Hi, Bob

I am really, really, very sorry for the complexity you have dug into with your question. I am really not trying to put you off. It is possible that a magnificent, extremely efficient and high-performing inverted L with X tuned to zero, will have a feed R of 17 ohms and a 3:1 SWR. It is also possible that an equally efficient and performing L just down the block with nearly the same aerial dimensions can have a feed R of 25.

I presume that people are trying to figure out how to get their SWR to 1:1.

The problem has absolutely nothing to do with the FCP and isolation transformer.

The question really has no single, simple answer. One title for the collection of information about all of this: "Taming the exasperating 160m Inverted L." The L itself is the exasperation. The efficiency of an FCP and isolation transformer for counterpoise simply exposes the actual mean temperament of an inverted L.

Unlike a good system of buried radials, which has a feed R that is fairly constant with frequency, an FCP, while very efficient, has a low R in low single digits, and X anywhere 100-200 ohms reactance, depending on a lot of things, mostly environment.

Use of the isolation transformer does not do anything to broaden the width of the FCP, though it cancels a lot of the FCP reactance. Then there is the L wire itself. In free space a 1/4 wave L over a perfect counterpoise has a feed R of 12 ohms, or 4:1 50 ohm SWR. With the FCP and transformer, the overall R of a real life 1/4 wave L will often be quite low, and not a good match to 50 ohms, even though the combo is actually performing admirably.

For L's without the bend at the 1/8 wave spot, and lengths other than 1/4 wave, the feed R+jX varies all over the map, and is particularly sensitive to what is inside the bend of the L.

So I will get voice or email correspondents, who basically have to see 1:1 50 ohm SWR or they can't sleep at night.

One strategy is to lengthen the L at the far end until the R part of R+jX is 50, and then put a series cap or coil to cancel the X portion. It IS possible to get lucky and quite accidentally hit R+jX = 50+j, but there is NOT any reliable formula to do so entirely with the dimensions of the L.

When I get to that web page section (after basics are published), there will probably be 5 to 6 large pages of text (quadruple length QST article) and a dozen pictures to explain all about the very complex and highly efficient L/IsoT/FCP and how to tame it. This includes non-intuitive things that cause loss. When the L is optimized and de-lossified, the "plain, ole" inverted L over an FCP is a very good antenna.

One title I am considering for this section is "Taming the exasperating 160m Inverted L in an L over FCP conversion (Long)"

With the caveat that series caps or inductors are nearly always involved, the common V+H aerial wire lengths for R=50 ohms fall in a range of 140 to 155 feet. This is resistance, not impedance.

Then there is the idea to set the electrical length of the horizontal so that the point of maximum RF current on the aerial wire is 1/16 wave below the bend of the L, to help performance by maximizing vertical polarization radiation getting past ground clutter, trees, etc (caution, NEC cannot model this properly). The horizontal is set to 88 feet, with the far end drooped if needed. The vertical is made as high as possible with support available, and the horizontal is attached to the top of the vertical. With no attention paid to 50 ohm SWR by managing wire lengths, this means a miscellaneous feed Z. Likely not a single piece of wire in it is "resonant" by the common definition.

This miscellaneous value is matched to 50+j0 with a network of some kind.

Further, if there are 40m or 80m dipoles or inverted vee's around, these with their coax can severely "pull" an L making it apparently un-tuneable by ordinary means. This is another complex subject that will be treated on the web page eventually. Some have needed a 1116det at the feed, and a 1116du at the ground to kill interaction with the 160 antenna.

At one point with one correspondent on this subject, I asked him if the antenna was "performing" well. He said "Yes, like gangbusters". Better than old antenna? "Way, way better." At some point he just gave up on matching it to 50+j0 and continued with a smartly performing antenna that wasn't 1:1 50 ohm SWR. He finally realized that performance and 1:1 SWR are not the same thing.

Have these people with further questions write me. k2av.guy@gmail.com or k2av@contesting.com.