Ham 129 –Hamstick 10M

Dr. Marc & Rosemary © 231028

1. HF (75M – 10M) antennas are very different from VHF/UHF (6M – 70cm) primarily because of longer length. For this reason, most HF are some configuration of horizontal.
2. Mathematically, all antennas are a variation of a dipole, with a radiator, a return, and a feedline point.
3. Our objective is an HF antenna system which is apartment usable, neighborhood HOA friendly, minimal lightning exposure, and anyone can install. Those constraints mean the antenna likely will be single band.
4. Most antenna systems focus on the radiator and almost ignore the return. Since that has not provided a very friendly design, we will do the opposite.
5. What if I told you my 10M antenna system occupies 52x42x2”, is in the attic, with 5-9-8 signals from Grand Cayman, NH, and OR with S1 noise? A similar configuration works to 75 meters. It is not magic, just doing the opposite of most antennas. You can even hide it behind a curtain.

Model	Band	BW 2:1	Fib+Whip
S-FM75	75 M	36 kHz	36 + 40”
S-FM40	40 M	40 kHz	36 + 8”
S-FM20	20 M	80 kHz	24 + 17”
S-FM15	15 M	110 kHz	24 + 17”
S-FM10	10 M	175 kHz	24 + 12”
S-FM_6	6 M	800 kHz	24 + 12”

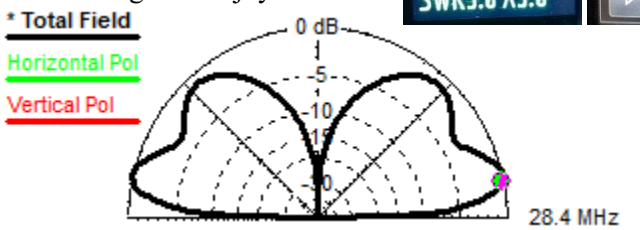
6. Shark mini-Hamsticks are hollow Fiberglas shafts wrapped with wire and a tuning whip out the top. The generic specs are in the table. These antennas are for interchangeable mobile service.
7. After quality time with EzNEC modelling and tweaking, a very usable antenna system came about.
   a. Use a 3/8”x24 antenna mount on a L-bracket base. Attach a mini-Hamstick to the mount.
   b. Use 2 opposing radial counterpoises of 5/32" rod or AWG 12 wire attached to the base.
   c. Drooping at 45 degrees raises impedance and reduces space width.
   d. Make the counterpoise lengths 1/12λ. For 10-meter, 33” works very well.
   e. Shorter counterpoises require increasing inductance to resonate. Lengthen the radiator or add a coil.
   f. Length of counterpoise increases bandwidth to a point.
   g. Feed with 50Ω coax. Use RG213, if over 25’.
   h. One foot below the SO-239 connection, snap on 3 to 5 ferrite beads of Type 31 mix by Palomar.
   i. The ferrite is critical to tune the antenna. Without the beads, the coax shield is a counterpoise.
   j. Mount feed-point ‘preferably’ higher than 0.16λ above earth, outside the reactive field interference.

My Hamsticks

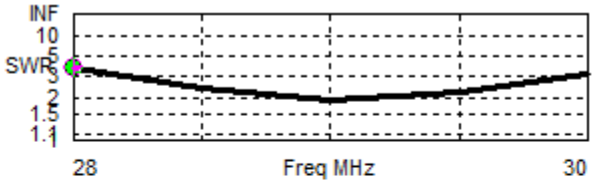
8. Use an antenna analyzer to tune the antenna. Lengthen the whip to lower frequency.
   a. Adjust for minimum SWR at 28.400 MHz, the middle of Technician SSB.
   b. The bandwidth was much wider than published, but SWR was near 3:1.
   c. When connected to the Icom 7300 HF transceiver, then tapped tune, it brought SWR (blue bars) below 1.1:1, allowing full-power operations.

9. Vertical antennas see an 18 dB drop when talking to a horizontal with surface wave.
   a. Reflected waves during DX rotate polarization, so do not have the signal drop.
   b. Verticals are omni-directional with little gain and low take-off.
10. Like all antennas, it is a compromise, but can work really-well on one-band.

11. The model, antenna analyzer, radio display, and performance all tell the same story.
12. Life is good. Enjoy!



Elevation Plot		Cursor Elev	11.0 deg.
Azimuth Angle	0.0 deg.	Gain	1.1 dBi
Outer Ring	1.27 dBi		-0.17 dBmax
Slice Max Gain	1.27 dBi @ Elev Angle = 13.0 deg.		
Beamwidth	21.3 deg.; -3dB @ 5.5, 26.8 deg.		
Sidelobe Gain	1.27 dBi @ Elev Angle = 167.0 deg.		
Front/Sidelobe	0.0 dB		



Freq	28 MHz	Source #	1
SWR	**3.66**	Z0	50 ohms
Z	112.6 at -46.71 deg.		
	= 77.22 - j 81.98 ohms		
Refl Coeff	0.5708 at -38.84 deg.		
	= 0.4446 - j 0.3579		
Ret Loss	4.9 dB		