Portable HF Antennas

Presented to the Stamford Amateur Radio Association

by Jon Perelstein

For purposes of this presentation, a "portable HF antenna" is

An antenna that doesn't require Terry Martin's assistance to install

Seriously:

- An antenna that can be person-carried to the site
- An antenna that can be installed by one person within a short period of time (say an hour)
- An antenna that does NOT require special equipment for installation, e.g.:
 - A powered launcher such as an air cannon
 - A human-powered launcher such as an EZ-Hang
 - Ladders

Implies that the antenna will be low to the ground

Horizontal antennas low to the ground have some very specific take-off characteristics



- As a horizontal antenna gets less than ½ wavelength above ground, the take-off angle increases
- Higher take-off angle means less DX
 - At the extreme, antennas low to the ground produce Near Vertical Incidence Skywaves (NVIS)
- On top of tall building, steep hill or cliff top tends to act as if it's well above ground



For reference: HF 1/2 wavelength and 1/4 wavelength heights

Band	Freq	½ λ (ft)	1⁄4 λ (ft)
160 meters	1.9MHz	258	129
80 meters	3.6MHz	136	68
75 meters	3.9MHz	126	63
60 meters	5.37MHz	92	46
40 meters	7.1MHz	69	34
30 meters	10.1MHz	48	24
20 meters	14.2MHz	34	17
17 meters	18.1MHz	27	14
15 meters	21.2MHz	23	12
12 meters	24.9MHz	20	10
10 meters	29.0MHz	17	8

Vertical antennas naturally have low takeoff angles, but are omnidirectional



A horizontal antenna low to the ground may not be able to work distant stations



communicate within a relatively local area on HF

A vertical antenna low to the ground may not be able to work close in stations



Always need to consider who/where you are trying to reach

- What antennas do you have available?
- What antenna(s) are they using?
- Some recent experiences
 - 40 meters from Marconi site on Cape Cod (25 watts CW)
 - Didn't hear much as a low horizontal (12' off ground)
 - 57 in Greece, 58 in eastern Italy as a vertical
 - Couldn't hit Boston either way
 - 20 meters from Stamford (25 watts SSB)
 - Broke a pileup in Buenos Aires as a vertical dipole
 - Couldn't hit anything closer than Arizona as a vertical dipole
 - Couldn't hit anything as a horizontal
 - 40 meters from Stamford (25, 50 watts SSB)
 - Good coverage of New Hampshire, Maine as a low horizontal
 - Good coverage of mid-Atlantic states as a vertical with counterpoise
 - Couldn't hit Hartford or Albany during daylight hours either way

Three general classes of horizontal portables: Short Dipoles ...



- e.g., Buddipole, TAK-tenna, MP-2, Hamsticks
- Multi-band with loading coils
 - Generally 40m-to-6m
- Single band helix wound mounted base-to-base as dipole

... End Fed ¹/₂ Wavelength Single Wire ...



- e.g., PAR End-Fedz
- Typically single band



...and Random-Length Long Wire



- Random length long wire
 - Ground, or
 - Counterpoise
- Need tuner
- Multiband
- Cannot be 1/2 wavelength (or multiple on any band used)

Most portable verticals are ground-mounted or raised monopoles with a counterpoise



- Counterpoise is a length of insulated wire
 - 1/4 wavelength in length
 - No less than 2 feet above ground
 - No electrical connection with ground
 - Should be as straight as possible
- Antenna will have a slight directionality in direction of counterpoise

Other vertical configurations usually not practical for portable ops



- Above-ground should have at least four radials, one in each quadrant
- A ground rod is usually less effective because real ground does not do a good job of reflecting the signal
 - Multiple deep rods better, but not practical for portable ops

BUT ... grounds such as cold water pipes and chain link fences can be surprisingly effective

Some verticals can be mounted as vertical dipoles



- e.g., Hamsticks
- All of the benefits of dipole (no directionality of course) in terms of balance, SWR, etc.
- None of the disadvantages of dipole in terms of height above ground

Short dipoles and verticals are typically multi-band using loading coil



- Near 1:1 SWR without tuner
- Adjust SWR for band in use by adjusting the tap point (red banana plug above) and length of the arm
 - Tap point for coarse change
 - Arm length for fine tuning

Some verticals are single band helix-wound



Where tuner needed, consider balun/unun near the feedpoint



• High SWR between tuner and antenna is not a good thing



- Low SWR over entire system is a good thing
 - May need tuner in addition to balun

There may be RF exposure issues ...

Band (m)	Power (W)
160	500
80	500
40	500
30	425
20	225
17	125
15	100
12	75
10	50
6	50
2	50

- In portable operations, you may be closer to the antenna than in a normal fixed operation (e.g., your shack).
- In addition, bystanders/passersby may be closer to your antennas than in a normal fixed operation
- FCC requires RF exposure study if power levels above those shown in chart to left

For more information:

http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet56/oet56e4.pdf

... and bystander safety issues



- Your antenna is going to be close to ground and may be within reach of bystanders
- Even at 100 watts, there is considerable current and considerable voltage at certain points in the antenna
- Also, don't forget other dangers such as:
 - Guy wires
 - Tripods falling over
 - Feedlines

The Buddipole is one of the best known HF portable antennas



- Basic unit \$200, can go over \$400 in deluxe package with extras
- 40 meters 2 meters, additional coils available for 80 meters
- Offers both horizontal AND vertical configurations
- http://www.buddipole.com/buddipole.html

The Buddistick is a simpler monopole vertical with counterpoise



- \$139
- 40 meters 2 meters
- http://www.buddipole.com/buddistick.html



Note "C Clamp" to mount antenna on a picnic table or other equivalent surface

The Chameleon V1 is a no-coil, 10' long monopole





- 80 meter 70 centimeter
- Tuner a must!!!
- http://chameleonantenna.com/page5/page5.html
- Available as a vertical dipole



Chameleon V11 is a vertical dipole



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PAR End-Fedz are single band half-wavelength horizontals



- \$50-\$85
- Company claims monoband ONLY, but some SARA members use them as multi-banders with tuners
- No tuner if used on designed band
- Some models limited power
- Note: no need for radials, counterpoise, ground, etc.
- http://www.parelectronics.com/end-fedz.php
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The TAK-tenna is a mono-band dipole



- \$139
- Multi-band with tuner
- Capture area is almost as large as a full-sized dipole
- http://www.tak-tenna.com/



The MFJ-1622 is a multi-band vertical with counterpoise



- \$100
- 40 meters 2 meters
- Designed to be mounted in a window
- http://www.mfjenterprises.com/Product.php?productid=MFJ-1622

Super Antennas MP-1 is a multi-band coil vertical monopole with counterpoise



- \$100
- 40 meters 6 meters plus option 80 meter coil
- Dipole kit allows mounting two MP-1s as a dipole
- http://www.superantennas.com/html/mp-1_portable.html

Super Antennas YP3 is a portable 3-element Yagi



- \$395
- 40 meters 6 meters
- http://www.superantennas.com/html/yp-3.html

Yo-Yo Antennas from HamRadioFun.com



- \$40
- Each yo-yo holds 40 feet of wire
 - Just extend out as much as you need from each yo-yo, throw each yo-yo over a tree branch, and you're on the air
- http://www.hamradiofun.com/yoyodeluxe.html