A T-Network Tuner Simulator, Kevin Schmidt, W9CF

Unsigned Java applets are now blocked by many browsers. You can run the applet locally on your computer by downloading the jar file http://fermi.la.asu.edu/w9cf/tuner/tuner.jar. Double click this file to run it. If that does not work, make sure java is installed. You can also type java -jar tuner.jar on the command line.

This is a simulator for the popular, series capacitor, parallel inductor T-network tuners. The three knobs across the bottom adjust the three components. They can be turned by moving your mouse to a knob, click and hold down the mouse button and drag the mouse around the outside of the knob. The knob should turn. The capacitor knobs have 10 turns between stops, and the coil knob has 30 turns between stops.

The SWR is shown both digitally in the upper left and on the SWR meter. The loss in the tuner is shown as a percentage of input power and the equivalent loss in decibels. Clicking the autotune button will attempt to have your computer calculate values of the components that should perfectly match the load and give low loss in the network assuming that the capacitors have much higher Q than the coil.

The autotune algorithm tries to minimize the inductance used by first finding a starting match by setting one of the capacitors to its maximum value and if that fails it tries each of the components at its current value. If no initial match is found, it gives up and a "Tune Failed" will be written in the message panel. If a starting match is found, a binary chop is done between the starting inductance value and zero to find the smallest inductance consistent with a match. Note it is straightforward to program a search algorithm that finds the minimum loss, but since our tuners don't come with a loss meter, a rule like tune for minimum inductance is much more useful. In any case, the Q of real components changes as they are adjusted.

The Set Up button allows you to change the maximum values of the three components and their Q values. Initially the capacitors are 250 pF, Q=2000 and the coil is 30 microH, with Q=100.

The three fields on the right allow you to change the load and the frequency in MHz.

One way to use this applet is to pick a load resistance and reactance, and then adjust the knobs of the tuner for a match as you would do on a real tuner. Note the percent loss in the tuner for your adjustment and then click the autotune button to see if the computer adjusts the tuner for less loss.

Note, if you are looking for design software for optimal networks with well characterized components, please look elsewhere.

To run this locally, you can download the file tuner.jar and the file you are looking at tuner.html into any convenient directory and point your browser at the tuner.html file. Old browsers may require you to unzip the tuner.jar file in that directory (Jar files are just zip files with an extra file that describes the contents). Alternatively, you can run this as a Java application if you have a java runtime environment installed.

Java Source code for the applet is distributed under the GNU general public license. The source is available in tunersrc.zip.

Back to W9CF home