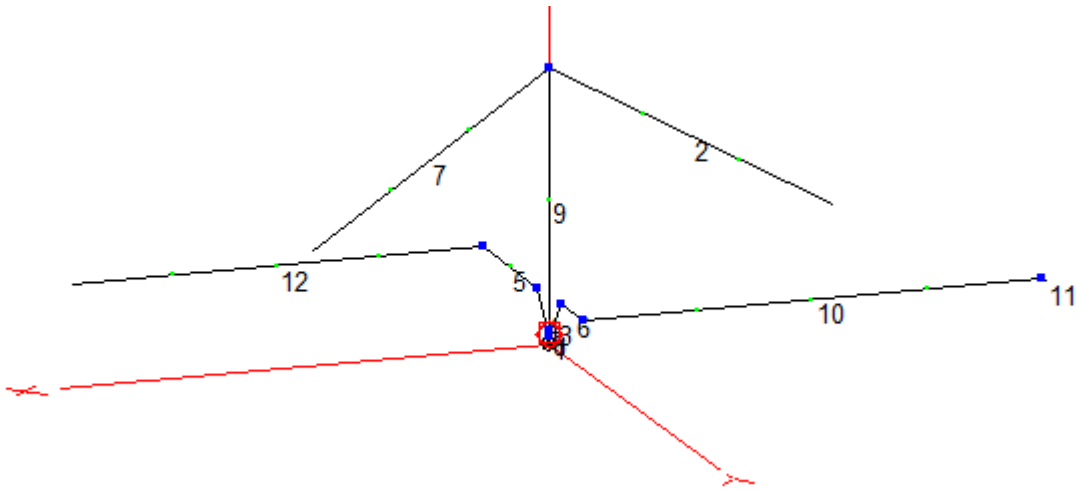
The Final 160 Meter Antenna Just to Work Rhode Island N6MW 12/22/2020

RI on 160 has been the hold out to finish off 10 Band WAS. Resort to FT8 has been required after N6MW's move (to a city lot) of more than 50 miles forcing a complete restart to the WAS process. It turns out most bands, including 10 m, and 6 in the summer with a yagi, are sometimes available using FT8, so after modest efforts, especially during COVID with time on hands, it all finally comes down to only RI on 160.

With the COVID opportunity for free time, a push for nearly a third of the states were still missing on 160, nearly all in the east was started. So a modest drooping (to two sides of the house) Vee antenna with center support initially at 40' , then 50', was put up with two quarter wave elements set at < 90 degrees. It was slow but after 2 months most all was well, except for RI. Several late nights and plus skeds did not work out.

So time to boost things up on 160 using a cobbled together 55' vertical attached to a spare fiberglass 60' Spider pole with two sloping loading wires attached to the top and 2 elevated quarter wave radials of ~ 125' (taken from the old Vee). This scheme is basically that for the 160 m part of the 160/80 m antenna used at V73MW (but no nearby beach or ocean now).

Turning to the resources of the junk box, enough wire of various sizes and quality was found to cover the needs after substantial patching together. After EZNEC modeling that included taking into account the limitations of the city lot, a scheme was developed, which might not incur the prompt wrath of neighbors?



The height of the vertical portion is dictated by the Spider pole, which cannot bear the weight of the top load wires on the top 5' pole segment. The vertical wire is attached to the pole at several heights.

The top load wires are of different lengths to fit on the lot but are long enough to be shortened from the ground if needed so they are at least ~ 50'. The approximate lengths at 59' and 67' were then found using EZNEC to get a manageable impedance. In this case the model impedance was Z = Ra+jXa of ~ 15 - j15 at 1.84 MHz which can be matched to a 50 ohm feedline with a simple "hairpin" coil in shunt across the feedline at the antenna. However the model is just an estimate to provide a starting point for the physical antenna, which will need to be experimentally tuned by altering wire location and lengths. The physical top load wires were thus cut long.

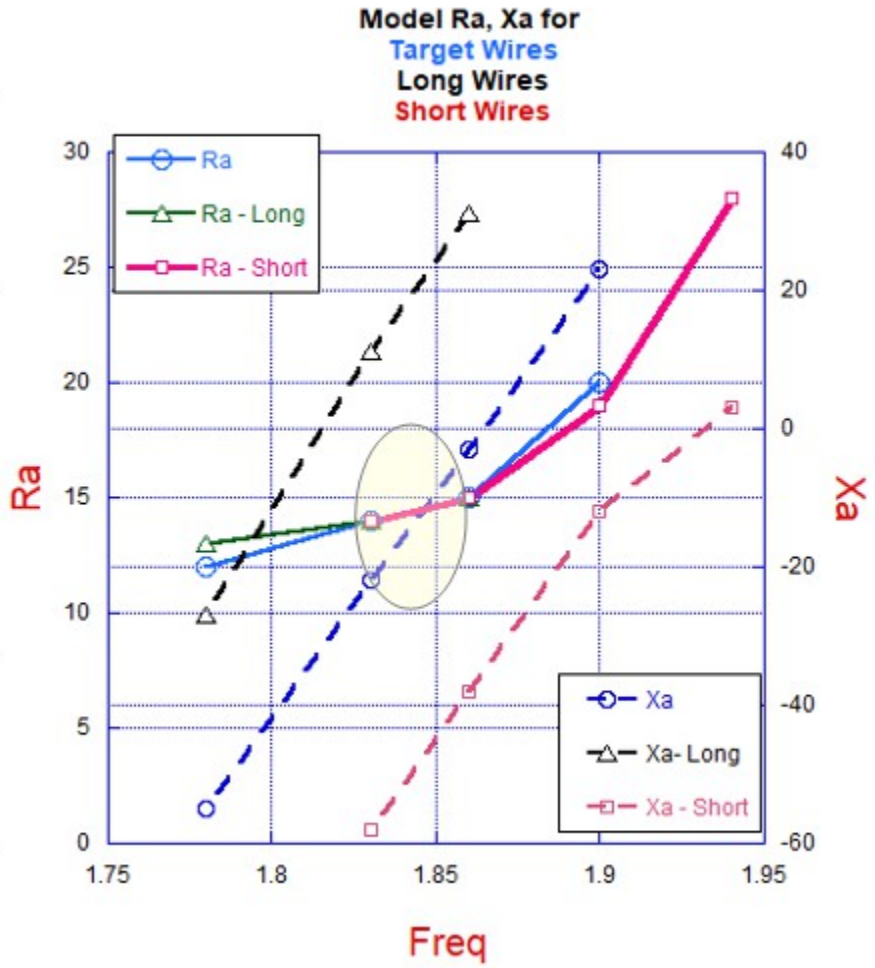
The elevated radials are held up by 8' 1X2 boards attached to a wooden fence or wooden fence posts

above about 3' putting the radials at ~10' high along an irregular path of property edges. It would probably be better to make it higher but this is being done on the cheap.

The bottom segment of the Spider pole is held firmly in place by strapping to a 5 foot 2X6 board, with 2X2 side elements, that is screwed into a substantial wooden fence post. This firm structure has the benefit that the lower guys for the Spider pole are not needed.

The pole was telescoped up to full height one 5' section at a time while carefully keeping track of the wires and guy ropes for tangles and snags. After attaching the 3 guys and 2 top wires to stable locations it is time to tune/trim the result to match the 50 ohm feedline.

Using the semi-faithful MFJ antenna analyzer the Xa=0 frequency occurs at about 1.77 MHz (lower limit of this MFJ) and Ra is ~ 10. Sadly the MFJ withholds the sign of Xa. But using the model one finds that Xa becomes negative at lower frequencies so this means the Xa is inductive (positive) in the 160 m band indicating the wires are significantly too long. This is as expected and planned by the initial long wires. For a hairpin match [1] you need the Xa value at the target frequency, here 1.84 MHz, to be negative and comparable with Ra so wire trimming is needed. Below is a plot of Ra & Xa vs freq from the model for nominal Target length, Long and Short top load wires (differing in length by about 2 meters from the target value) with the "sweet spot" for matching shown in yellow.



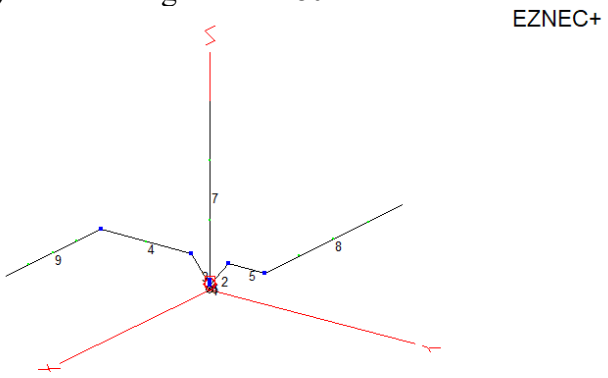
The ends of the insulated top wires were cautiously first folded back and then trimmed to slowly work toward a better raw antenna impedance. The final result gets Z = 11 - j22 at 1.84 which is close to a respectable hairpin matching value. The lengths of the physical top wires are not far from the model estimates. Then a suitable gauge wire hairpin coil of ~ 2.3 microH was installed a SWR of ~ 1.2 resulted, both at the antenna and in the shack. Always verify it is okay in the shack because if there are significant common mode currents on the coax braid this may call for a choke near the feed point to fix that issue - this is not a joke. Here is the elegant hairpin and junction wiring.

Note the quality detail of the feedpoint wiring to the antenna, radials and coil with only the finest quality wire nuts. The 1X2 support in front is of course at an angle of 20 degrees off vertical to the North. And you will need to carefully seal this unit against the weather.

But enough fun for now. The antenna went into action Dec 12 and seemed to be a couple of dB better than the old drooping Vee at longer ranges, likely due to minumum radiation vertically.

W1LY was copied on Dec 17 and we had an email exchange requesting a "be on the lookout." On Dec 18, after many repeats, contact using FT8 was made with RI under marginal conditions with him using a 80 m dipole because the big snow storm damaged his 160 m antenna. So the goal of 10 Band WAS was done, but with some ambiguity. On Dec 20 a solid but struggling contact using JT9 was finally made with N8LI in RI (after several failed skeds and much communication of strategy over two months and over two antennas) on 160 m after a 45 minute determined effort including an in and out signal strength report back to RI of just -26. So the goal of 10 Band WAS was completed, and there was much rejoycing. All my 10 Band WAS qsos have been confirmed by LOTW except for VT on 6 m, which is a card. I await the next Es season in June when the homebrew 5 el yagi will return.

Of course the next scheme is to repurpose the 160 m antenna and covert to a 80 m vertical (no top wires and with shorter radials) for new adventures. The 2 meandering elevated radials are ~ 90' (surprisingly long, after tuning) and the vertical wire is now up to 60', the full extent of the Spider pole. By the greatest of good fortune, the old 160 m hairpin matching coil is just right (at double the inpedance with appropriate tuning) for matching the new 80 m vertical and it covers both FT8 and CW.



[1] Hairpin Details: see http://ehpes.com/n6mw/ or June 2013 article in QST by N6MW.