

# **The Radio Hotel – Gain – An Observation**

Rick Hiller – W5RH

Unfortunately, what I am about to tell you is not an ‘energized light bulb over the head’ break through. It is simply an observation of technical fact.

I was using the EZNEC modeling program to increase the forward gain of my single element, 40 meter W5RH DX Delta Loop. I wanted to improve its pattern toward ‘the land down under’. I knew that I needed to maintain the already low angle of radiation -- 17degrees. In order to do that and keep the array physically close to the ground (just above my roof level), it needed to remain vertically polarized. So the RF and physical characteristics and limitations were in place and understood. Being in Sharpstown, I needed to generate this gain improvement within my moderately sized back yard. The path to more gain from a single element antenna is a move toward parasitic arrays, extended arrays or driven arrays (i.e. Yagi-Uda’s, EDZ’s or W8JK’s respectively). Yagi-Uda’s, although easier to implement will not give as much gain as a driven array, and an EDZ type -- Extended Double Zepp, is a way to get driven array gain without the typical dual feed point of the driven array. Each has it’s merits and caveats.

I modeled all of the possible 40 meter configurations for both driven and parasitic arrays. I even modeled a side by side driven, but shortened, delta loop array, which amazingly, fit within my yard. (I envisioned implementing it by hanging it under a 17 meter EDZ made from aluminum tubing at 45 feet...(the 17 meter EDZ is another story in itself.) I coaxed and coerced as much gain out of these wires and arrays that I could muster EZNEC to squeeze. In the end, for those 10 hours of modeling and analysis, I went from a single element delta loop with 2.9 dBi gain at 17 degrees primary launch angle, to 2 delta loop elements with 6.9 dBi gain at 15 degrees. 6.9 dBi was the best gain figure of all of the arrays modeled and it occurred with the “fore and aft” driven array. So far, so good in the virtual world. However, in order to physically implement this 2 element array to get the 4dB increase, I would still have to 1) put up a 32 foot long aluminum boom support at 45 feet, 2) build a second shortened element, and 3) design and build a phasing network to feed this beast. So I had “miles to go before I’d DX”.

A 4dB increase in transmit gain is good. It took a lot of analysis, thought and modeling to get that 4 dB and it would certainly help in making my thrice weekly skeds with VK3CWB easier to accomplish, (or at times even just possible with my 100 watt barefoot signal.) However, as I sat in front of my transceiver the other evening trying to dig a signal out of the mud.... IF Shift, RF Gain, Narrow Filter came into play in order to improve things. One last button remained – “Pre-amp”. I thought as I pushed it –“hmmm...20 dB gain”. Holy Toledo!!! A simple push of a button gave me 20 dB....20 dB !!! – 5 times the 4dB transmit gain I labored hours on the computer to attain and had not yet proven in the physical realm. A single stage in the receive chain of a modern day HF transceiver gave me a real 20dB receive antenna system gain. Wow.

## **The Moral**

Receiver gain – appreciate the ease of acquisition. Antenna Transmit gain – relish the enlightenment.

Enjoy your hobby – W5RH