‘Tis the Season…

As I sit writing this we are experiencing (I hope) Old Man Winter’s last hurrah. I don’t know about you gentle reader but I am ready for some warm Spring weather. However, the cold and the snow should not keep us from Ham Radio out there in the great outdoors. I use this time of apparent inactivity to plot and plan the first outings as soon as the weather allows. Its a good time for re-evaluating the /P equipment, especially the antennas.

I never cease to be amazed by how much more portable equipment is now than it was just a few years ago. With the advent of TFR’s (Trail Friendly Radios) such as Elecraft’s KX1 and KX3, Steve Weber’s PFR (portable Field Radio) and ATS series of Backpacker radios. There is however one constant, the antenna. We still gotta have an antenna.

Trip planning will kinda dictate what flavor of antenna you’ll be willing to use. If, like me, your excursions are no more than a couple of hours then the simplest and lightest will likely be best. If however you’re planning an extended trip, several days to maybe several weeks at the same location then a more robust and possibly larger antenna may find favor in your kit. I’d like to offer a few suggestions for simple, easy to deploy antennas that are proven performers in the field. I’m only going to discuss for a single band – 20m – as that’s the one I use the most. It offers the best all round chances of making QSOs from dawn till dusk (and if conditions are right, long into the night) both In-Country and DX.

OK, first up is the 33’ vertical wire. Don’t forget we’re discussing 20m so the 33’ antenna equates to a half-wave (or within inches of a half-wave) so there’s a couple of things we need to consider. It will present a high impedance at the feed point (at the base, it’s the easiest way to feed this antenna) so it will need some kind of impedance transformation network, which we will call an Antenna System Tuning Unit, hereinafter referred to as an A.S.T.U. The second consideration is the angle of radiation such an antenna will present. Take a look at figure 1, It represents a vertical slice of the radiation pattern. As you can see the angle of maximum radiation is 20º with respect to ground (I modeled this using EZNEC[1] with “real” ground conditions). Because it’s a vertical antenna that means its 20º radiation angle is good for 360º of azimuth. That’s great for the further flung places but to work closer in a different approach will likely be needed. I mentioned an A.S.T.U, well we’ll get to that in due time but for now I just want you to see that there are many options, the ones I’m presenting here are just a sample, but they have been used by me and they do work.

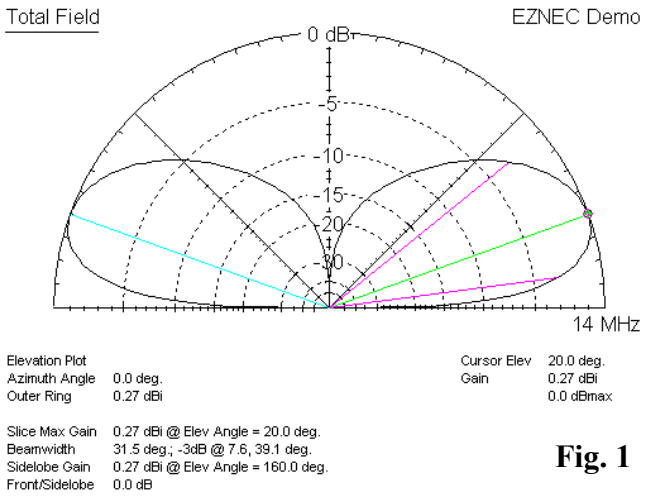

Fig. 1

Next up, the 66’ wire. For convenience we’re going to configure it as an “Inverted L” i.e. a 20 foot (about) vertical section with the remainder strung out horizontally This is an antenna that crops up time and again in the Ham Radio press and with good reason, it works. One of Ham Radios doyens, from whom I have learned so much, is Ade Weiss, W0RSP, and his prolific writings. Ade has been there and done it.

Let me quote from his book “**HISTORY OF QRP IN THE US, 1924-60**” :

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“I took the Viking 3x5 (CQ Magazine May and August 1980) along on my motorcycle camping trip during the summer of 1979 on the outside chance that I’d be able to operate from different locations in a portable situation. Naturally, a potential campsite was ranked according to the antenna supports it offered in the form of trees. I pitched my tent in Iowa beside a lake with an hour to spare before the clouds that had followed me all day began to drench the landscape. It wasn’t very comfortable lying on my stomach in the small puptent floor and supporting myself on my elbows, just like I did when I started out in radio. It was difficult to hold the single earphone with one hand and tune the transceiver with the other, or to hold the microswitch which I used as a keyer with the fingertips of my left hand, while trying to send intelligible code with my right hand. But I had many excellent contacts all over the U.S. using the 66ft wire strung out between two trees. In fact, during the several hours each day spent in the tent to escape the rain, I don’t recall failing to QSO anyone I called.”

As I said, Ade has been there and done it. His initial experiences and mine when taking radio into the great outdoors are remarkably similar, and these experiences will be familiar I guess, to many of you as well. The key sentence is the one describing the antenna, yep, *66 feet of wire*. I’m guessing that the layout of the antenna was similar to that which I described in the opening sentences of this section. So, let’s go with that and have a look at what it’ll yield in terms of performance.

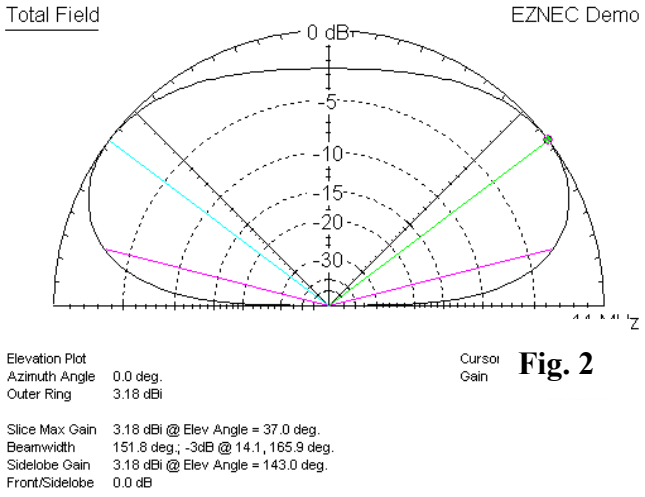

Fig. 2

Fig 2, is again a slice through the vertical radiation pattern, the max. radiation angle (as modeled) with respect to ground is now 37º, not too shabby either. It should yield QSOs with in the U.S. as well as maybe, just maybe, some DX if the conditions are right. You’ll have to read the rest of Ade’s account to see how he fared.

Fig. 3 is a look down on the horizontal radiation pattern. As can be seen it is cardiod in shape (the antenna runs vertically on the page) with major radiation taking place at slightly less than 90º on either side of the horizontal wire.

66 feet of wire laid out in an “Inverted L” works very well.

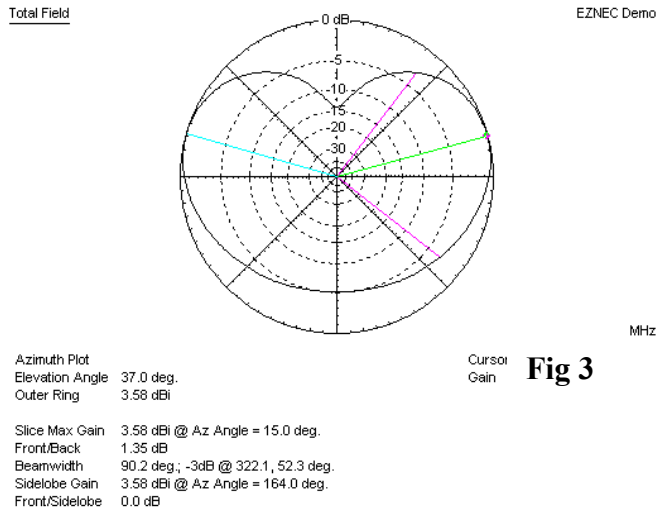

Fig 3

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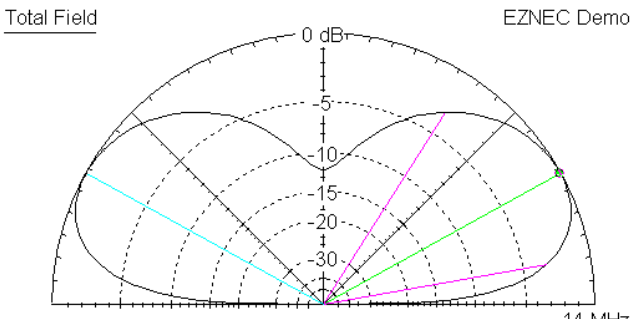
OK, next up, a question: when is an 84’ wire antenna *not* an 84’ wire antenna? When it’s a W3EDP antenna of course! This antenna has had so much nonsense talked about it it’s almost laughable. There are 2 ways of dealing with an 84’ length antenna:

1. It’s an 84’ wire with a “normal” quarter-wave counterpoise (determined by band) at the A.S.T.U. It’ll work great but it’s NOT a W3EDP. To get to know the antenna better you really have to go back to the article that appeared in the 1936 edition of QST. Or:
2. We can deal with it as Mr. H.J. Siegel (W3EDP) did in 1934 which is as a *balanced* antenna.

Either way is good and we’ll look first at the straightforward 84’ wire with a quarter-wave counterpoise. Fig 4 shows a vertical slice through the projected radiation pattern. Max. angle of radiation this time is indicated as 29º, a nice compromise between the 20º of the vertical and the 36º of the 66’ inverted L. This antenna is also configured as an inverted L. Projected performance in not too shabby either and it will work for both inter U.S. QSOs as well as some DX if the conditions are right.



Elevation Plot
Azimuth Angle 0.0 deg.
Outer Ring -8.22 dBi

Slice Max Gain -8.22 dBi @ Elev Angle = 29.0 deg.
Beamwidth 47.3 deg.; -3dB @ 10.2, 57.5 deg.
Sidelobe Gain -8.22 dBi @ Elev Angle = 151.0 deg.
Front/Sidelobe 0.0 dB

Cursor Elev
Gain

Fig 4

Now let’s look at the horizontal radiation pattern (at the 29º elevation point) Fig 5. You’ll see that we have 4 very useful lobes with which to work. This antenna has always produced results for me whenever I have deployed it, although it took me a while to figure out what was going on with W3EDP’s original.

The thing to remember with wire antennas is that every part of the wire radiates. So, is there some way to remove the electrical feedpoint from the proximity of the operator and still have the physical feedpoint at the operating position? Yes there is. W3EDP’s original discovery back in 1934 (It wasn’t written up in QST until 1936).

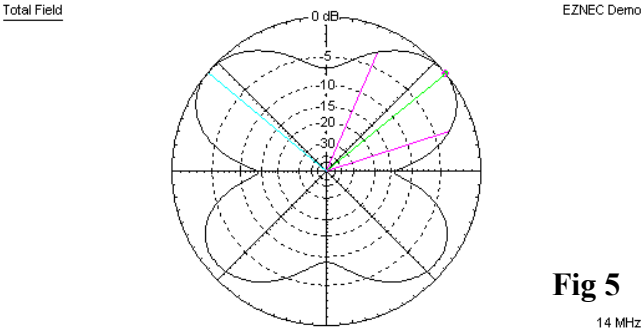


Fig 5

Azimuth Plot
Elevation Angle 29.0 deg.
Outer Ring 5.35 dBi

Slice Max Gain 5.35 dBi @ Az Angle = 39.0 deg.
Front/Back 1.22 dB
Beamwidth 48.7 deg.; -3dB @ 17.9, 66.6 deg.
Sidelobe Gain 5.35 dBi @ Az Angle = 140.0 deg.
Front/Sidelobe 0.0 dB

Cursor Az 39.0 deg.
Gain 5.35 dBi
0.0 dBmax

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Now let’s look at the W3EDP as originally envisioned, back in 1934. Again let me urge you to read the original article available from The ARRL[2]. W3EDP was dissatisfied with the available antennas of the day so he did what any good Radio Ham would do, namely, try and find a workable antenna solution for his situation. He took a spool of wire and experimented with various lengths, noting all his findings and in the end, when all the results were in and tabulated a length of 84 feet turned out to perform best. To quote from the original article “*Not entirely liking the idea of an end-fed single wire antenna, W3EDP set about to a counterpoise for the best results with hi 84’ antenna*”. These dimensions turned out to be 17 feet on 160m, 80m, 40m and 10m with 6.5 feet being the optimum length on 20m.

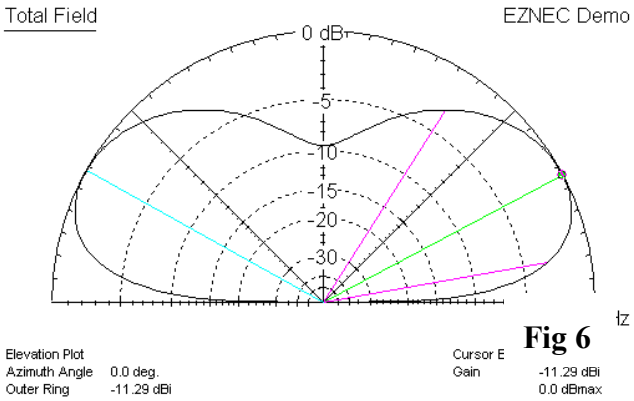

Fig 6

Here’s where the story gets interesting, the antenna is not an 84 foot wire with a shorter than normal counterpoise at all, it’s actually a 67’ wire antenna with 17’ of balanced feeder (or 77.5’ wire with 6.5’ of balanced feeder). The clue here is in the original method of coupling the transmitter to the wire/counterpoise combo. It’s a balanced feeder that does not require to be laid out parallel (a la 300, 450 or 600Ω twin lead). That shifts the feed point to a point 17’/6.5’ feet from the (*Balanced*) A.S.T.U and therefore the operating position.

Fig 6 shows a vertical slice through the antennas radiation pattern (20m, 84’ wire with the 6.5’ counterpoise). The difference to the antenna when configured as an 84’ wire with a “standard” quarter-wave counterpoise is only 1º of elevation. No big deal at HF.

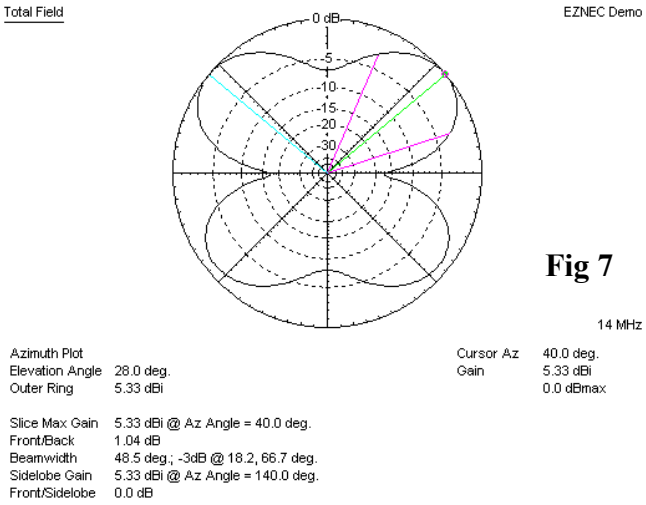

Fig 7

Now let’s look at the azimuthal projection. Fig 7 shows that the radiation pattern to be almost identical to the “standard” 84’ wire. The W3EDP version is a balanced antenna and therefore needs to fed by a balanced A.S.T.U. If you don’t and still try to use the shortened counterpoise lengths you will experience difficuluty in bringing the antenna to resonance.

Performance wise, it’s your choice. Either will work just fine, the 84’ with quarter-wave counterpoise can be fed via an unbalanced A.S.T.U, the W3EDP version does require a *balanced* A.S.T.U.

I promised to mention a little about A.S.T.U’s and so I shall. I now lean towards the “Auto ATU”. Proncipally the Elecraft T1, the SGC 211 and the LDG Z817. They are all self-contained (carry their own power source) and operate very well indeed. If you need to connect a balanced antenna to an unbalanced A.S.T.U then the addition of a 1:1. 4:1 or 9:1 BalUn between the tuner and the antenna may prove beneficial. If only one band is of interest then the vertical antenna may prove very convenient.

Wayne S. Dillon – KC0PMH - 2014

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A visit to AA5TB’s webpage[3] will provide a wealth of helpful information. Steve is another operator who has been there and done it, he then wrote it up for our benefit in a very readable fashion.

If you need more proof that the 33’ wire really works then visit with Jim Cluett[4] on his web-page where he describes his many /P excursions (with pictures), detailing the equipment and logs.

Remember, nothing is set in stone, just use the S.I.A.S (Suck It And See) approach. If it’s doing what you need it to do, great. If not, then try something different.

References:

1 EZNEC by Row Lewallen. Antenna modeling software which is easy to use and free to evaluate. Evaluation version has some limitations but works just fine. Get it here: http://www.eznec.com/
2 ARRL, QST May 1936, For the Experimeter, “An Unorthodox Antenna” by Yardley Beers – W3AWH. http://www.arrl.org/
3 AA5TB – Steve Yates. http://aa5tb.com/efha.html
4 Jim Cluett – W1PID http://w1pid.com/

Quotes from “**HISTORY OF QRP IN THE US, 1924-60” by kind permission of the author Ade Weiss - W0RSP. Thanks Ade.**

If you would like more then next time out we’ll get into the details of equipment, specifically A.S.T.U’s. Please let me know if you liked this (or if you didn’t!) and I’ll get some more for Randy when time permits. Until then have fun and be safe.

72 de Wayne – KC0PMH

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