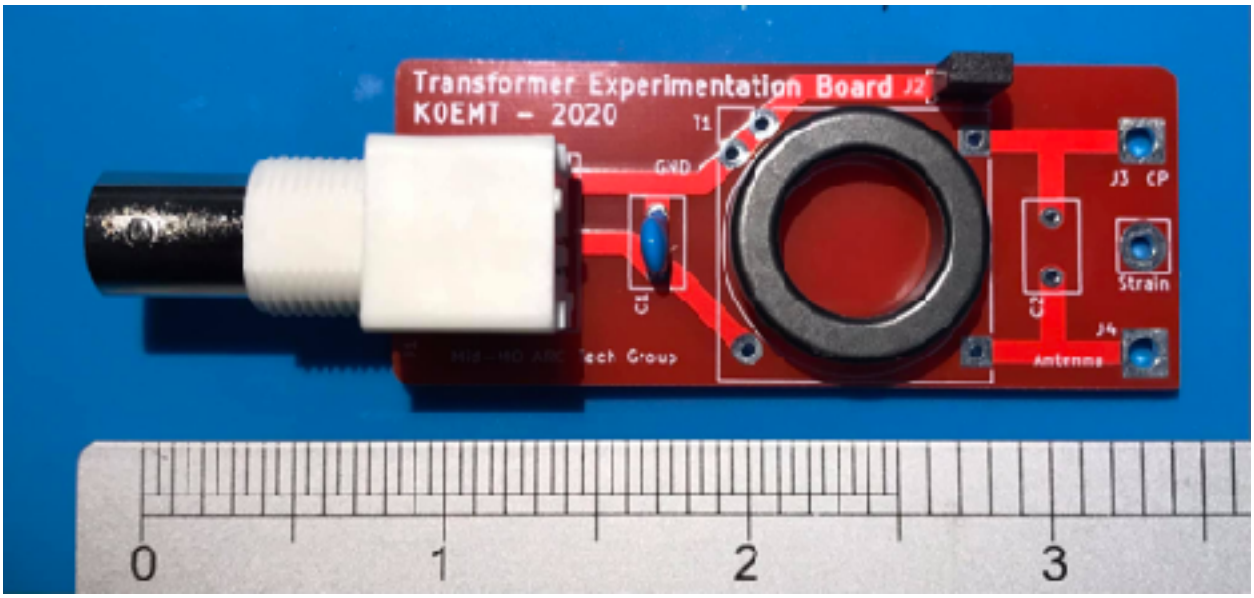


This board can be used for creating a wide variety of transformers. For example multiple ratios and style of EFHW transformers can be wound. You can also create transformers for random wire and dipole antennas.

The BNC connector is a DigiKey part #A97553-ND. It is a TE Connectivity AMP Connectors part #1-1337543-0.

The picture above shows a capacitor installed on the input side, an FT82-43, and shunt jumper at J2. You may opt to solder in a component lead at J2 for your shunt.

EFHW Transformers

The typical capacitor used is a 1KV rated 100pF ceramic on the input side. Typical implementation values are: not installed, 100pF, 50pF, or 150pF.

There are several different ways of winding an EFHW transformer. The "traditional" way with or without a capacitor on the primary:

- https://www.ai6xg.com/post/efhw-xfrmr-capacitor

An approach that AA5TB shows is to put a variable capacitor on the secondary and may or not ground L2 with L1.

- http://www.aa5tb.com/coupler2.html
- http://www.aa5tb.com/coupler4.html

With some of these designs we often see L1 and L2 wires twisted together for the length of L1. Finishing/tinning and putting two wires in one hole can be awkward. So, I put two holes on L1 ground side.

The output is designed so that you do a "cross over" at mid windings of L2 to get your antenna wire to the proper hole. This also provides for the AA5TB style of winding. That is why there is an optional shunt from the BNC/primary ground to L2.

Since I focus on QRP up to 100W, the board is sized to work with **FT82-43** (61, etc) toroids.

There is also room to experiment with binocular cores as well!
- https://owenduffy.net/blog/?p=13233

There are holes for optional capacitors on both L1 and L2 for the different approaches above, C1 and C2 respectively.

There are also single band or one band at a time designs that can work with Type 2 or 6 cores.
Besides the different ways of building the transformer, and the different materials you can use, there are different “standard” transformation ratios. The “standard” transformation ratios for an EFHW antenna are: 49:1, 64:1 and 81:1.

A typical 49:1 transformer has 2 turns for L1 and 14 turns for L2.
14 is divisible by 2 7 times.
7^2 = 49.

You can accomplish the same transformation with L1 of 3 and L2 of 21. These turns ratios are for **Ferrite** Toroids (FT) and Binoculars.

Ratio	L1	L2
49:1	2	14
49:1	3	21
64:1	2	16
81:1	2	18

I have seen QRP tuners that use other than ferrite type materials along with a polyvaricon for specific band transformers. This is with the type of design that uses a common wire all the way around. Common ground, tap at the number of turns specified by L1 to “antenna” on your input. Then continue around to complete L2. For everything below assuming variable or tuned capacitor in the range of 5-150pF. I typically pick up capacitors rated for 1KV for EFHW transformers. Probably overkill for QRP use. 24 AWG enamel coated wire.

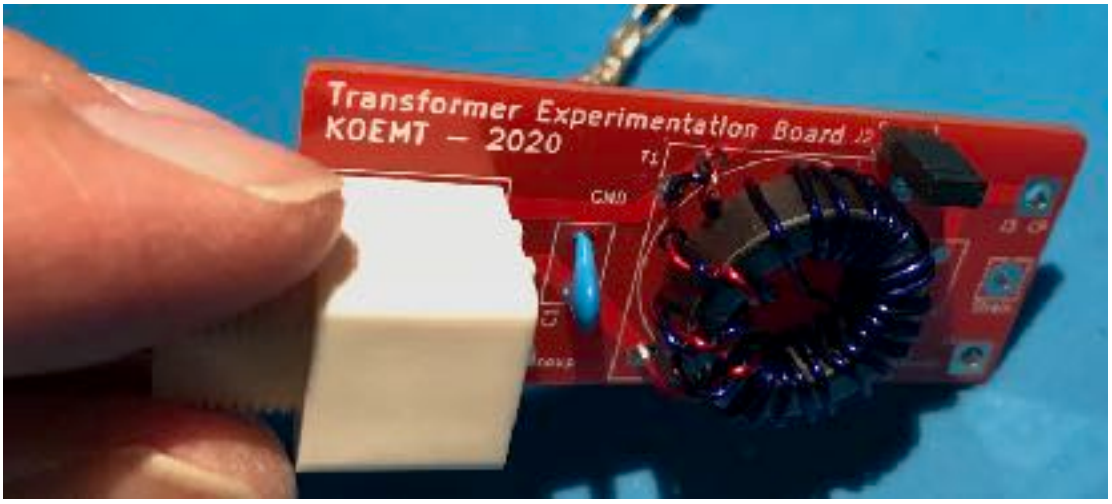
Band specific windings for EFHW with a T50-6

Toroid	L1	L2	Comment
T50-1	5	45	80m
T50-6	3	23	Common ratio
T50-6	1	7	10m
T50-6	1	8	12m
T50-6	1 or 2	9	15m
T50-6	2	11	17m
T50-6	2	15	20m
T50-6	3 or 2	21	30m
T50-6	3	31	40m

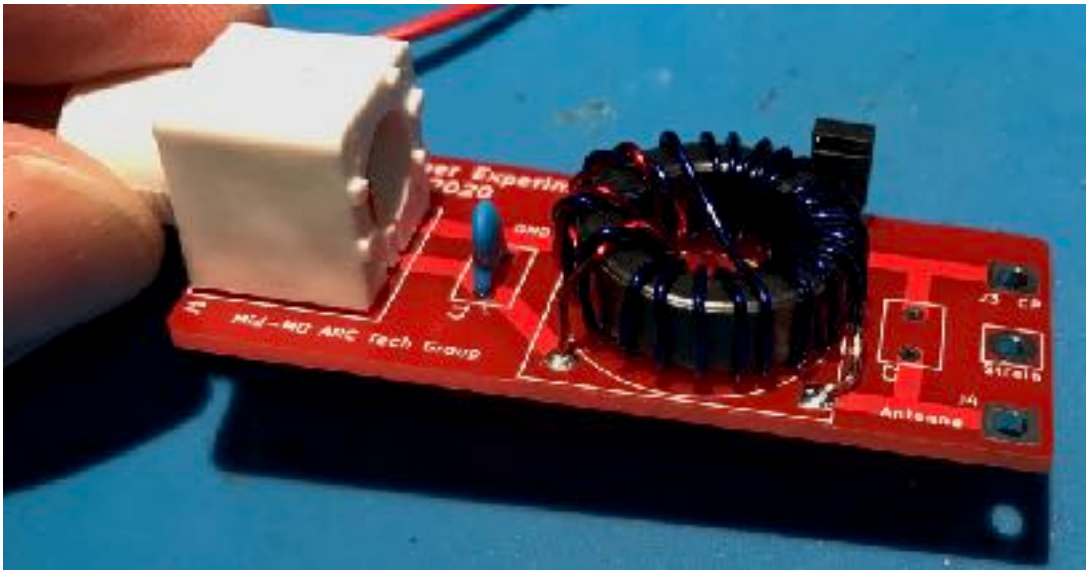
Typical EFHW antenna lengths and bands to expect.

Bands	Antenna Length	Counterpoise
20-10	~33.5’	1’
40-20-10	~67’	2’
80-40-20-10	~134’	4’

EFHW Example 49:1



3T primary, 21T secondary. Note use of both ground holes. FT82-43



Note mid-point crossover on L2.

18-AWG enamel coated wire was used.

Random wire and dipole transformations

You can do transformations besides for an EFHW. For example, you could do 9:1, 4:1, or 1:1 transformers. Transformer configuration information, including wiring diagram, can be found on VK6YSF's page:
http://vk6ysf.com/unun_9-1.htm

This is an example of a 9:1 wound with a larger type 6 core (**T94-6**).

Note: there is a bridge soldered across the jumper location. No capacitors are used and the toroid is a tight fit.

I wrapped the board with Super 33+ to protect the enamel coated wire and to prevent shorting or grounding of the soldered connections on the back.

End fed “random” wire lengths. Use with a 17’ counterpoise wire *and* a tuner.

“Random” Wire Antenna	Antenna
40-30-20-17-15-12-10	35.5’
40-30-20-17-15-12-10	58’
80-40-30-20-17-15-12-10	84’

Lots of good information about “random” wire antennas can be found here:

http://udel.edu/~mm/ham/randomWire/

Notes:

It is not unusual to get some common mode current with an end fed wire. I typically use a 6’ long feed line along with a W2DU choke balun to get the common mode under control.