Ham 119 – COMPACtenna for Real?

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1. Recently, I was asked again, 'Is the COMPACtenna for real?' The short answer: *YES!*
2. We have purchased, I think, all the ham-series of antennas for a simple reason. They work.
   a. Like everyone, we have seen the dismissing comments or heard the profundity and pontification.
   b. These apparently come from prophets who have not followed the physics or done the math.
   c. The paradigm-shift design counters virtually everything most thought they knew about antennas.
   d. The package is unbelievably small, yet effective. There are no long radiators.
   e. The basic radome is 7.75" tall, with a 9.25" enhanced version.
3. Unlike traditional inductor wire antennas, this is a spiral, cylindrical capacitor radiator.
   a. Before seeing these, I built small air-core cylindrical grid antennas, including 40-m.
   b. Looking for more data on capacitive designs led to trying the COMPACtenna.
4. My first version was the nominal-7" 2-m/70-cm version. With a counterpoise, it really worked great.
   a. I then placed another one as a mobile unit. I did not locate the antenna on the corner per instructions.
   b. Instead, an antenna analyzer allowed moving the antenna to different locations.
   c. The toolbox center visually looked more symmetrical. It works fine, with elevated SWR of 2.05:1.
5. Elliptical polarization lets the antenna receive from multiple directions (phase-diversity), like a Wi-Fi.
   a. Consequently, it is less restricted to Line-Off-Sight (LOS). These are not high gain, directional.
   b. In our area with many hills and large buildings, its Near-Line-Of-Sight (NLOS) has proven itself.
   c. Many in our ham group, use the counterpoise COMPACtenna on a piece of conduit, raised to the peak of the attic. It is a very HOA friendly and effective radiator.

$2\pi fL = 1/2\pi fC$
$f_o = 1/2\pi\sqrt{LC}$

6. The terrain blocks the highway LOS to our place. At 7-miles, simplex signal was lost. On one journey, when signal vanished, I stopped to replace the 7" with a 9". When calling base, the co-author responded, you are back. Sold.
7. Our VHF Go-Box has an ICOM 2730 feeding a 7" 2-M/220/440 mounted to a counterpoise base attached to a 1" PVC pipe. The radials are standard 18.75" quarter-wave. Most often, I use 1/12 wavelength radials. The math works.
8. The next two COMPACtenna we have are HF/2-m/440. The radome is 6.5" mounted on a 3/8" shaft for overall height of 20". It mounts in a standard magnetic mount or 3/8" feedthrough. What a crazy concept, like a fox.
   a. I originally purchased a 20-m version. The most recent is the 10-m version.
9. The big bazooka is a 40/20/10/6/2m/220/440 in a 28" x 3" radome mounted on the same 3/8 x 13" support.
   a. A short 6" matching radiator projects from the top. One downside is that the bandwidth is narrow.

10. Manufacturer instructions suggest building a metal sheet ground plane for each of the HF versions.
    a. Being a research scientist, who has modelled and built literally hundreds of antenna variations, my co-author reminds me about an inherent problem of leaving well-enough alone.
    b. As an electrical circuit, all antennas need a return path, whether one-side of a dipole, radials, counterpoise, or earth. In essence, all these off-sides are coupling to earth as the return.
    c. We have modelled and built myriad dipole variations. Our most used is horizontal counterpoise (off-side) parallel to the earth. Then the radiator can be bent, folded, horizontal, or vertical with associated Z and radiation changes.
    d. This same approach works with the COMPACtenna, without the sheet metal montage.
    e. The photos show the 10-m with a single, quarter-wave 8'8" counterpoise. The ICOM 7300 was happy.
11. Our final discussion is the COMPACtenna VHF/UHF micro-beam.
    a. This device uses a normal 9" radome and counterpoise.
    b. Its signal is directed by two circular reflectors of copper wire set behind the radiator.
    c. Borrowing from magnetic loop design, one is 9" diameter, the other is 26".
    d. The predictable style is a round Yagi, without the long elements.

12. Experiments measured relative field strength when transmitting, using an ICOM 5100, low power, on same coax.
    a. Mount at 2λ high for less ground effect. Measurements are far field 2λ (400 cm) horizontal from radiator.
    b. The 9" on counterpoise is ~0.11 mW/cm^2. As a comparison, the Diamond X-50A is ~0.08.
    c. Not in an anechoic chamber, because of sensitivity to distance, this appears within margin of error.
    d. They both hit a repeater 56-miles away, with the 9" having a 1 bar stronger signal. Over horizon is NLOS.
    e. Because of take-off angle, the beam has a ~0.16 signal about 15 degree up and to side. Front to side ratio >4:1.

13. 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.
14. Life is good. Enjoy!