2 METER EH ANTENNA EXPERIMENT
APRIL/2007
Ted

This document describes a 2 meter antenna the reader may build and test to validate the performance, and to learn more about the EH Antenna. To make life really simple, a flat antenna was chosen. Tests in an anechoic chamber indicate that it has close to the same performance characteristics as a round antenna. A round one this size would have a diameter of 3/8 inch. I chose that size to make it easier to build than a smaller one and it has more bandwidth, so it will be less critical.

On the last page I have included the calculations for the antenna. The only difference is that the diameter should be multiplied by . to give the width (effective circumference) for the flat antenna. It will work if the copper is glued to a piece of paper, but it is preferable if you glue the copper to a piece of clear plastic. For the test antenna I used a plastic ruler. Run the feed line out to the side of the antenna and down to the radio. This is illustrated in the photograph below. For testing tape the ruler to the radio
I suggest that the tuning coil and the twisted pair feed line be made of #24 or smaller enamel covered wire because that is readily available at Radio Shack, or at a local motor rewind shop. Tap the tuning coil at about 1 turn from the cold end. Spread the wires as needed for tuning and matching.

The twisted pair is simply a pair of wires twisted together. The amount of twist is not critical, but I use about **3** complete turns per inch because that is easy when using an electric drill. To prevent distortion of the radiation pattern be sure to use an ohm meter to validate that the ground end of the tuning coil is the same as the ground on the radio. The test results from the example antenna are documented in the attached analysis. I hope
you will install the antenna on your handheld radio and compare the communication range against the standard antenna. Please share the results of your experiment on the forum.

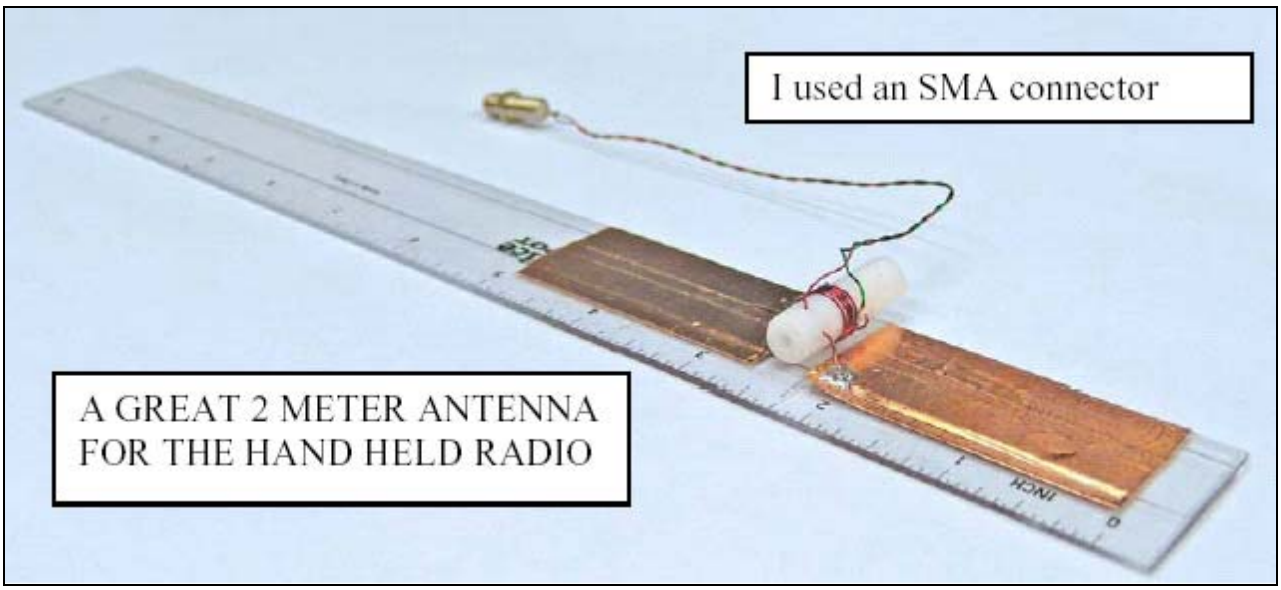

Fig. 1

As a general comment, tuning and matching the antenna takes only a few minutes if you have the proper test equipment, i.e., a network analyzer. If you only have a field strength meter it takes longer to change frequency on the radio to verify the frequency of

maximum radiation and to adjust the tap for best match.

FOLLOWING IS A DESIGN PROGRAM FOR AN EH ANTENNA
SPECIFY THE PARAMETERS IN THE BLUE CELLS

Frequency	**146**	MHz	flat
Cylinder Diameter	**0.375**	Inches	1.17825
L/D ratio	**6**		
Total Length	4.88	Inches	
Total Length	0.41	Feet	
Capacity	2.0	pFd	LINE A
Inductance needed	0.6	uHy	
Coil Capacity	0.86	pFd	LINE B
Total Capacity	**2.9**	pFd	LINE A+B
Modified Inductance	0.4	UHy	
Reactance	545.1	Ohms	
Coil Diameter	**0.375**	Inches	
Wire Spacing	**0.013**	Inches	#28 wire
# Turns	6.5	Turns	
Coil Length	0.1	Inches	
Wire Length	0.6	Feet	

USE THE ABOVE TO BUILD AND RESONATE THE ANTENNA AND TO MATCH IT TO 50 OHMS. INSERT THE MEASURED BANDWIDTH AFTER MATCHING.

Measued +/- 3 dB BW	**19400**	KHz
Measued 2:1 VSWR BW	**6000**	KHz
Radiation Resistance	72.4	Ohms
Antenna Q	7.5	
CALCULATE ANTENNA EFICIENCY		
Assume coil Q	**200**	
RF Resistance in coil	2.7	Ohms
Antenna Efficiency	96.4	%
Antenna Efficiency	-0.16	dB
ANTENNA POWER PARAMETERS		
Transmitter Power	**5**	watts
Transmission Line Z	**50**	Ohms
Transmission Line voltage	15.8	Volts RMS
Transmission Line Current	0.3	Amps RMS
Current between Cilinders	0.3	Amps RMS
Voltage between Cylinders	143.2	Volts RMS
Voltage between Cylinders	401.0	Volts P-P

EXPERIMENT OF THIS EH ANTENNA FROM UA1ACO
May/2007
Vlad Kononov

UA1ACO (Vlad), made this EH antenna and make some experiments.
The antenna was made head-to-head and was felt with station "Kenwood TH-F6A" under output power 50 milliwatts and included internal attenuator -20 dB.

Fig. 2

Two experiences.

The First:
1. On station have installed antenna "rubbers".
2. Two stations were referred on distance around 1 kilometer (about 0.7 mile) while on one of the station factor S-meter became to show on **-10 dB** (stations were calibrated on HF generator).
3. Hereinafter antenna "rubber" was replaced on EH antenna.
4. After change on EH antenna level S-meter has shown gain more than **10 dB**.

The Second:
1. The used radio station "Kenwood TH-F6A" and radio receiver with quartz stabilization. Without AGC, the dynamic range more than 60 dB and pin by antenna length 10 centimeters (4 inch). On leaving the receiver was used digital indicator (accuracy of reading 0.1 dB).
2. Radio station and receiver were referred on distance beside 8 lengths of the waves (16 metres or 17,5 yard)

3. On radio stations "Kenwood TH-F6A" have installed the full-size antenna Dipole, and on receiver, level of the signal has takeaased (statement) **0 dB**.
4. After installing on radio stations "Kenwood TH-F6A" antenna "rubber" level of the signal on receiver became **-5 dB**.
5 After installing on radio stations "Kenwood TH-F6A" EH antenna, level of the signal on receiver became **+3 dB**.

After called on experience was measurement fields from EH antenna by means of sensor E and H field.
Results of the measurements possible to see on drawing Fig.3

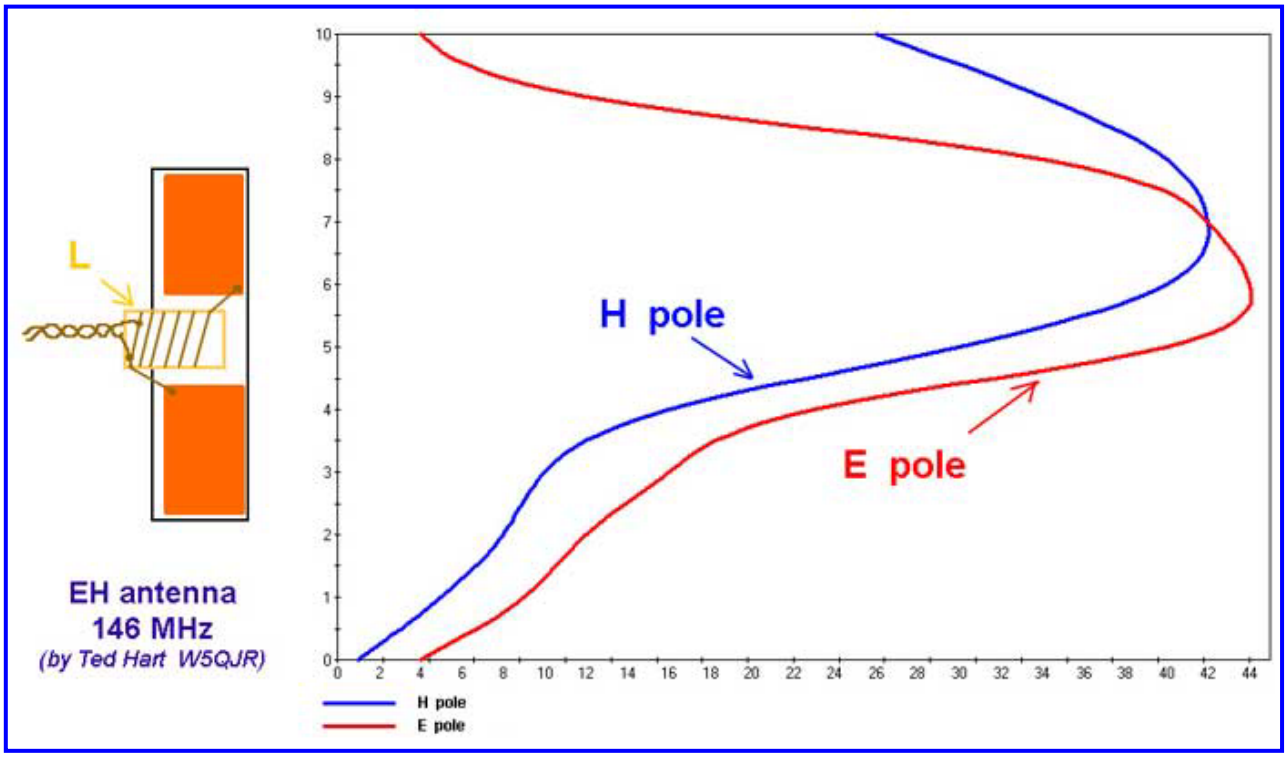

Fig. 3

I think, that all remembered graphs of the distribution E and H fields beside of Dipole? Realy, there is something general?

I wish good luck and excellent health!
73! Vladimir UA1ACO St.-Petersburg, Russia