Ham 174 - Triad compactenna real

Dr. Marc & Rosemary Durham, Theway Labs, Bixby, OK

Objective. Recently, I was asked again, 'Is the COMPACtenna for real?' The short answer: *Yes!*

Fig. 1. Triad Compactenna, 10-in counterpoise

Purchase. We have purchased, I think, most all the ham-series of COMPACtenna for a simple reason. They work. Like everyone, we have seen the dismissing comments or heard the profundity and pontification. These apparently come from prophets who have not followed the physics or done the math. One must give-up their opinions to learn.

The paradigm-shift design counters virtually everything most thought they knew about antennas. The package is unbelievably small, yet effective. There are no long radiators. The basic radome is 7.75" tall, with a 9.25" enhanced version.

Non-traditional. Unlike traditional wire-inductor antennas, this is a spiral, cylindrical-capacitor radiator. Before seeing these, I built small air-core cylindrical antennas, including 40-m. Looking for more data on capacitive designs led to our trying the COMPACtenna.

First. My first version was the nominal 7-in, 2-m/70-cm unit. With a counterpoise, it really worked great. I then installed another one as a mobile unit. I did not locate the antenna on the corner per instructions. Instead, an antenna analyzer allowed moving the antenna to different locations. The toolbox center visually looked more symmetrical. It works fine, but with elevated SWR of 2.05:1.

Fig. 2. 18" counterpoise

Different. The terrain around Concharty Mountain blocks the wave path from the highway to our ranch. At 7-miles, simplex signal was lost. On one trip, when the signal vanished, I stopped to replace the 7-in with a 9-in. Upon calling base, the co-author responded, you are back. Sold.

Go Box. Our VHF Go-Box has an ICOM 2730 transceiver feeding a 7-in 2-m/70-cm with a counterpoise mount attached to a 1" PVC pipe. Quarter-wavelength (λ/4) is 20.375-in. Our counterpoise is about one-half the standard length (λ/8) at 11-in. The math works.

Elliptical. Like a Wi-Fi antenna, the polarization lets the antenna receive from multiple directions (called phase-diversity). So, it is less restricted to line-of-sight (LOS). These are not high gain, directional devices. In our area with many hills and large buildings, its near-line-of-sight (NLOS) has proven itself. Many in our ham group, use the COMPACtenna with counterpoise on a piece of conduit in the attic. It is a very HOA friendly and effective radiator.

Fig. 3. 11" counterpoise

Field Measurements. On our test range, experiments measured relative field strength when transmitting, using an ICOM 5100 transceiver on low power with the same coax feeding both antennas. Measurements are in the far field, which is 2λ or 400 cm horizontal from the radiator.

The 9-in with 18-in counterpoise radiated ~0.11 mW/cm^2. As a comparison, the Diamond X-50A radiated only ~0.08, which is considerably weaker. Since the tests were not in an anechoic chamber, because of sensitivity to distance, one could assume it is within the margin of error. But it is not. Both hit a repeater 56-miles away, with the 9" producing a 1 S-unit (6 dB) stronger signal. That is over the horizon, not line of sight. The 9-in outperforms a vertical.

Key. *Because the Triad counterpoise design is to compensate for height and shape, all three elements interact and require adjustment. Adjust the counterpoises for SWR.*

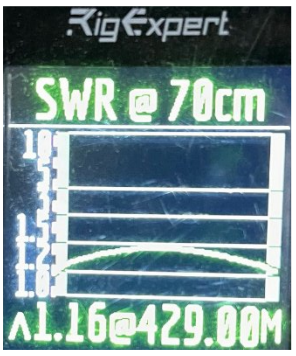

Fig. 4. UHF works well

Counterpoise. With the Triad design, short is better. Conventional length is about 19-in. SWR plots for various dimensions compare the effectiveness. Is there a significant difference? Optimum is about 11-in, with as short as 9-in performing adequately. Brass is 10% shorter.

For the explanation of why, see the article, "Triad antenna background"

Who done it? Since working with, using, and abusing these antennas, we have met and become well-acquainted with the inventor, Dr. Jack Nilsson. Fortunately, his out-of-the-ordinary approach has produced a great new antenna paradigm. It takes time for novel to catch on.

Results. The Triad antenna system using a Compactenna radiator, and Triad sized counterpoise yields stellar results in an incredibly small package.

Life is good. Enjoy!