COMPARISON OF PERFORMANCE BETWEEN DIFFERENT TYPES OF ANTENNAS ON A CB PORTABLE SET

A TEST TO SHOW THAT THE EH ANTENNA WORKS WELL EVEN WITHOUT A COAX CABLE AND NO GROUND PLANE

On Ted's Yahoo Forum I once mentioned that I had tested the EH Antenna mounted directly on a CB Portable Transceiver against a CB Station located some 22 km away from my QTH. First I called him with the 72 cm glassfiber whip. I told him that I wanted to check out another antenna, but I did not say what kind of antenna I intended to use. The receiving station recorded my S-meter reading on the glassfiber whip. Then I changed to the EH Antenna. This time the radio was better on both sides and the S-Meter reading at the remote station was recorded once again. This time I got a report which was 2 S-Meter units higher than with the 72 cm whip.

When I wrote this on the Forum, I got bombarded with comments about useless S-meter readings and my body might be a part of the antenna radiation, and the two S-units could not be possible etc. Well, nobody knows how many dB higher the EH Antenna signal was. But the fact is that the signal when using the EH Antenna was *stronger*, not weaker, that is the main interesting observation. Which I was keen to prove - that the EH Antenna works even without a coax cable.

My attempt to show different performance between various antennas

The Test Transceiver:

The Antennas Under Test were connected directly to the portable Maycom AH-27 CB transceiver set to channel 30, or 27.305 MHz. The power source was a 12 Volt, 600 mAh Nicad Battery which had been fully charged prior to the test. This Nicad Battery is slid onto the transceiver body without connecting wires. On top of the transceiver there is a TNC connector. It is possible to switch the power between 1 W (LO) and 4 W (HI). The RF output power was checked on the Stabilock 4040 after the test and was recorded as 1.01 Watts on LO and 4.03 Watts on HI.

The picture of the Maycom CB Portable shows it with the 24 cm Helical "Rubber Duck" mounted on the TNC socket. The Battery casing is plastic.

The Site:

The transmitter was placed 125 cm above the ground on a wooden stool. It was placed in a small vice to keep it from toppling over by the weight of the different antennas during the test. The distance to the receiver, the Radiometer AFM3 was close to 9.5 meters. The receiving equipment sits on a wooden table on top of two cartons. The height over the ground is about 1.0 meter. The receiving antenna is a 73 cm long glass fiber whip. There was no attempt made to calibrate the receiver on the site; all measure-ments were made with the antenna in the same location and with the same settings. Only the difference in ERP was recorded.

The receiver:

The receiver used for the level recordings is a Radiometer AFM3. This instrument can be used to measure AM and FM modulation. It has a 40 dB input attenuator (10 + 10 + 20 dB) and the input impedance is 50 Ohm.

When the level meter is set to position "Manual", the AFM3 can be used as a level meter. As we are interested only to see the difference between the different antennas under test, a calibration as such is not neccesary.

Important is not to alter any potentiometer settings. Only the input attenuator was altered from time to time to keep the deflection within the panel meter scale and to ensure an optimum meter reading. All input attenuator settings and the meter readings were recorded.

The Tests

There were three different tests with the three different antennas. An additional test with the EH Antenna (4) held in the hand was also recorded:

1. Test with 1 Watt RF output power
2. Test with 4 Watt RF output power
3. Test with 1 Watt RF output power and holding one hand on the transceiver (but still fixed in the small vice and standing on the wooden table.
4. Test with 4 Watt RF output power with the EH Antenna plus holding one hand on the transceiver (but still fixed in the small vice and standing on the wooden table.

Test No. 1, test with 1 Watt RF output power:

Antenna under Test	**Attenuator (dB)**	**Meter Reading (dB)**	**Substitution**	**Difference**
			Signal (dBuV)	
f = 27.305 MHz	(AFM-3)	AFM-3	(Stabilock 4040)	
Helical 24 cm	10 + 10	-7.5	72.6	0
Fiberglas whip, 73 cm	10 + 10	-3.0	77.1	+4.5
EH Antenna ("blue/red")	10 + 20	-6.0	84.2	+11.6

The Helical "rubber duck", which comes with the transceiver as a standard accessory was considered to be the "reference" level. It has been well known for many years, that the glass-fiber whip performs better than the 24 cm long (or short) helical antenna. It is interesting to note that the EH Antenna outperforms both the helical and the fiberglass antenna!

Test No. 2, test with 4 Watt RF output power:

Antenna under Test	Attenuator (dB)	Meter Reading (dB)	Substitution	Difference
			Signal (dBuV)	
f = 27.305 MHz	(AFM-3)	AFM-3	(Stabilock 4040)	
Helical 24 cm	10 + 10	-2.0	77.9	0
Fiberglas whip, 73 cm	10 + 20	-8.7	81.7	+3.8
EH Antenna ("blue/red")	10 + 10 + 20	-11.0	89.5	+11.6

Again, the Helical “rubber duck”, was considered to be the “reference” level. The 73 cm fiberglass whip again performs better than the 24 cm long helical antenna. The increase in dB is rather identical with the first test with one Watt RF power. It is interesting to note that the EH Antenna again outperforms both the helical and the fiberglass antenna at almost the same rate!

Test No. 3, test with 1 Watt RF output power and placing one hand on the transceiver:

Antenna under Test	Attenuator (dB)	Meter Reading (dB)	Substitution	Difference
			Signal (dBuV)	
f = 27.305 MHz	(AFM-3)	AFM-3	(Stabilock 4040)	
Helical 24 cm	10 + 20	-7.0	83.2	+10.6
Fiberglas whip, 73 cm	10 + 20	-4.2	85.9	+8.8
EH Antenna ("blue/red")	10 + 10 + 20	-10.0	90.1	+5.9

The Helical “rubber duck”, was once again considered to be the “reference” level. I compare these readings with the first test, just to show the difference compared with the transmitter sitting on an insulated table.

It can be noted that the 24 cm Helical antenna profits most from holding the transceiver in the hand. Interesting is that the 73 cm glassfiber whip does not profit that much from holding the transceiver in the hand.

The most interesting observation is that the EH Antenna, which manages rather well on its own, shows the least additional gain when held in the hand. It already performs well even without a ground plane.

Test No. 4, EH test with 4 Watt RF output power and placing one hand on the transceiver:

Antenna under Test	Attenuator (dB)	Meter Reading (dB)	Substitution	Difference
			Signal (dBuV)	
f = 27.305 MHz	(AFM-3)	AFM-3	(Stabilock 4040)	
EH Antenna ("blue/red")	10 + 10 + 20	-5.0	95.2	+5.7

Again it can be noticed, that the EH Antenna gains 5.7 dB when set to HI output power and placing a hand around the cabinet. The increase is much like the increase recorded with 1 Watt RF.

Conclusion:

This test has clearly shown that the EH Antenna can radiate power even without a coaxial line. It also clearly shows, that it works much better than the other two test antennas. Therefore I am tempted to say that I have proved that my signal over 22 km must have been stronger on the EH.