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The "Best" Random Wire Antenna Lengths

Random wire lengths you should and should not use!
Jack, VE3EED - SK

Updated 07-08-2013

The random wire antenna is probably one of the least expensive, easiest and cheapest HF antennas to use if you have a tuner and you want to get the "most" out of a length of "random" wire without having to pull out that calculator, doing the math, getting the center insulator built or bought, running the feedline, and all the rest that goes with putting up a more elaborate antenna.

All you need for a random wire antenna is some wire, your tuner, one or more supports up as high as you can get them to string the wire from the supports to the tuner, at least one or two insulators and a little time.

One single wire, no solder connections, very simple.... all the way from the tuner to the end support. That's it in a nutshell.....**or is it?**

Many hams have tried till they are blue in the face to install the random wire antenna that works on most; if not all of the HF bands with terrible results.

Swr usually is all over the place and the tuner will just not do it's job. You can get good loading and low swr on sometimes 2 or 3 bands, but one or more of the bands that you want, just will not cooperate with an swr that can be adjusted with the "tuner".

So after much frustration..down it comes and you go on to a totally different type of antenna....all that time just wasted in your opinion.....until now!

We recently found some good information about random wire lengths that you **should** and **should not** use.

Jack, VE3EED, hopefully has solved a major headache we all have when we attempt to go thru the trial and error and frustration with getting the random wire to work where WE want it to work.

He knew that in order for the tuner to "see" a fairly low swr to work within it's range, that the antenna had to be **NOT A HALF WAVE ON ANY FREQUENCY** that we wanted to us, because a half wave will give us a very high impedance and the resulting swr into a 50 ohm transmitter!

So Jack took most of one day, did the math with the aid of his trusty calculator, SEVERED cups of coffee and came up with.....

In Jack's own words....
"Here's the word on random-wire antennae."

Presented for your consideration by Jack, VE3EED.

The table below represents half wave lengths and multiples that you **DO NOT WANT TO USE!**

You have to stay away from a half wavelength on any frequency. Therefore, we came up with the following numbers to avoid (IN FEET):

These lengths in the table below are the **culprits** that cause all of the trouble when using random lengths.

Frequency MHz	1/2 Wave	2nd Multiple	3rd Multiple	4th Multiple
1.9	246	492	738	984
3.8	123	246	369	492
7.2	65	130	195	260
10.1	46	92	138	184
14.2	33	66	99	132
18.1	26	52	78	104
21.3	22	44	66	88
24.9	19	38	57	76
28.5	16	32	48	64

So those are the numbers above that we have to stay as far away from as possible when building a long-wire antenna.

Here they are in order:
 REVISED: 16 19 22 26 32 33 38 44 46 48 52 64 65 66 76 78 80 88 92 95 96 99 104 110 112 114 123 128 130 132 133 138 144 152 154 156 160 165 171 176 182 184 190 192 195 198 208 209 220 224 228 230 231 234 240 242 246 247 256 260 264 266 272 276 285 286 288 297 304 308 312 320 322 323 325 330 336 338 342 352 361 363 364 366 368 369 374 380 384 390 396 399 400 414 416 418 429 432 437 440 442 448 455 456 460 462 464 468 475 480 484 494 495 496.

Some of these numbers are too close to squeeze in between them.

Here are the final numbers (in my opinion) in green below that would be good for a long-wire antenna: (You may want to make a note of them)

REVISED: 29 35.5 41 58 71 84 107 119 148 203 347 407 423

REVISION NOTE: We had a note from James, KB5YN, pointing out that one of my so-called GOOD numbers was 220 feet. That is the 10th multiple of a half wave on 15 meters. Well, I didn't think it would make any difference at that many multiples. However, the radio didn't tune up very well on 15 meters.

So, having nothing better to do one day, I re-did the calculations going out to 500 feet. That meant calculating all the way to 32 multiples of a half wave on 10 meters. I won't bore you with all that so the first portion of this still only shows up to the 4th multiple. There are so many new frequencies to stay away from, that it gets pretty tricky for the longer wires. However, the list has been revised and is good for wires as long as 500 feet.

73.... JACK, VE3EED
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More on Random Wire Lengths from Mike, AB3AP (06-29-2012)

Hello everyone!

I was surfing around Hamuniverse.com and found this page on random wire antennas: which got me thinking. Jack, VE3EED, used center frequencies of the bands described in the article above, and I thought it would be nice to use band edges.

I wrote a small C program that does just what Jack did, but I used the band edges. Because I'm more visually oriented I then plotted the many overlapping "red zones" and ended up with the page at:
<http://udel.edu/~mm/ham/randomWire/>

I plotted the results for the U.S. CW band edges for use with my 4 band Elecraft K1 qrp rig.

You will note that when comparing my results with VE3EED that some of the results are a bit different.

Just an FYI that I thought you might be interested in.

73,
 Mike ab3ap

Editors note: *Many thanks to Jack, VE3EDD (SK) and Mike, AB3AP for sharing their math and computer skills with us. Hopefully these random wire length calculations will help us all make this "easy" antenna work better! (Also note that here may be instances where the suggested lengths may not work exactly due to the many variables in the surroundings of the antenna, wire length variances, your tuner, it's height above ground, it's construction, etc. Just add or subtract as needed a little at a time to get the best compromise. (The numbers above are a great start, thanks to Jack and Mike!)*

Note that Jack, VE3EED, went SK several years ago...he will be missed.
 (Also check out AB3AP'S [Website](#) and say thanks for sharing his skills. They just saved you and I loads of time and frustration.
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