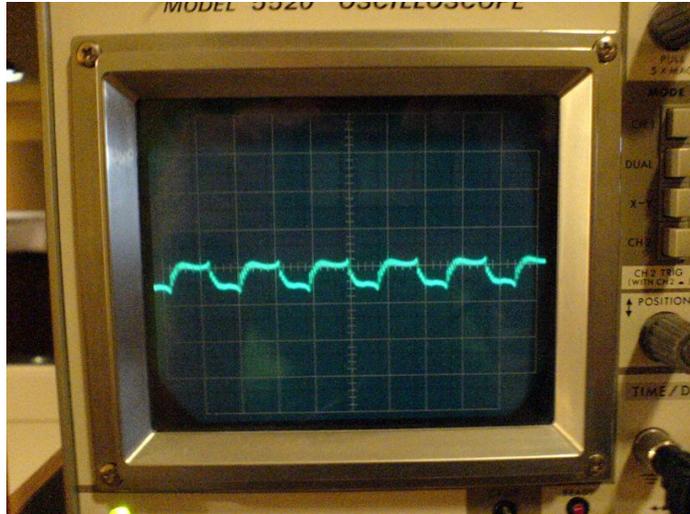
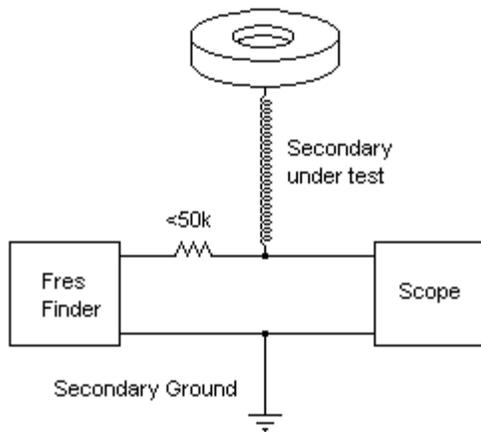
# FRES FINDER

When tuning resonant circuits it's often best to just hit the circuit with a variable frequency and look for a response, as this saves a lot of math and gives a more accurate result. If you want to do it via math you will need exact component values, but since component values deviate from their ratings and homemade components have no values printed on them this is difficult. To add to the difficulty many circuits also have considerable parasitic L or C components, greatly increasing error. Having an extra 74HC14 kicking around I made simple square wave oscillator, with a frequency range of 50kHz to 1.6MHz, a good wide sweeping range for TCs in my opinion.

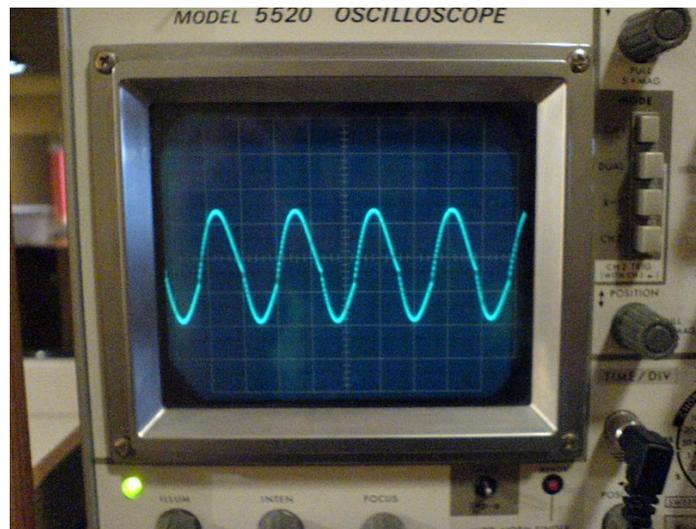


The circuit can be used to tune for both parallel or series resonance. When tuning Tesla Coil secondaries one looks for the series resonant frequency.

This resonant frequency can be found by connecting the base of the secondary in series with a 10 - 50k resistor which goes to the fres finder. The secondary base is connected to the scope as well. Both the scope and the fres finder are then grounded to the TC/ earth ground, as shown in the schematic below. Then by sweeping through the frequency range and looking for the frequency which gives the lowest amplitude one can find resonance. Amplitude will decrease as the frequency increases because of the scope lead's capacitance and fres finder series resistance, so don't be fooled. The real resonance will easily stick out from the surrounding frequencies. When the amplitude increases near fres you have found a parallel resonance. Remember that series resonant circuits have their lowest impedance at resonance, while parallel resonant circuits have maximum impedance at resonance. With the given circuit layout the signal amplitude will naturally decrease as it is shorted more and more to ground. The TC secondary couples to ground through it's topload capacitance, leaving it connected to ground in a sense. The circuit can be viewed as a voltage divider, with the TC secondary as the "lower" resistor. The voltage at the scope probe will decrease as the secondary impedance decreases.



I haven't needed to tune for parallel resonance yet, but I would do so by connecting the parallel resonant circuit in parallel with the fres finder, with a  $\sim 1k$  resistor in series with the fres finder output and PR circuit. The PR circuit would then be scoped, and a waveform like this should be present at resonance.



Source: <http://uzzors2k.4hv.org/index.php?page=tcfresfinder>