Ham 131 – Hamstick Construction

Dr. Marc & Rosemary © 231101

1. Shark Hamsticks are single band antennas for HF & 6M (75M – 6M). Other brands have not been tested.
   a. The 2-to-3-foot length plus whip makes them highly desirable antennas with a counterpoise.
   b. Our objective is an HF antenna system which is apartment usable, neighborhood HOA friendly, minimal lightning exposure, and anyone can install.
   c. At a basic cost ~$25, they are budget friendly.
2. Use L-bracket with a 1/2” for mounting components.
   a. Place a 3/8”x24 to SO-239 connector on the bracket. The coax connector must bond to the bracket.
   b. Add a counterpoise of two radials which are 1/12λ in length.
   c. Use 5/32” rod or #12 solid wire soldered to spade lugs.
3. All antenna configurations are a trade-off, like every engineering or other problem.
   a. All antennas are a variation of a dipole, with a radiator, return, and feed.
   b. Multi-band antennas tend to be very long, while single-band can be more compact.
   c. Longer wavelength / lower frequency has narrower bandwidth.
   d. Multi-band do not have great SWR, since they are not tuned, so they need matching circuits.
   e. A vertical antenna has a radiator, while counterpoise is the return. The feed connects to both.
   f. Classical verticals are 1/4λ tall with 0.25λ length radials.
   g. This size is simply for convenience and tradition, but that radial is not preferred.
   h. Radials with 1/12λ will have a radiator of 0.31λ for resonance.
   i. For an elevated counterpoise, two radials are all that are required.
   j. Vertical antennas are about 30Ω. Bending radials down to 45 degrees increases impedance.
   k. Radials can be practically shortened to 1/12λ with a limit of 1/20 λ.
   l. As radials shorten, inductance must be added to the radiator, by additional length or a coil.
   m. Tune the antenna by adjusting the whip. Longer moves the frequency lower.
   n. Shortened radials increase SWR. 1/12 λ radial makes SWR about 3:1
   o. Shortened radials increase resistance and capacitance.
   p. On 10M, I see bandwidth about 800kHz.
4. For dual band, two hamsticks can be connected in parallel.
   a. Use a 3/4" flat metal bar. Drill two 3/8” holes a couple of inches apart.
   b. Affix one hole between the stud and antenna. Attach the second antenna to other hole.
   c. The radials should be sized for the lower frequency.
   d. The counterpoise must be a little longer to reduce the new increased SWR.
   e. The radiators will need retuning.
   f. Parallel makes the Low band move down and the High band move up.
5. Antennas may be mounted vertically or horizontally.
   a. Vertical antennas see an 18 dB drop when talking to a horizontal by surface wave.
   b. Reflected waves during DX rotate polarization, so you do not see the signal drop.
   c. Verticals are omni-directional with little gain and low take-off about 11 degrees.
   d. Horizontal are directional with about 6 dB gain and 33-degree takeoff.
   e. Horizontal must be rotatable because of the gain-direction trade-off.
6. Mount feed-point ‘preferably’ higher than 0.16λ above earth, outside the earth reactive field interference. If that height is not possible, mount at least 10’ up.
   a. One foot below the SO-239 connection, snap on 3 to 5 ferrite beads of Type 31 mix.
   b. The ferrite is critical to tune the antenna.
   c. Without beads, the coax shield is part of the counterpoise with noise and stray currents.
   d. The counterpoise may or may not be grounded.
   e. If installed outside, ground the counterpoise and add protectors.
7. 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 10-M Technician SSB.
   b. The transceiver should be able to adjust for SWR variations.
8. The Icom 7300 internal tuner works very well for reasonably good antennas.
   a. Tuning must be done at a frequency with SWR less than 3 for the circuit to engage.
   b. The tuned frequency will be very near 1:1 allowing full power.
   c. Transmission can be done at other frequencies as long as their tuned SWR is still low.
9. Life is good. Enjoy!