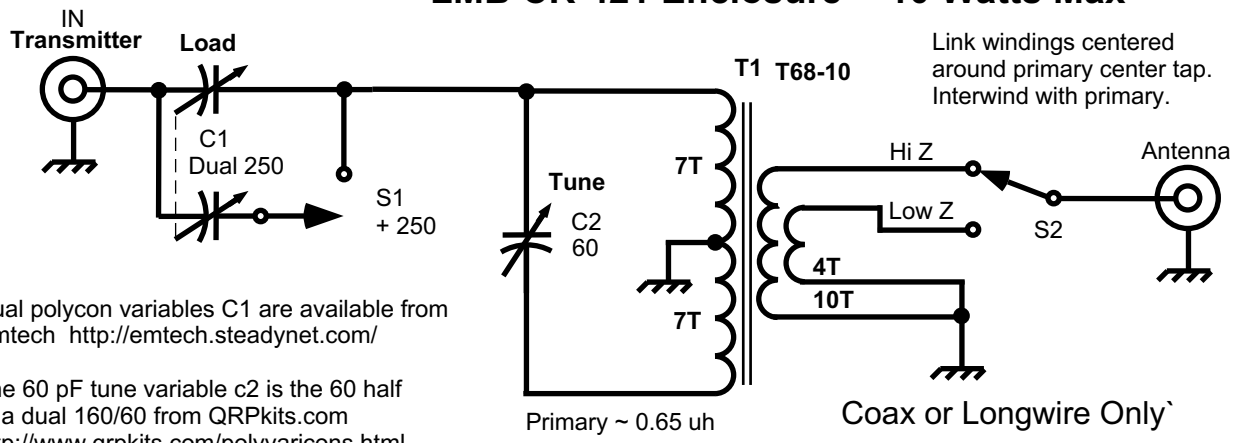
6 Meter Z-Match Antenna Tuning Unit
LMB CR-421 Enclosure -- 10 Watts Max



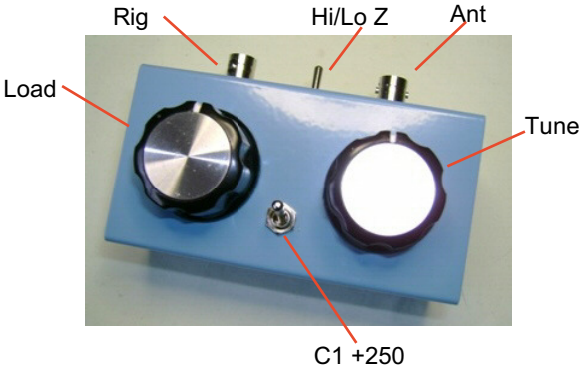
Link windings centered around primary center tap. Interwind with primary.

Dual polycon variables C1 are available from Emtech http://emtech.steadynet.com/

The 60 pF tune variable c2 is the 60 half of a dual 160/60 from QRPkits.com http://www.qrpkits.com/polyvaricons.html or http://www.angelfire.com/electronic2/index1/160pfVarCap.html

Toroid: T68-10, coded black, (looks like ferrite but isn't)

Finished Tuner Sans Labels



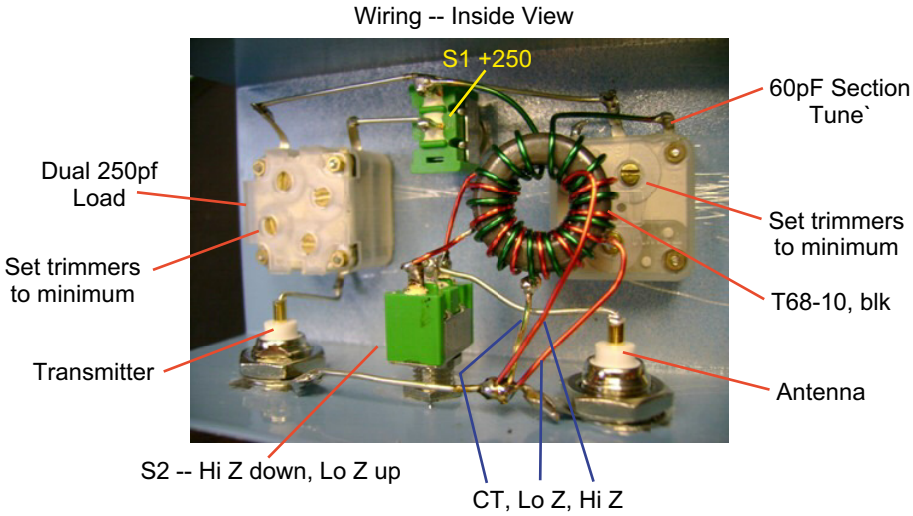
Drilled LMB CR-421 Enclosure

Parts Mounted -- Inside View

Parts Mounted -- Top View

Plastic shaft extensions to minimize hand loading

Wiring -- Inside View



Test and Field Tryout:

AI1H bench test, matched 3 Ohms to 1.6k Ohms with good efficiency, less than 1dB loss.

Easily matched Station 88ft EDZ and Butternut HF9V

Mobil Rig is an FT-857 hooked up to a center loaded (rcv) whip that is resonate at about 11 MHz. Easily matched the whip - no bars in the '857 SWR indicator

Set up MP-1 extended vertical resonate at ~ 16Mhz 4 ft top whip and 5 ft bottom section -- 2, 25ft radials

Using the '817 connected the MP-1 to a random length of RG-8X. Easily matched with no SWR bars

Hung a 20 m dipole as a sloper with the top and at about 20 ft and bottom at 6 ft. Same coax - matched

W5USJ Drawing 23 Dec '08

6 Meter Z-Match ATU Notes

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The purpose of this tuner is to provide a matched load when using antennas not normally used for 6 meter operation. Also for peaking up portable or rover antennas.

The capacitors are the power limiting factor. The toroid is rated at 100 W although that might be only ideal.

Tuner enclosure is an LMB-CR-421 Mouser PN 537-CR-421.

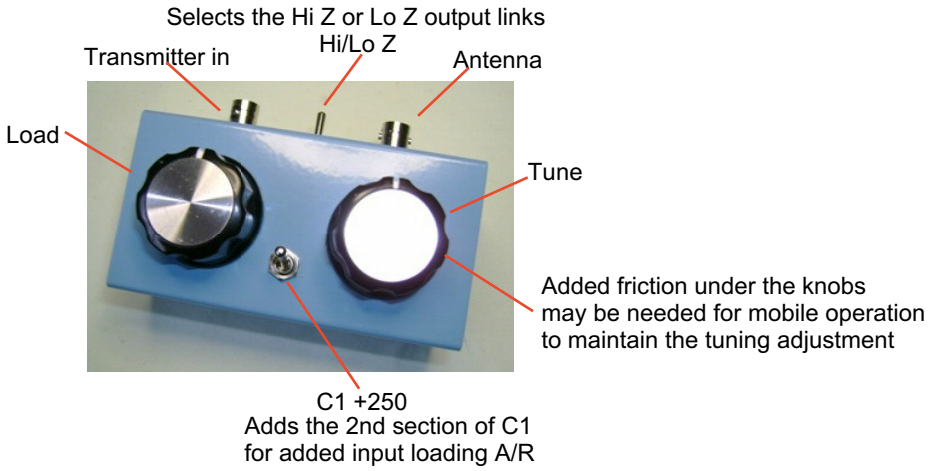
Several toroids were tried in the circuit. T103-6s worked but didn't allow enough turns to provide a wide impedance matching range. T68-6s did a little better. Also 50 mhz is the upper frequencyrange of the -6 material.

The T68-10 material has an upper frequency range of 100 mhz and produced a much better turns ratio and efficiency. Using the T68-10 toroid the tuning range is about 3 to 1.6k Ohms.

Methods developed by Frank Witt, AI1H, were used for bench testing. His tuner profiling methods and procedures are described in QEX and used in part by ARRL. An MFJ-259B is the test meter.

A match is considered to be 1.1:1 or better. Match loss is calculated with: Lest = ((RL1+RL2)/4) –4.77

Matching was easily achieved with several types of antennas including doublets and verticals. Didn't try the TV antenna because there is a hi-dollar LNA in the feed line.



Tuning with the Z-Match is an iterative process.

Start with the Hi/Lo Z switch in the Hi position. The Hi position produces the best efficiency

Adjust back and forth between the two knobs until the SWR indicator is as low as you can get it. If the SWR is 1.1:1 or lower that's good.

If the SWR is higher, switch to the Lo Z position and try it again. Use which ever position is best.

With all the antennas tried so far, the match has always been better than 1.1:1 with the Hi Z link. Greater than 30dB return loss (RL).

Note: The black coding of the -10 material makes the toroids look a lot like -43 ferrites. The paint on the -10s isn't as hard as the ferrite. Also -10 not as magnetic.

W5USJ 24 Dec '08