**K5LRK 40M Array Dx Spot Comparison** *using SNR (dB) from reverse beacons*

Winter Field Day 1/26/20

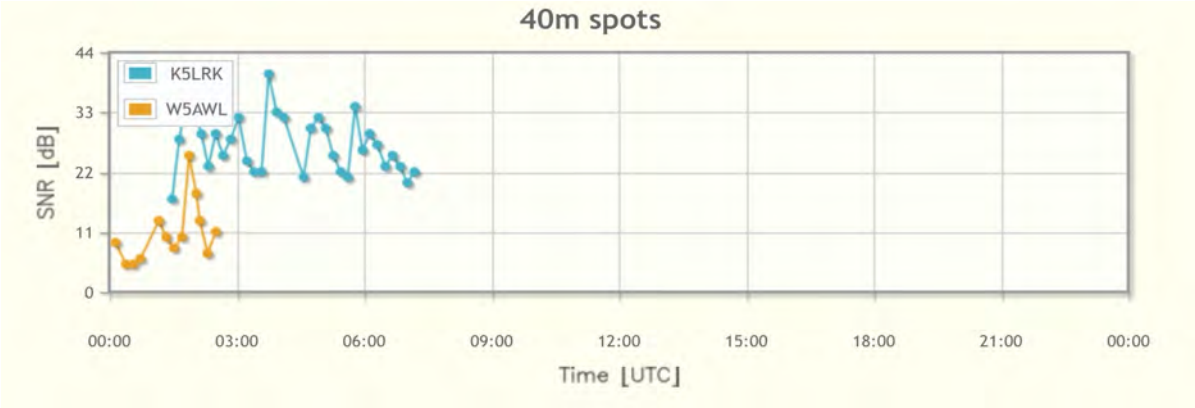
A comparison of signals from **K5LRK** and **W5AWL**.

**K5LRK** used a 4 - Element 40M parasitic array with tuned - elevated radials. The array was pointed towards the Northeast.
**W5AWL** used a single Vertical radiator on 40M. Unclear if radials were burried or elevated and tuned.

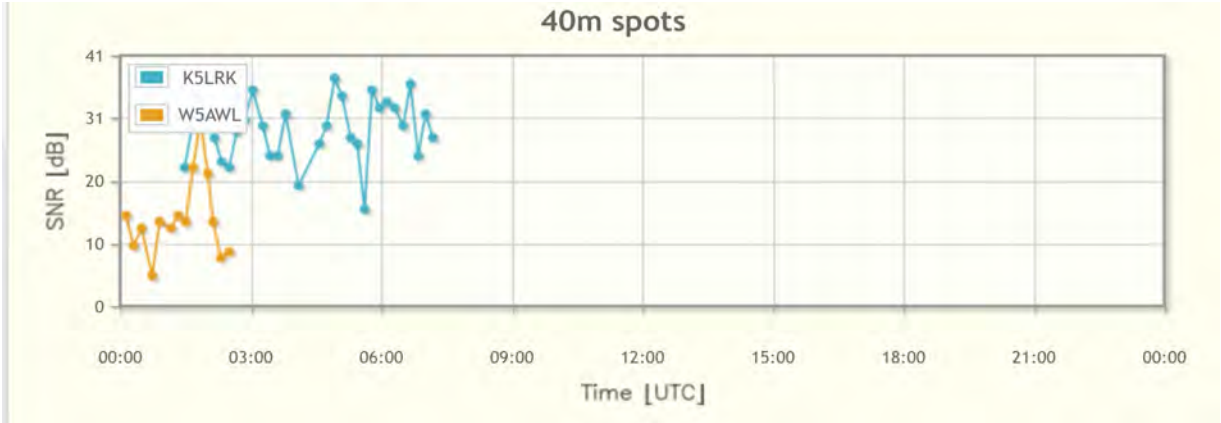
We were LOUD in the direction of the array - up towards the Northeast.
The next set of charts show signal comparisons in these cities:

| | | | |
|---|---|---|---|
| chart 1 | KM3T | Amherst | NH |
| chart 2 | W3AU | Bedford | NH |
| chart 3 | W8WTS | Chagrin Falls | OH |
| chart 4 | NA0B | Pittsburgh | PA |
| chart 5 | W3RGA-3 | Sunbury | PA |

### *chart 1: KM3T . Amerst, NH.*




### *chart 2: W3AU . Bedford, NH.*



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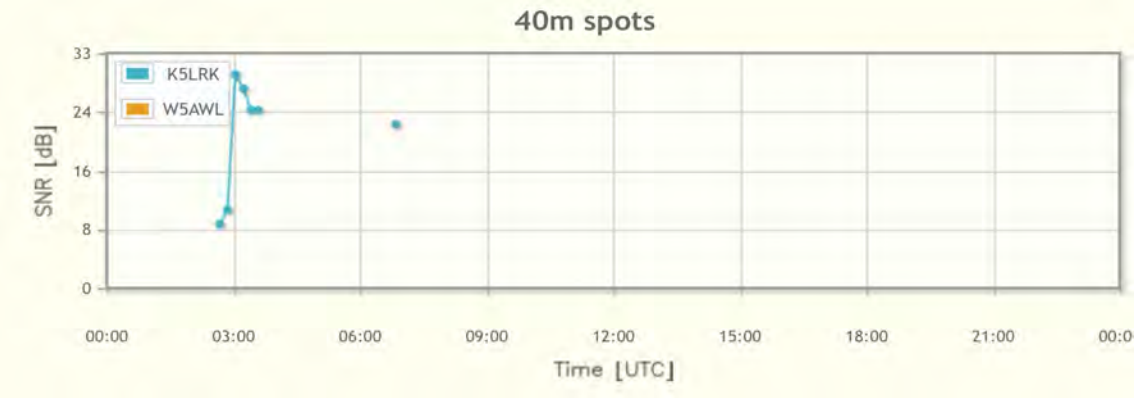
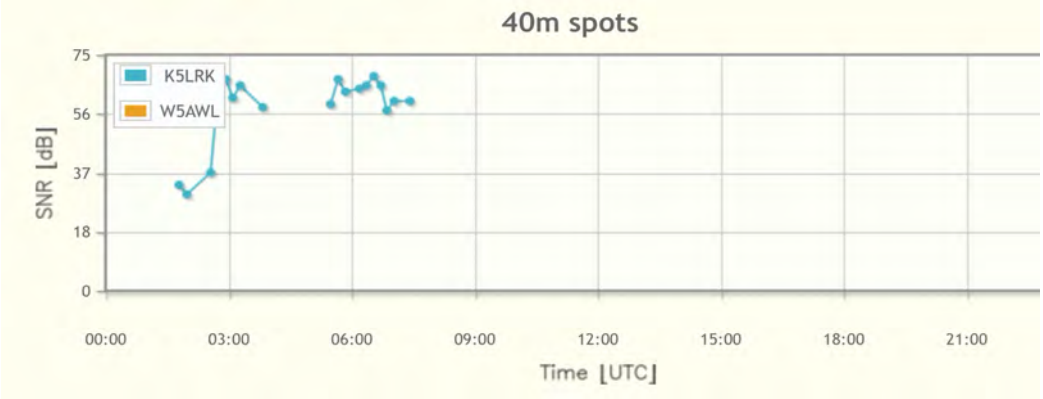
### *chart 3: W8WTS . Chagrin Falls, OH.*

*(spotty but still a fairly strong signal, note that W5AWL didn't show any spots in Chagrin Falls.)*



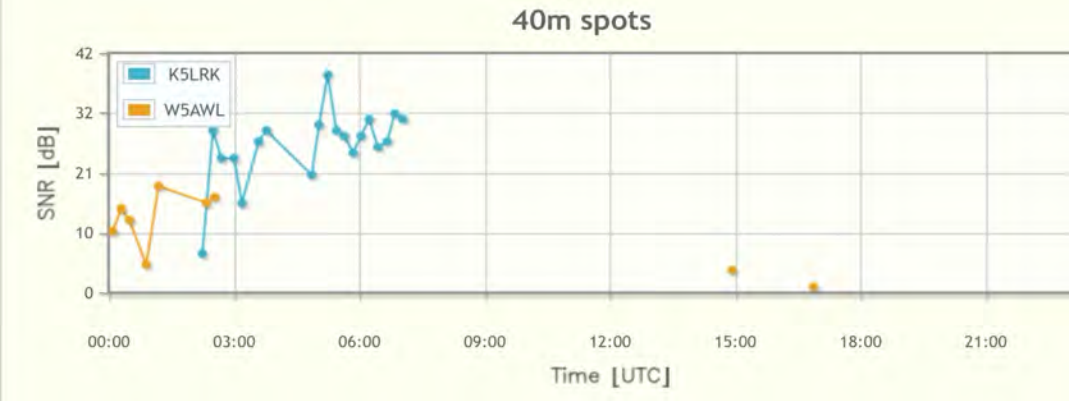

### *chart 4: NA0B . Pittsburgh, PA*

*(Incredibly loud signal! Interestingly again, no W5AWL spots)*




### *chart 5: W3RGA-3 . Sunbury, PA.*

*(We were louder in Pittsburgh, but still not to shabby….)*



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The array modeling shows the array has a fairly wide beam-width.
Here are a couple of cities I found that showed spots off to the side of our array.

I looked for a third city, but finding beacons that showed both K5LRK & W5AWL spots Wasn't the easiest. I think the case can be made that even off the side the array performed at least as well as a vertical.

| | | | |
|---|---|---|---|
| chart 6 | N7TR | Reno | NV |
| chart 7 | VE7CC | Maple Ridge | BC - *( 170 miles due North of Tacoma WA )* |

***chart 6: N7TR . Reno, NV.***

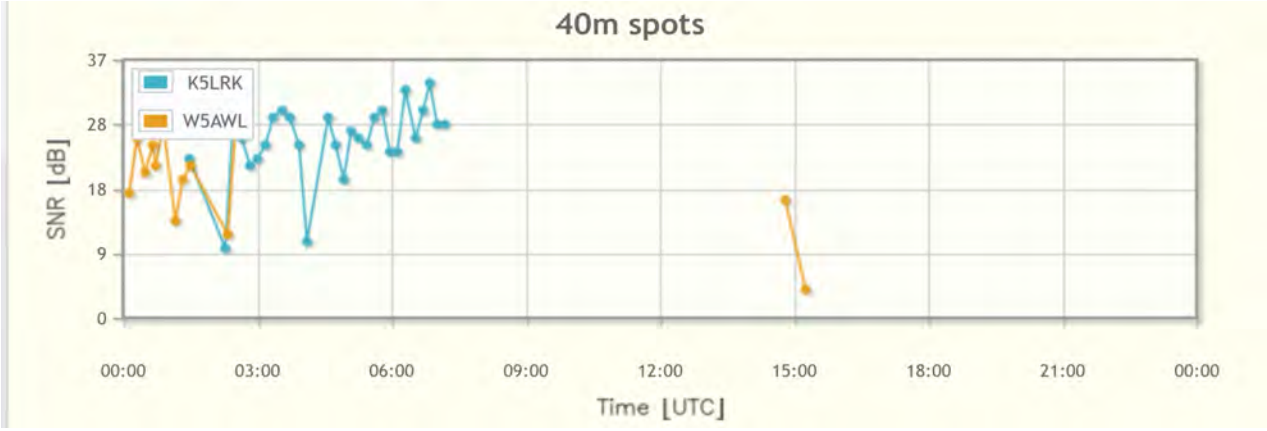
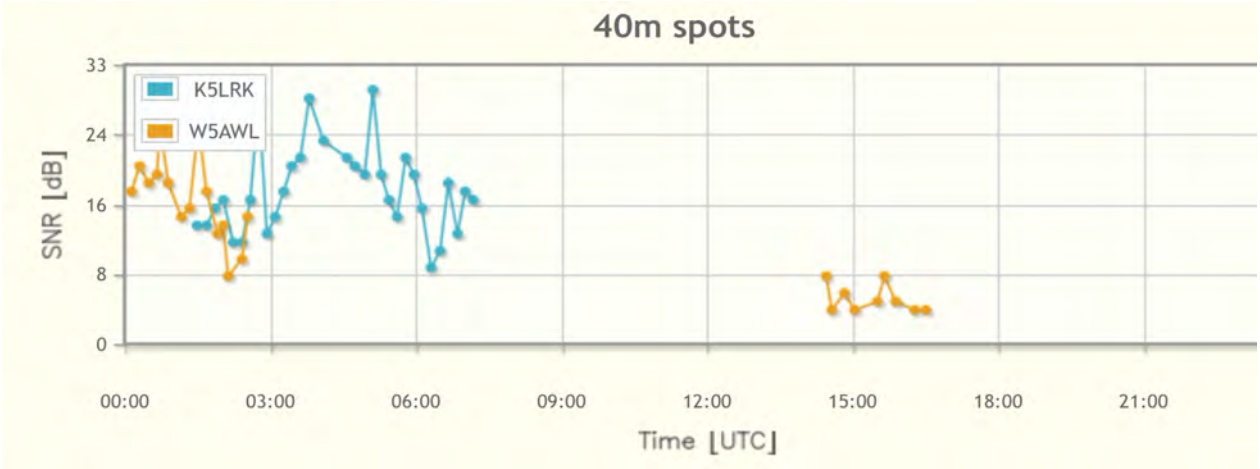



***chart 7: VE7CC . Maple Ridge, BC.***



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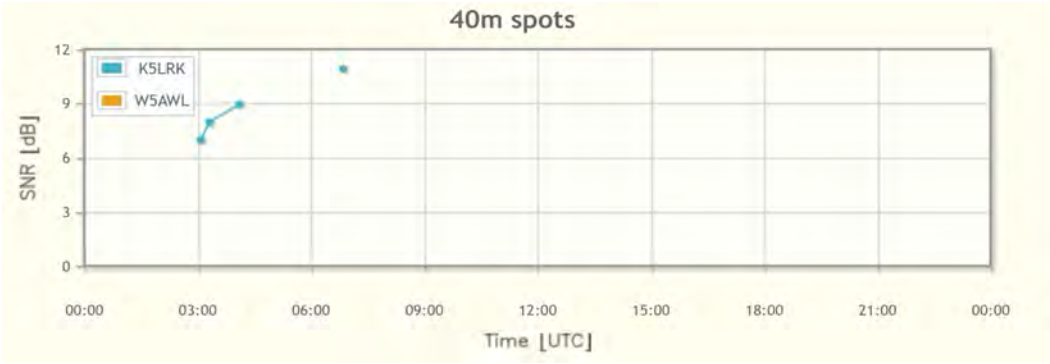
Here is an interesting chart… Honolulu was the back-side of the array. Maybe we are seeing long-path? There was only K5LRK spots.

***chart 8: WH7W . Honolulu, HI.***




Here are a couple more interesting charts… possibly NVIS? The next two charts are cities within 400 miles give or take of our location. Here we are loooking at Fredericksburg, TX & Louisburg, KS.

***chart 9: N5RZ . Fredricksburg, TX. ( 80 miles West of Austin )***

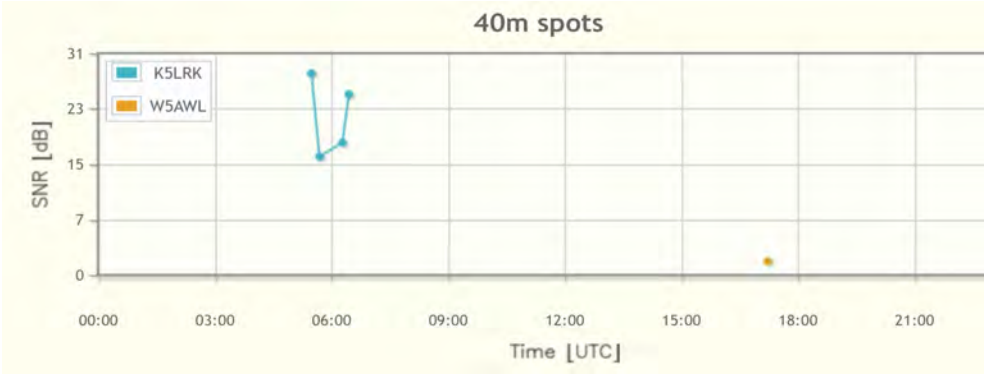
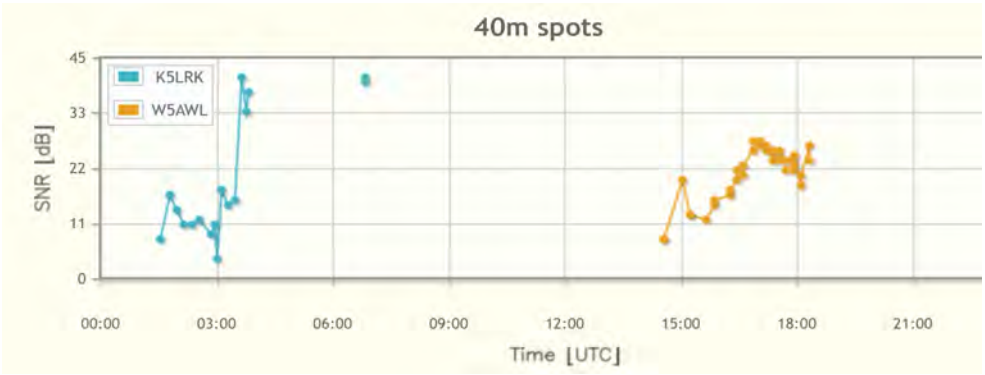



***chart 10: AC0C . Louisburg, KS. ( 60 miles South of Kansas City )***



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Finally, we made a pretty good splash across the pond too. The following are cities in Europe that spotted the K5LRK signal. The cities in BOLD are the ones for which I included charts

| | | |
|---|---|---|
| DF7KF | Noervenich | Germany |
| **EA5WU** | **Burriana** | **Spain** |
| HB9JCB | Malters | Switzerland |
| HG2EWS | Veszprem | Hungary |
| **OE9GHV** | **Rankweil** | **Austria** |
| OK2EW | nr. Brno | Czech Republic |
| **S50ARX** | **Nova Gorica** | **Slovenia** |

***chart 11: EA5WU . Burriana, Spain.***

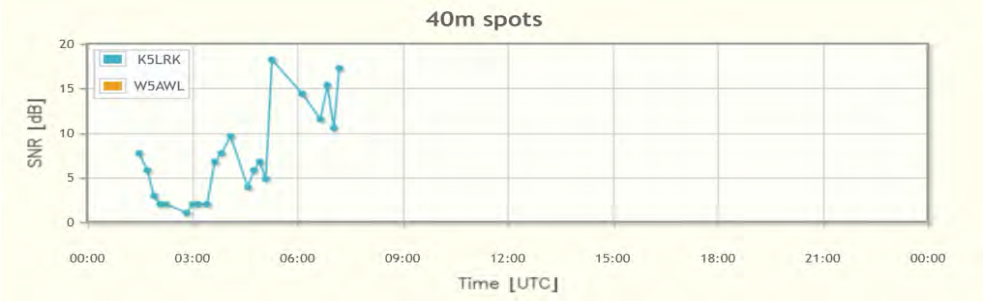



***chart 12: OE9GHV . Rankweil, Austria.***

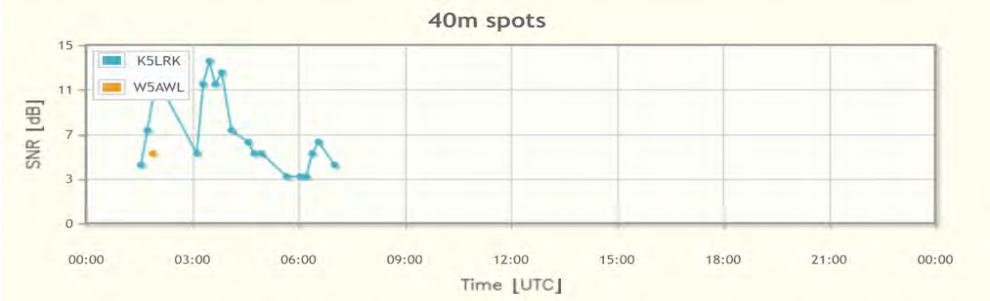
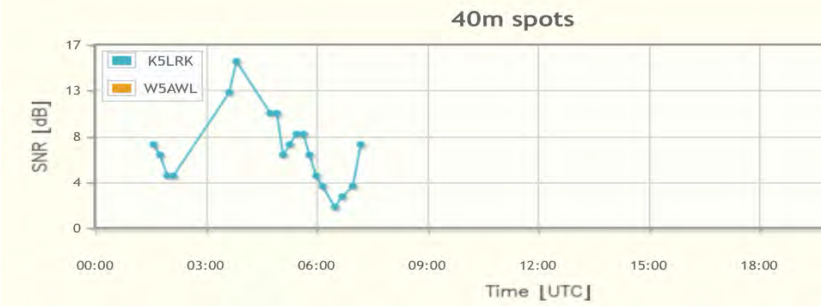



***chart 13: S50ARX . Nova Gorica, Slovenia.***



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## Some quick notes and thoughts.

1. This is in no way meant to be a comprehensive report for publishing. It is provided simply for interested club members of the K5LRK club. (or any other ham club)

2. The data was aquired from www.reversebeacon.net using the DX analysis tool.

3. If someone has a better way to measure performance of the array VS. a stand-alone vertical radiator, I'm all ears and would welcome the information.

4. I appologize not all charts were cropped the exact same way. However, all the information is still there. (It took quite a while to screen capture the charts from the analysis tool.)

5. I invite anyone to do their own research on reversebeacon. It may seem as I pulled charts that supported a narative, I assure that I didn't. I tried to use charts that carried the most useful information for comparison.

6. I wouldn't make the claim that the information presented definitely proves the array was wildly better than a stand-alone vertical, but I do feel the charts suggest fairly strong supporting evidence that the performance over-all was enhanced over a standard stand-alone vertical radiator.

7. Some key information about the set-up:

   a: The array is based on a single driven element, a parasitic reflector element and 2 parasitic director elements.

   b: The radial field is an elevated radial field as it is meant to be a temporay setup. The approximate elevation was 1 meter. Because the radials are elevated, they are tuned to each element, meaning the radiator, driven element, and director elements all have different lengths of radials.

   c: Spacing between all elements was equi-distant. (8.4 meters / 27.58 feet / 331 inches)

   d: This array requires some real estate! Its footprint with the radial field is approx 120' x 80'

   e: The array can be put together by 3 folks in an 'easy hour'. … or rushed 30-45 mins.

8. I spent a good amount of time modeling with MMANA and testing - a focused 4 months. I built everything; the mounting plates, the elements and the coax input blocks. While this is 100% my design from trial and error, a great amount of support and key information came from some key sources. ( I know I'm gonna miss someone..)

   | | |
   |---|---|
   | NM5M | *Eric Silverthorn, Inspiration & direction for this project (and future projects)* |
   | M0MCX | *Callum McCormick of DX Commander antennas - tutorials on MMANA software* |
   | N6LF | *Rudy Severns, Has written an incredible paper on radials. Truly an education* |
   | KW5KB | *Kevin Braby, Guidance in material selection, inspiration & idea bouncer-offer* |

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Here are some pics of the array. Set up at winter field day and pics during construction.

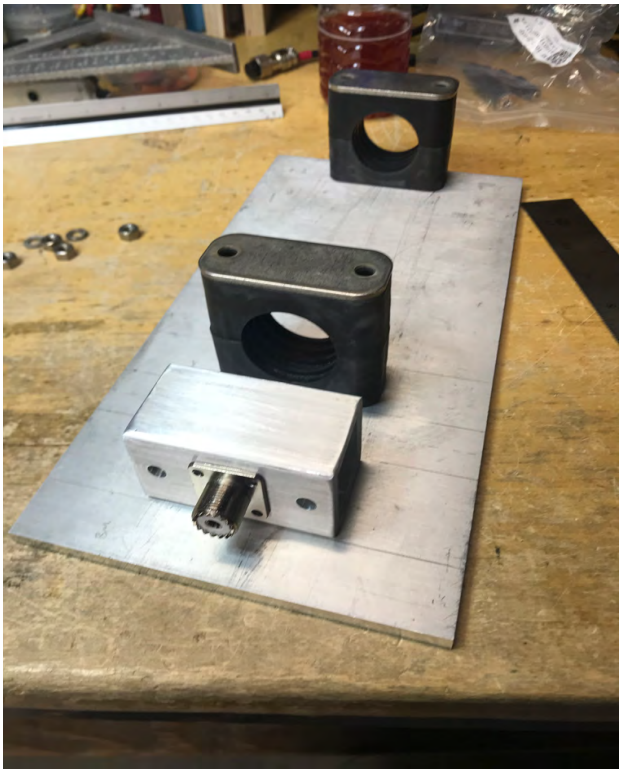
**Above:** *Set up at K5LRK Winter Field Day Janurary 2020* - (the little white stakes are the radials)

*All 4 element bases finished!*

*Testing and comparing the modeling results*

*Coax input block…*

*Test-fitting / layout*



Checking wrench tolerance

Backside - ...obviously!

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Winter Field Day 1/26/20

**WRAP -UP!**

This was a great project for me. I learned an incredible amout about verticals and radials as well as building / working with aluminum.

I consider the project not only a personal success, but a success for the club.
The performance seems to be what I was hoping / expected based on the modeling.
The users of the antenna at Winter Field Day all seemed to be quite pleased with the real world performance of the array.

I consider it a club success because it is pretty easy to set-up and take down. The set-up and take-down time really isn't to bad, neither is it back-breaking hard work. The biggest drawback is the required space it takes up. It is a high-performance antenna system that is easily deployed and duplicated without a ton of trouble.

for the last couple of pages, I've included data from the MMANA modeling program.
below is the layout of the antenna with it's radials. The driven element is the one with the two radials 180 degrees apart from each other.

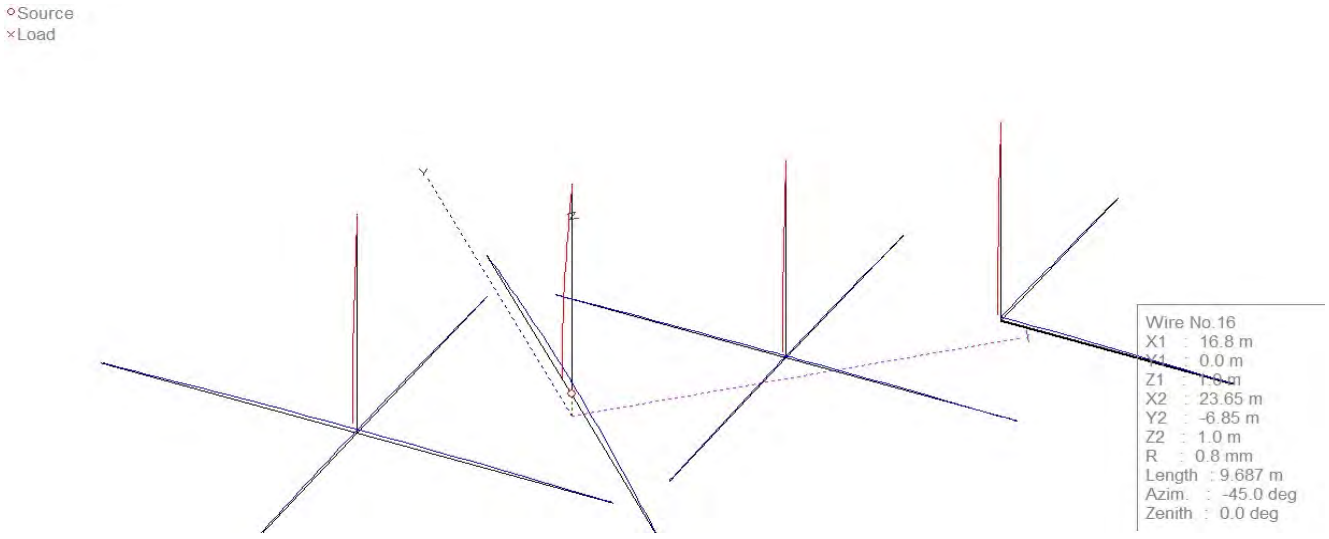
The next page is the modeled far-field plot.

The final page is the predicted SWR and Impedance data from the model

Thank you for indulging in this little report on the project. I hope you found it as interesting as I did in creating it! I look forward to being able to use it for future field days and other functions assuming there is a desire from the club to deploy it again.

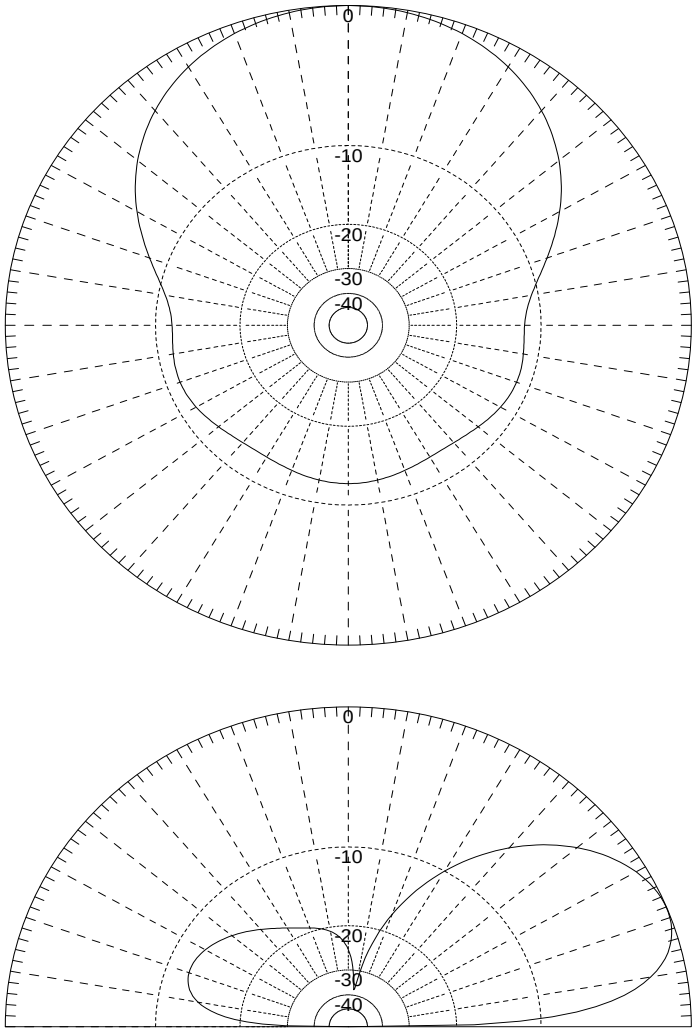
Respectfully Submitted,

Perry Schrag N0PAS



FAR FIELD PLOTS

MMANA-GAL basic v. 3.0.0.31




Ga : 4.98 dBi = 0 dB (Vertical polarization)
F/B: 11.61 dB; Rear: Azim. 120 deg, Elev. 60 deg
Freq: 7.150 MHz
Z: 31.593 + j7.311 Ohm
SWR: 1.6 (50.0 Ohm),
Elev: 21.8 deg (Real GND :0.00 m height)

# PREDICTED SWR & IMPEDANCE CHARTS