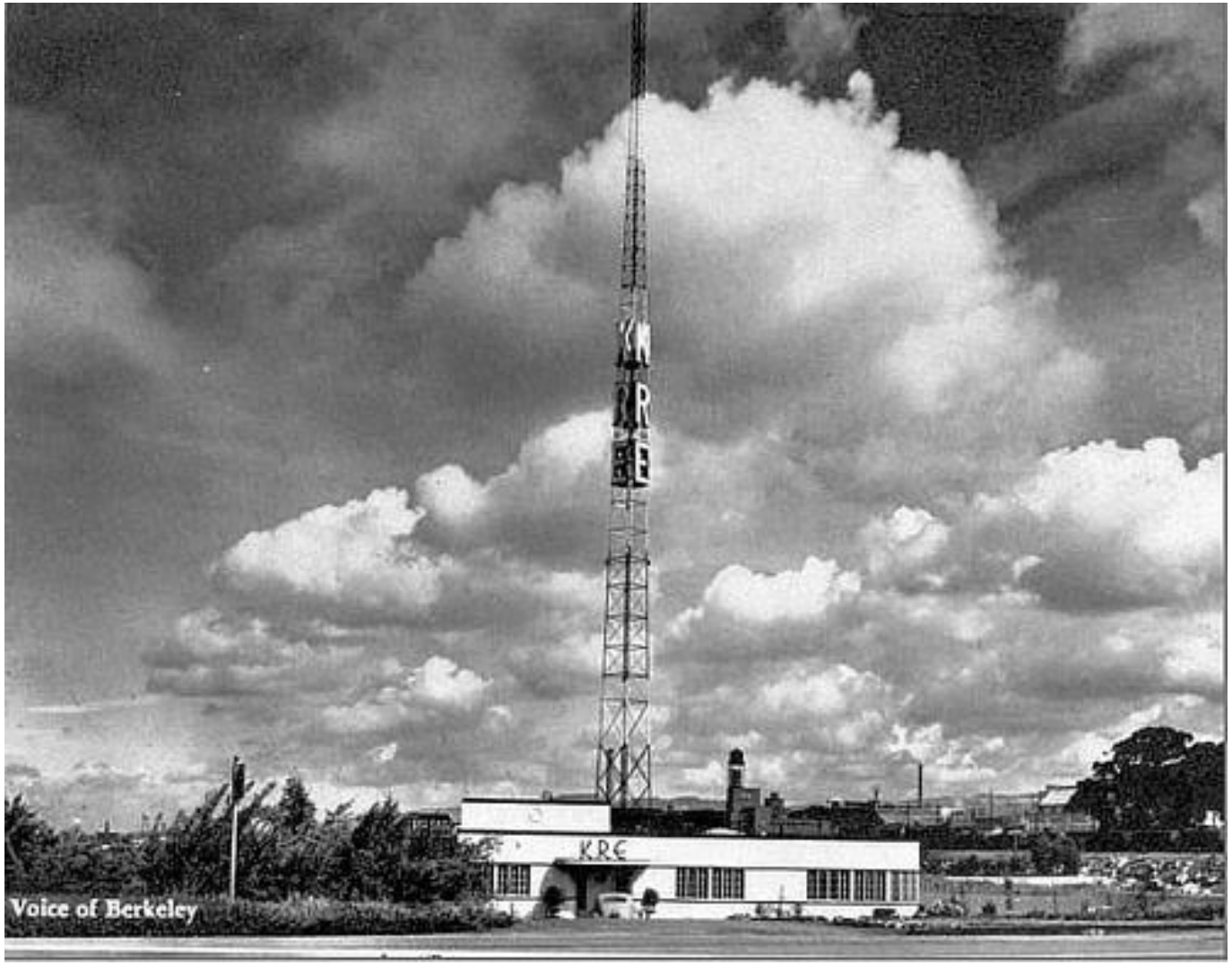
Low Band DX Antennas (on a small lot)



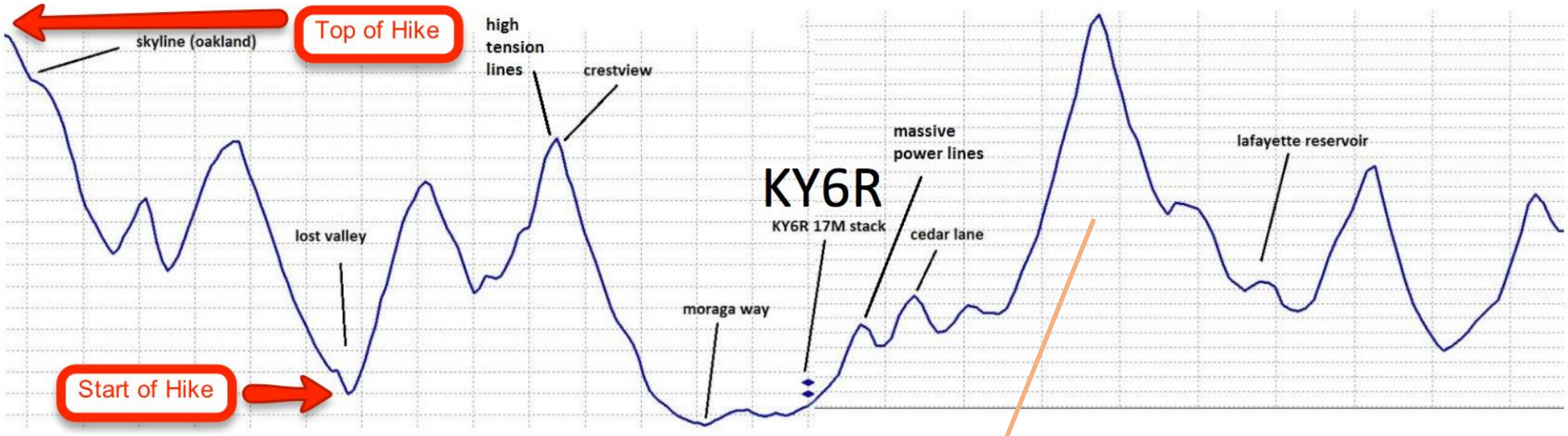
Low Band DX Antennas – KY6R Antenna Farm

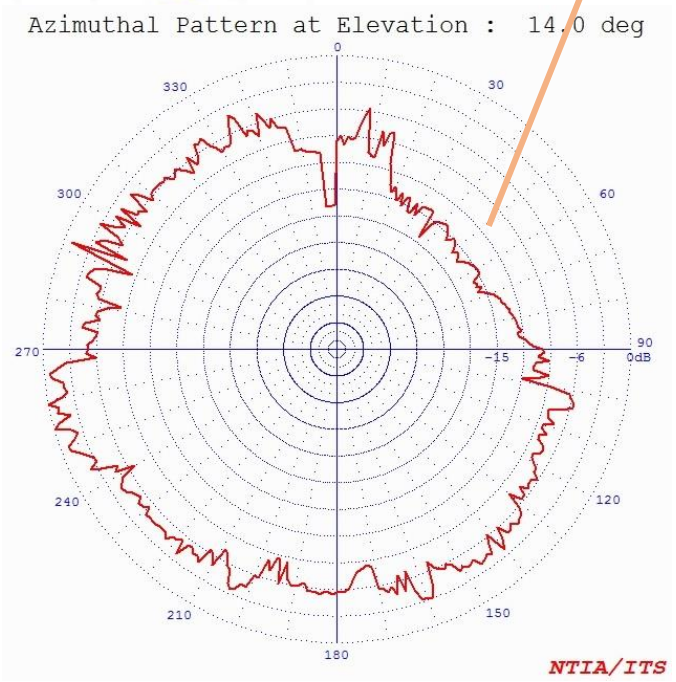
2 element 20M home brewed yagi

40M DX Engineering Phased Array

30M Bobtail (all band) Curtain Array

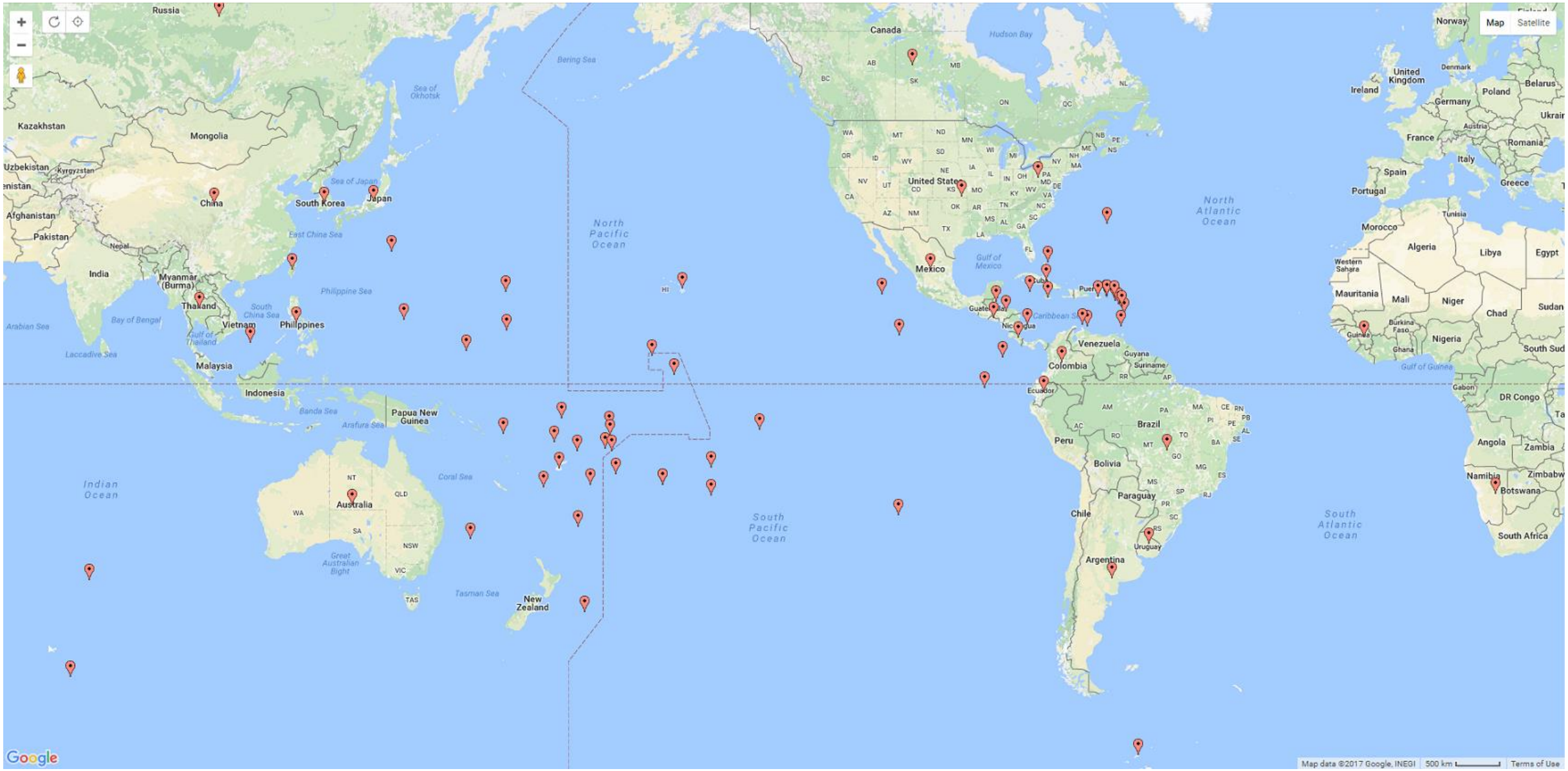
Low Band DX Antennas – (Location, Location, Location!)



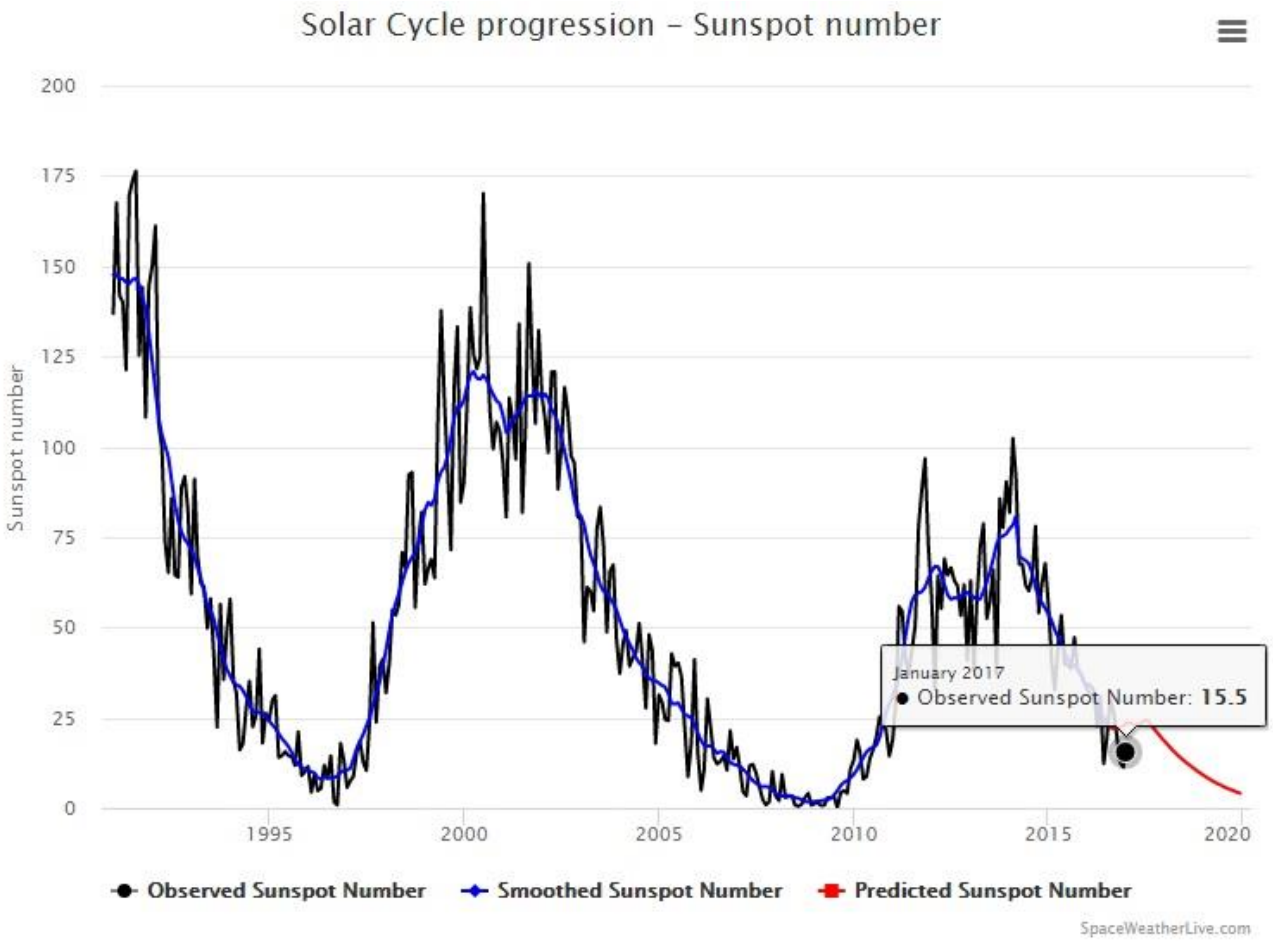


I used K6TU's HFTA Sweep to generate this. At http://k6tu.net he has tools to generate HFTA files and then you can run them through HFTASweep

Low Band DX Antennas – 160M Confirmed

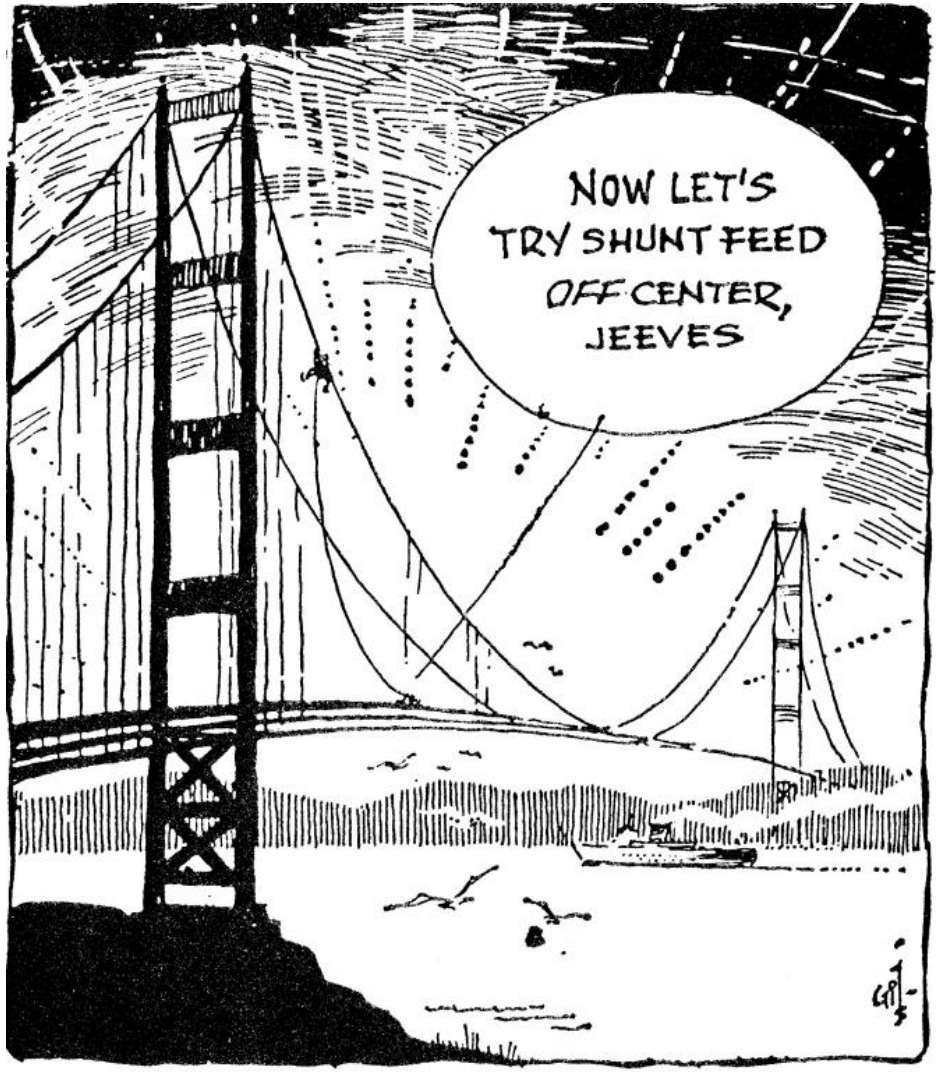


Low Band DX Antennas – Solar Cycle 24 / 25



- The Low Bands will be especially important during the years of sunspot minima, which we have just dropped into
- Carl, K9LA predicts that Solar Cycle 25 will be at least the same as Cycle 24
- The bottom of the cycle is predicted to happen in 2019 – 2022 or so

Low Band DX Antennas



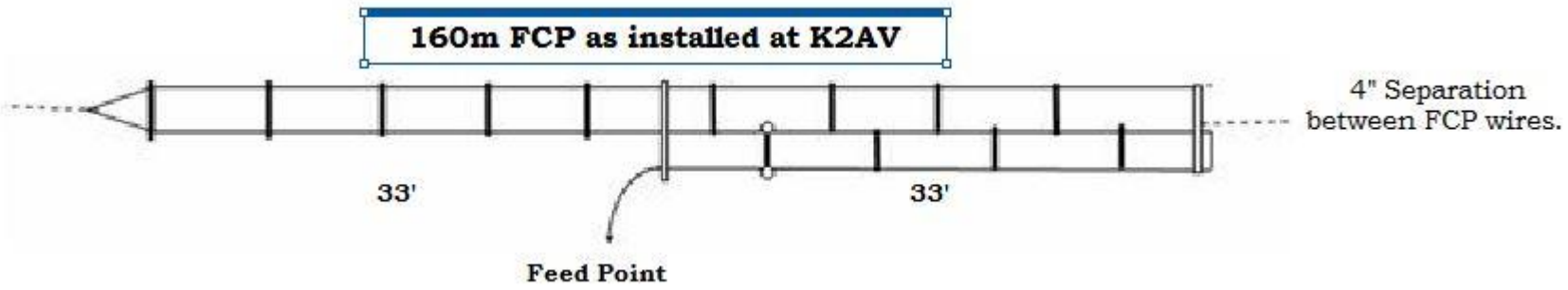
- The low bands offer DX once the higher bands go quiet
- During the last minima (2007 – 2010) even 20M struggled to open
- 40M was a real savior for DX-ers
- 160 and 80M had some of the best conditions as well
- 30M sometimes behaves like 40 and sometimes like 20M

Low Band DX Antennas

- On a small lot (or even a large lot), verticals are most practical
- Buried or raised radials – or even an “FCP” can be used
- Verticals can take up a surprising amount of space
- The “higher the better” and quarter wave length verticals work great

  160M - @130’ tall!
  80M - @65’ tall!
  40M - @34’ tall
  30M - @24’ tall
- Its easy to get something up for 40 or 30M. In fact, you can even phase two!

DX Engineering
DV-40-P
And DV-160-P

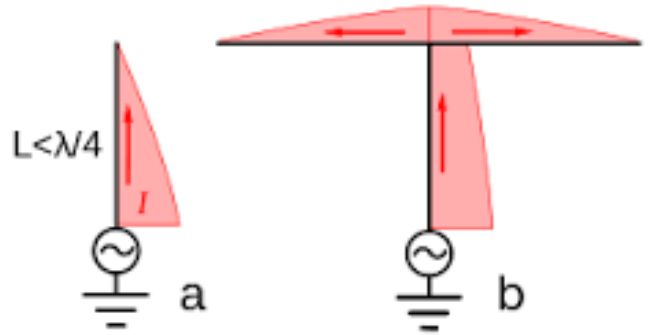


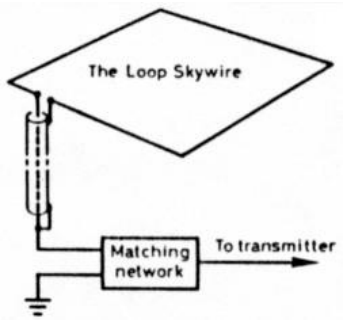
Low Band DX Antennas

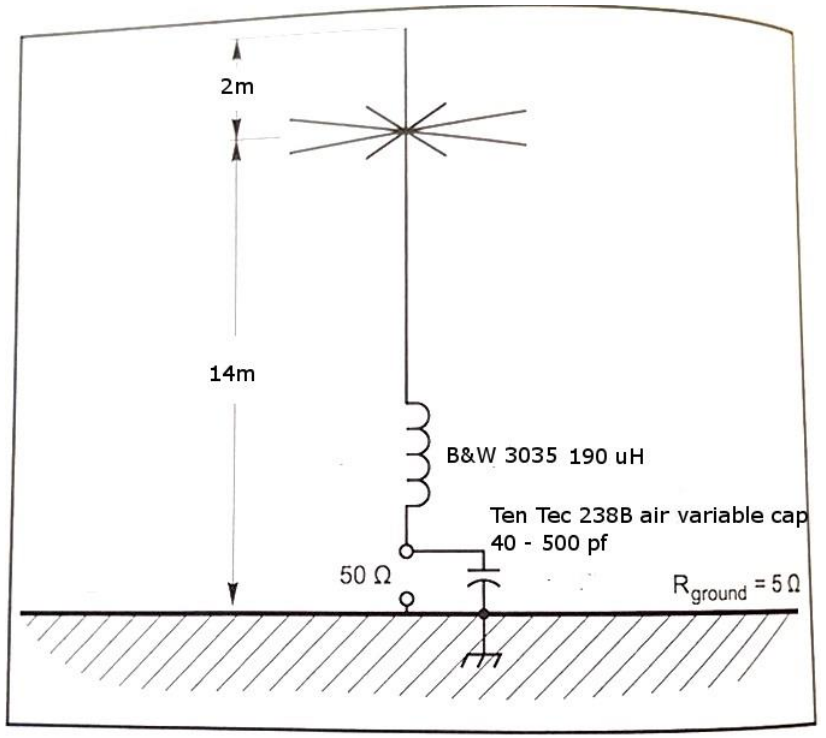
- Lets go from easiest to hardest antennas to put up on the low bands
  - SteppIR CrankIR – no radials
  - Shortened vertical dipole (using loading coils and “T Bar hats”) – no radials
  - On 40M and 30M a dipole up 50’ or more is a good antenna
  - Single vertical using an UNUN or current choke and radials
  - 2 element phased arrays – with radials
    - 30M verticals are only 24’ tall and two can be phased separated by 24’
    - 40M verticals are only 34’ tall and two can be phased separated by 34’
  - The biggest decision is what kind of radials (ground or elevated)

Low Band DX Antennas

- T – or “Marconi” shortened capacitance hats (Top Hats)
- V – sloping radials (not as efficient but they worked fine for me)

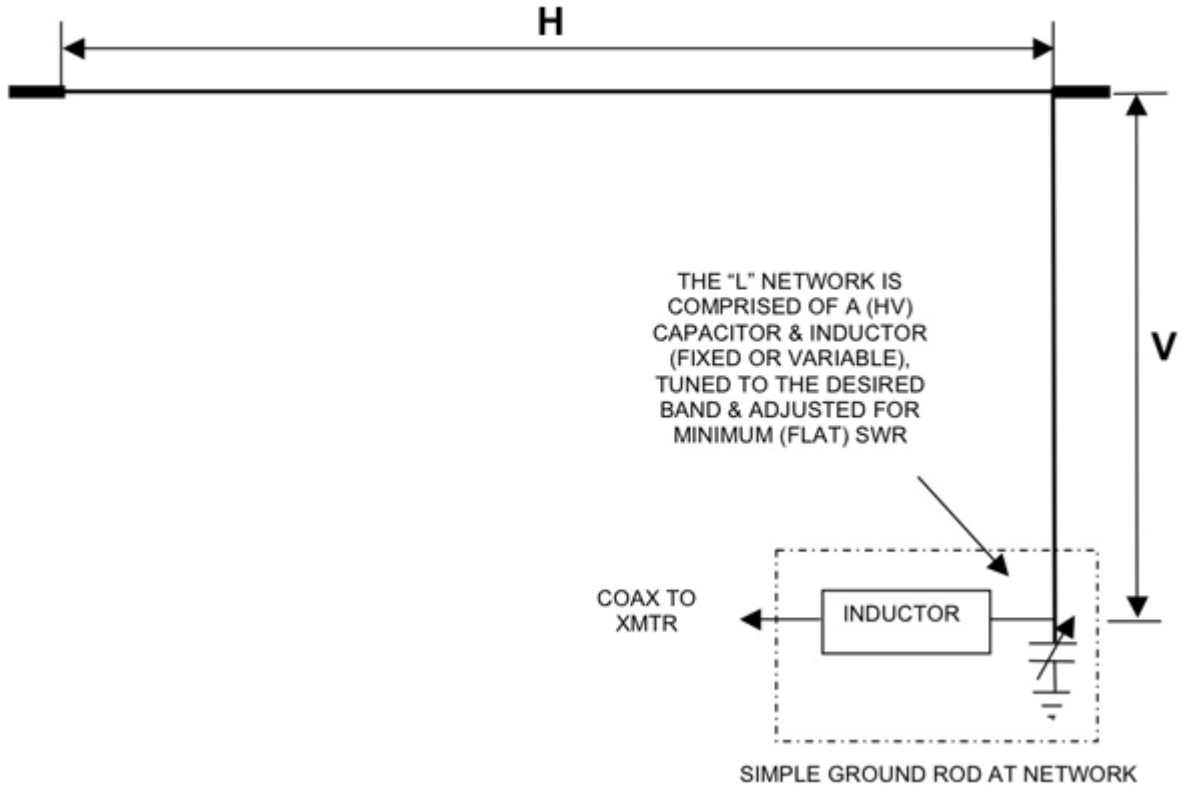


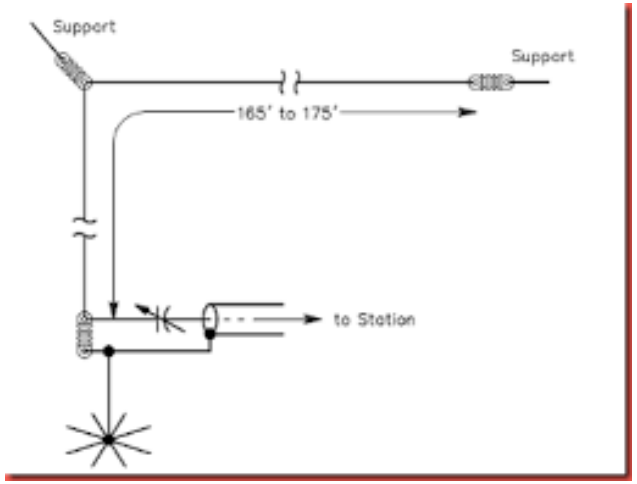




Low Band DX Antennas

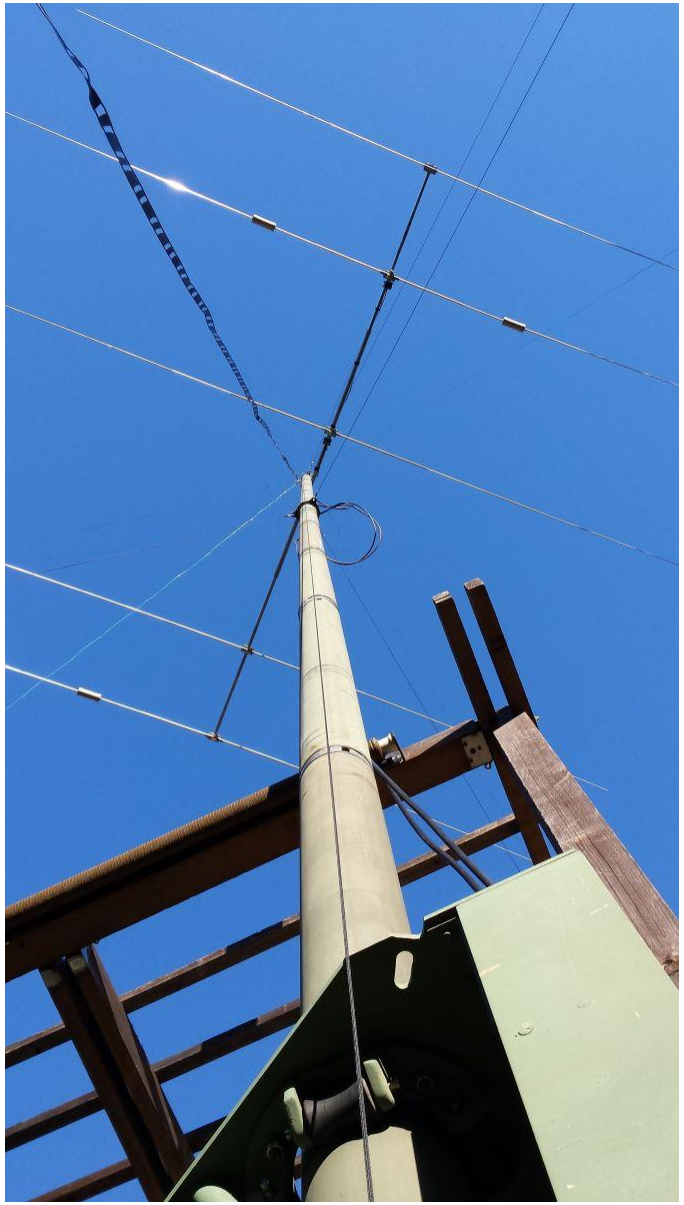
- On 80 and 160M, it gets much tougher, but the Inverted L is a very good antenna and can even be used on 160 – 30M with a tuner
- Its easy to use a 43’ vertical and use a couple wires to make it resonate on 80M
- 160M is the biggest challenge – on a small lot, its hardly ever “easy”
  - You try to get to ¼ wavelength on the low bands, but there are tricks and schemes to overcome the size requirements on 80 and 160M





Low Band DX Antennas

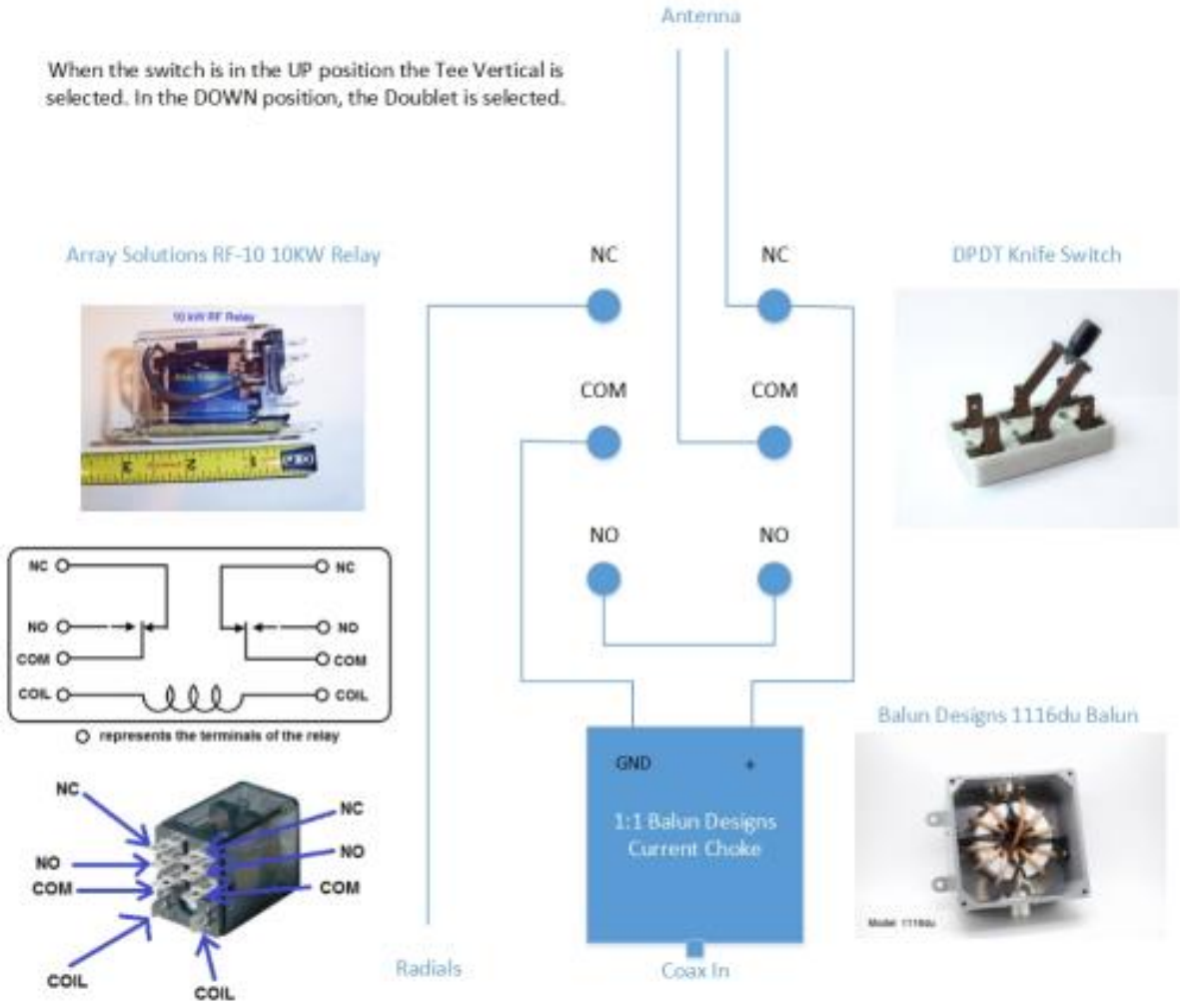
60’ Top Hatted N7JW



N6BT DXU-32 and 80M Delta

Phased 40M Verticals

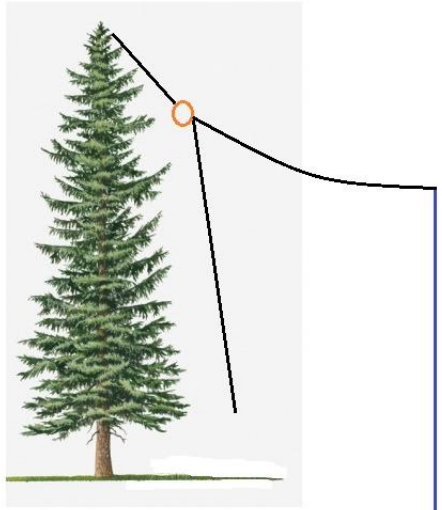
Low Band DX Antennas

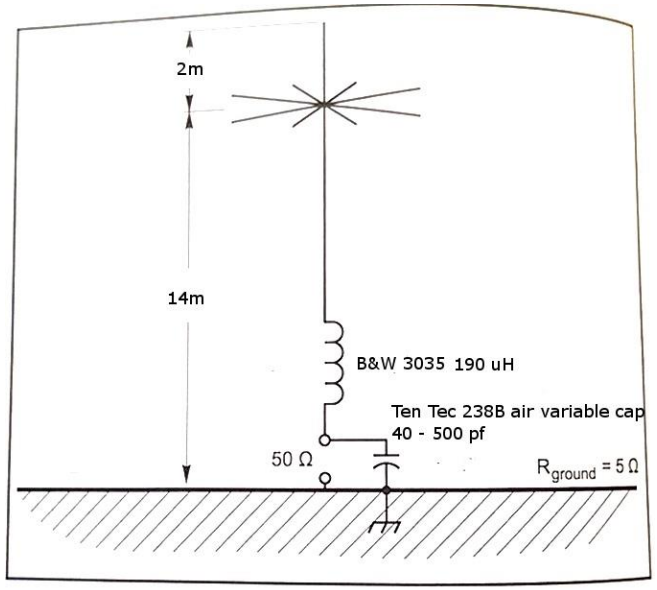


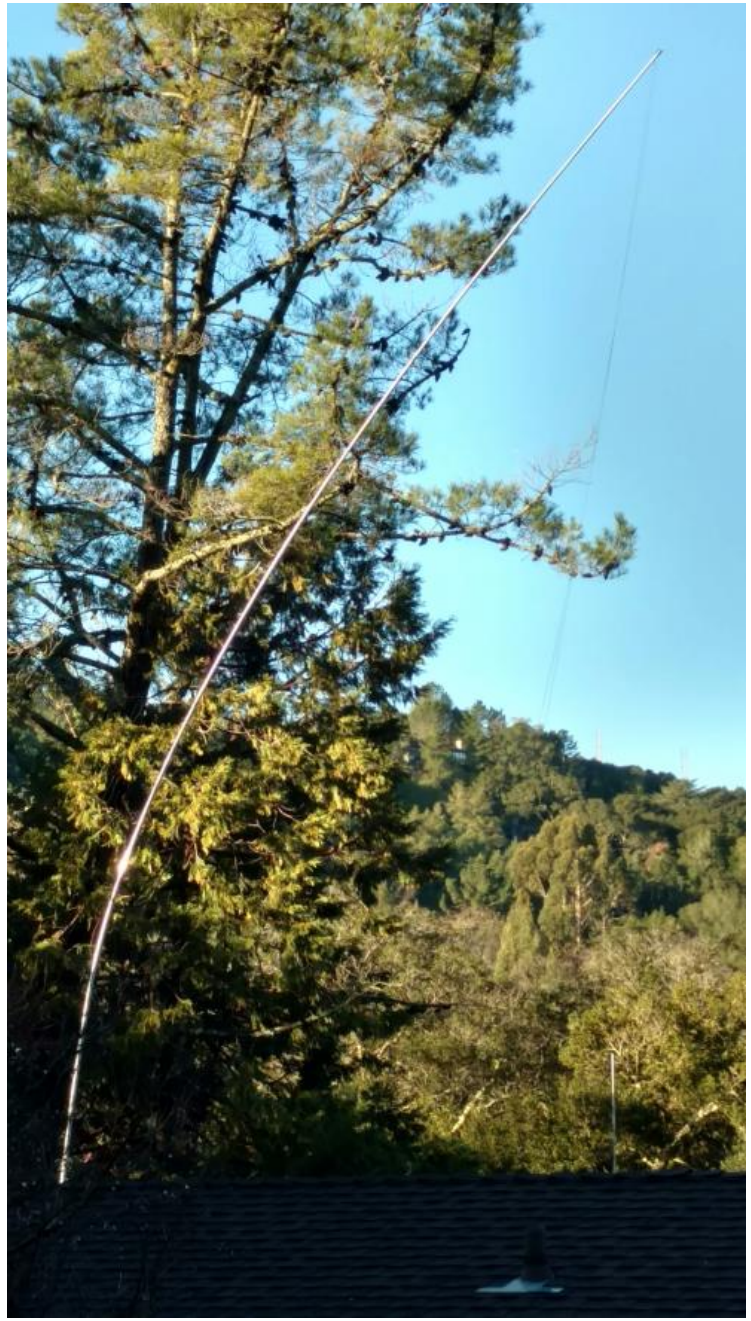
You can easily turn an inverted vee into
A top hatted vertical just by using a single
High power relay

Low Band DX Antennas

- Lets start with 160M – I found even trying to get an N7JW style top loaded vertical up 60’ was tricky
- Previously I used a “magical” Cushcraft MA160V 36’ top loaded vertical
- Now I use an “all low band” modified Bobtail Curtain

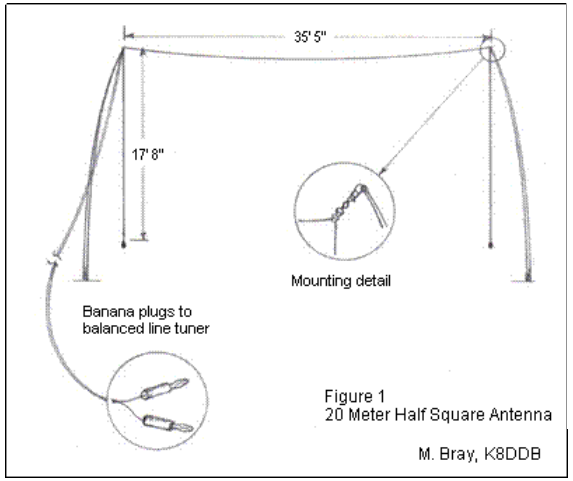






Low Band DX Antennas

- Phasing schemes
  - Parasitic
  - Half Square
  - Bobtail Curtain
  - Bruce Array
  - Christman – using coax and an Array Solutions Stackmatch II switch
  - DX Engineering DV series



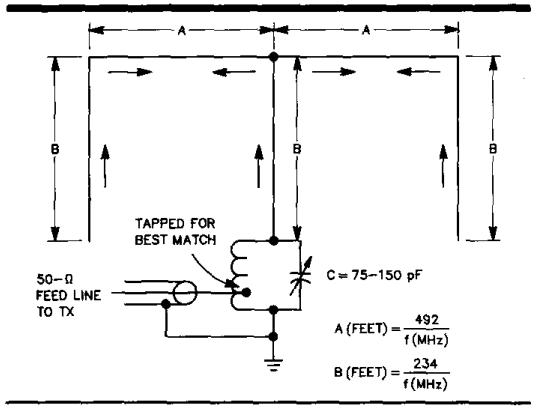
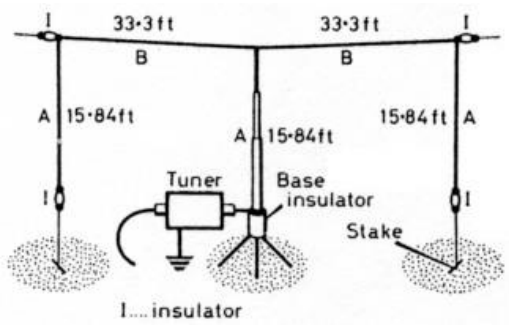


Fig 62—The bobtail curtain is an excellent low-angle radiator having broadside bidirectional characteristics. Current distribution is represented by the arrows. Dimensions A and B (in feet, for wire antennas) can be determined from the equations.



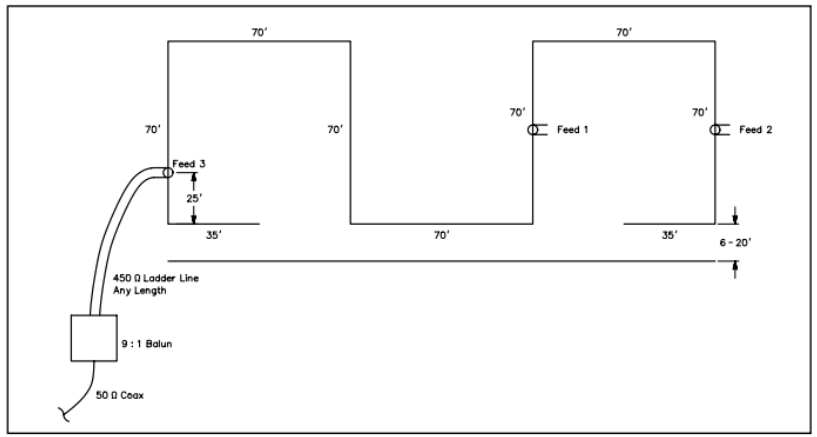
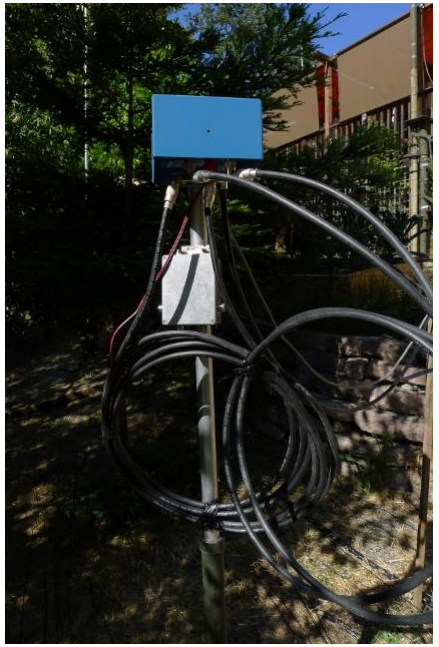


Figure 4—The 80-meter Bruce array employed at N6LF. Alternate feed points are indicated.



Christman Phasing Calculator

Operating frequency:
7.050 Mhz
Coax velocity factor:
0.66 Vf
Calculate

Measuring your 71-degree phasing line

The **71-degree** phasing line should be: **0.00 ft** or **0.00 m**.

The 71-degree phasing line is 90 degrees at **0.00 Mhz**.

Cut the coax to the suggested length plus a few inches, in case your velocity factor is not quite right.

Leaving one end of the coax open, set your RF analyzer to **0.00 Mhz** and trim the coax until you see minimum Z impedance. You now have a length of 71 degrees at your desired operating frequency.

Measuring your 84-degree feedlines

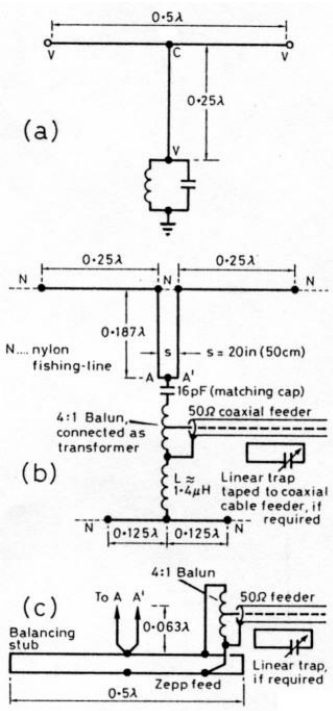
Each **84-degree** feedline should be: **0.00 ft** or **0.00 m**.

The 84-degree feedlines are 90 degrees long at **0.00 Mhz**.

Cut the coax to the suggested length plus a few inches, in case your velocity factor is not quite right.

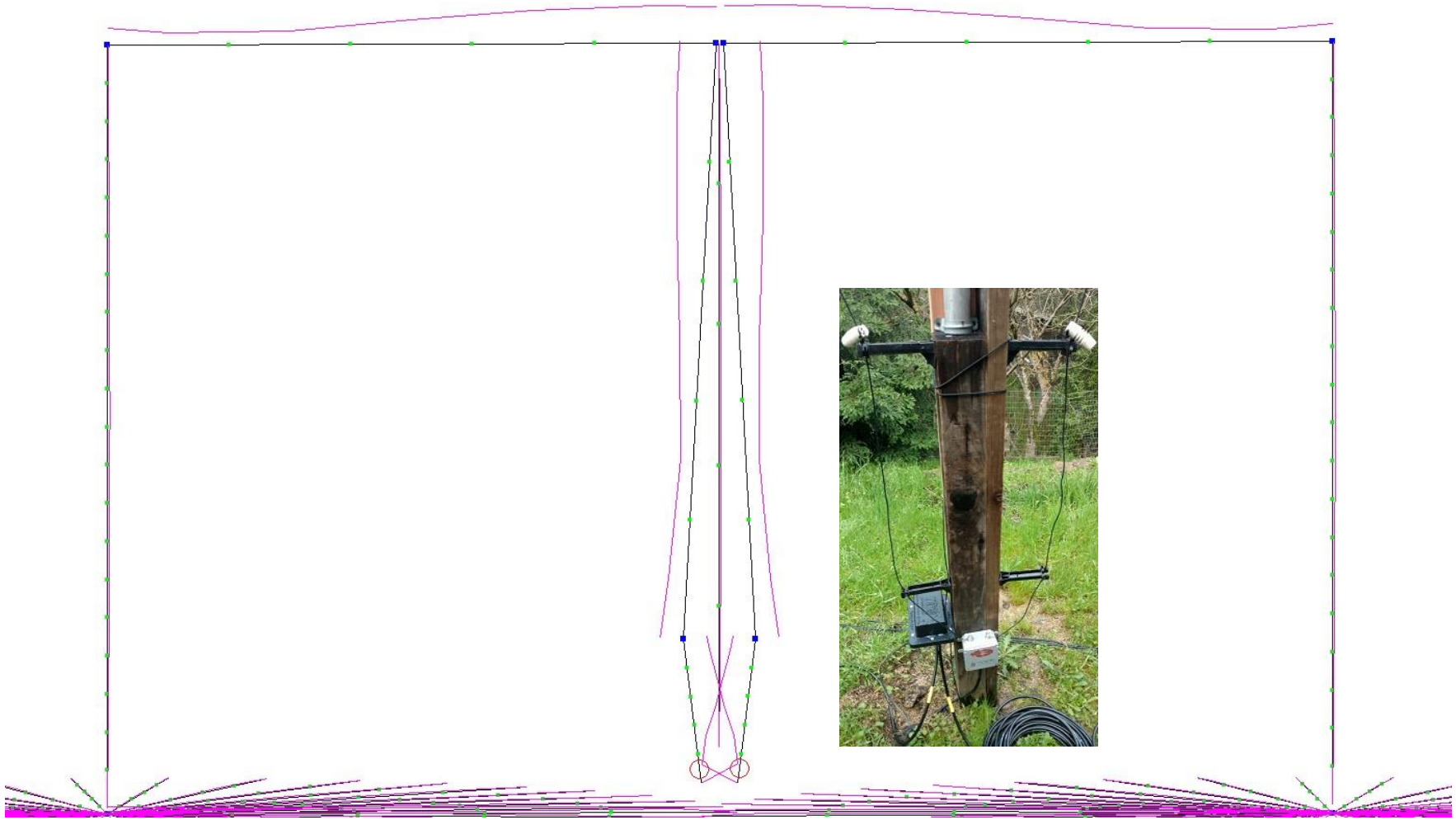
Leaving one end of the coax open, set your RF analyzer to **0.00 Mhz** and trim the coax until you see minimum Z impedance. You now have a length of 84 degrees at your desired operating frequency.

VA7ST Christman Phasing Calculator



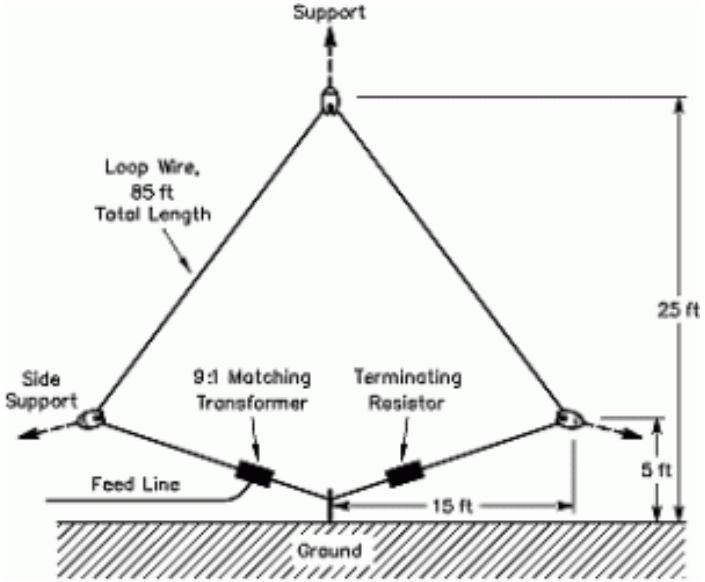
Low Band DX Antennas

30M Bobtail Curtain (that works on all bands)

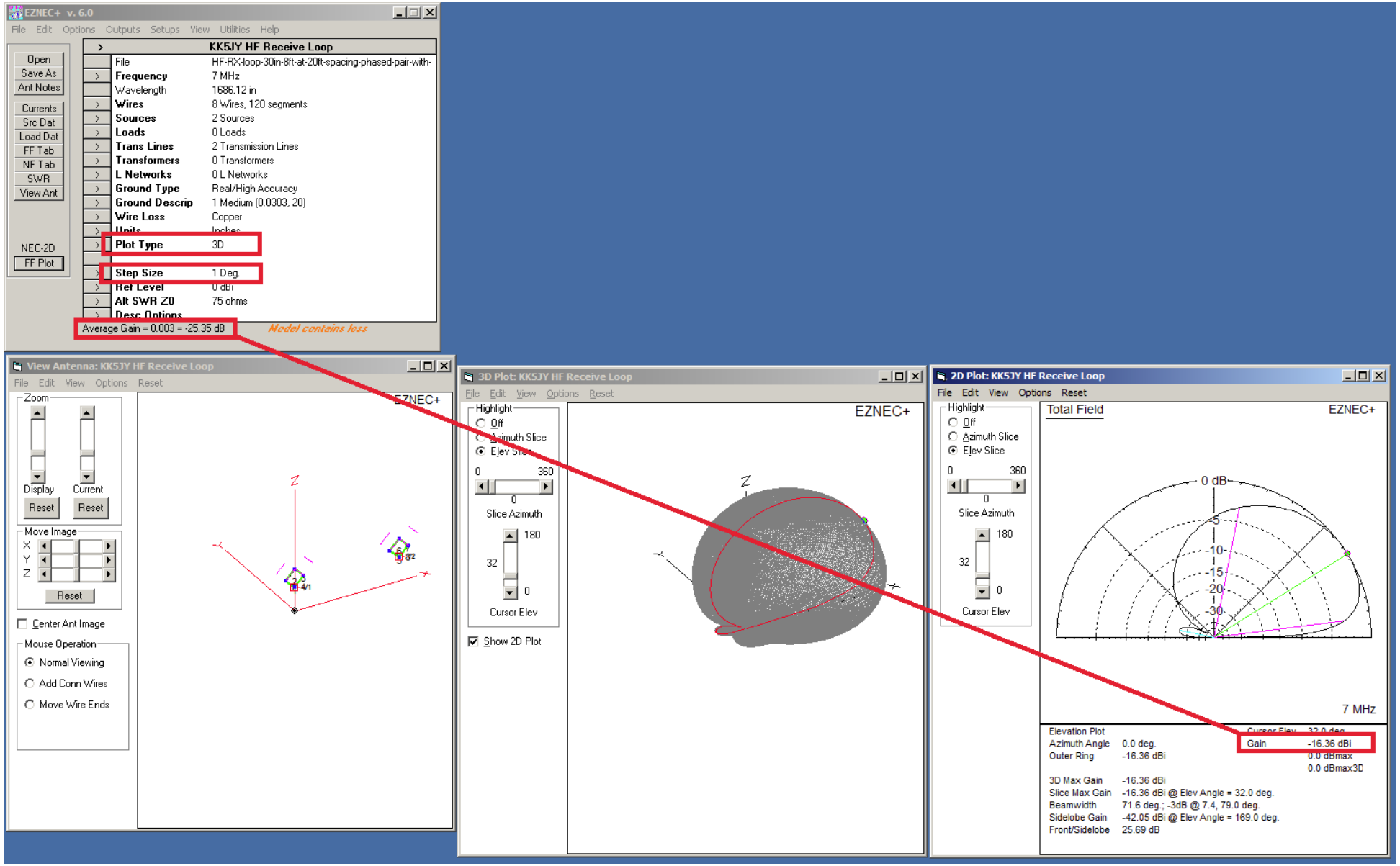


Low Band DX Antennas – Receive Only (RX)

- On 160, your biggest issue will be hearing DX stations
- I experimented with
  - Coaxial Loops
  - Single wire loops
  - Flags (EWE, K9AY and Pennant)
  - Phased verticals
  - And then I found the best – a modified K6SE Flag
  - By accident – I had my antenna switch to the wrong antenna and found that my DX Engineering 40M phased array worked as well as my modified K6SE Flag and NCC-2

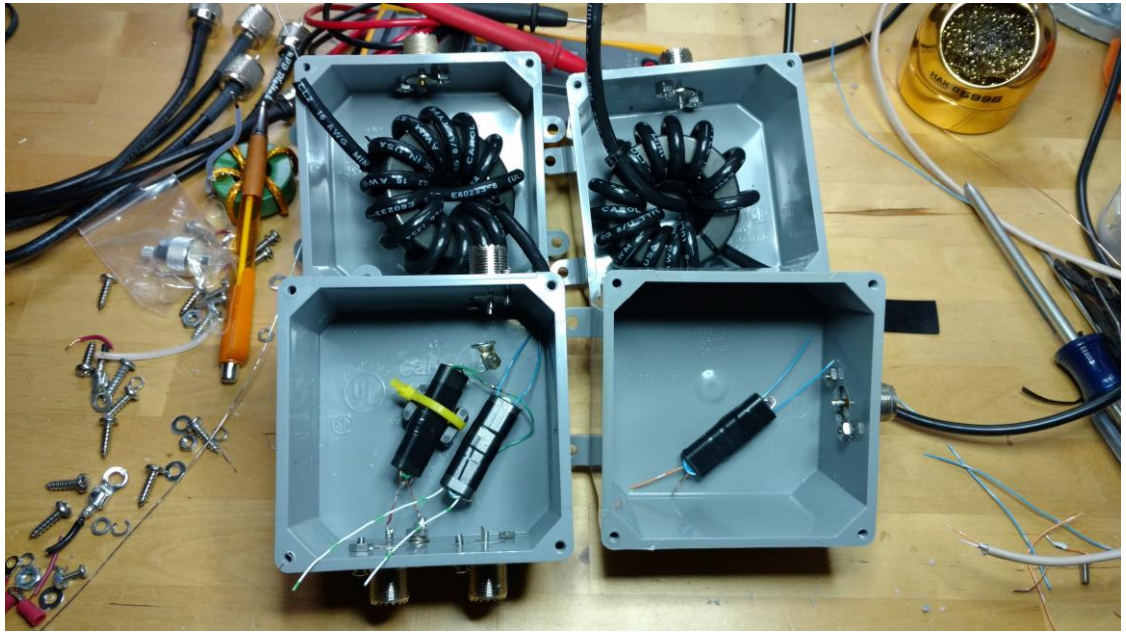


Low Band DX Antennas - RDF



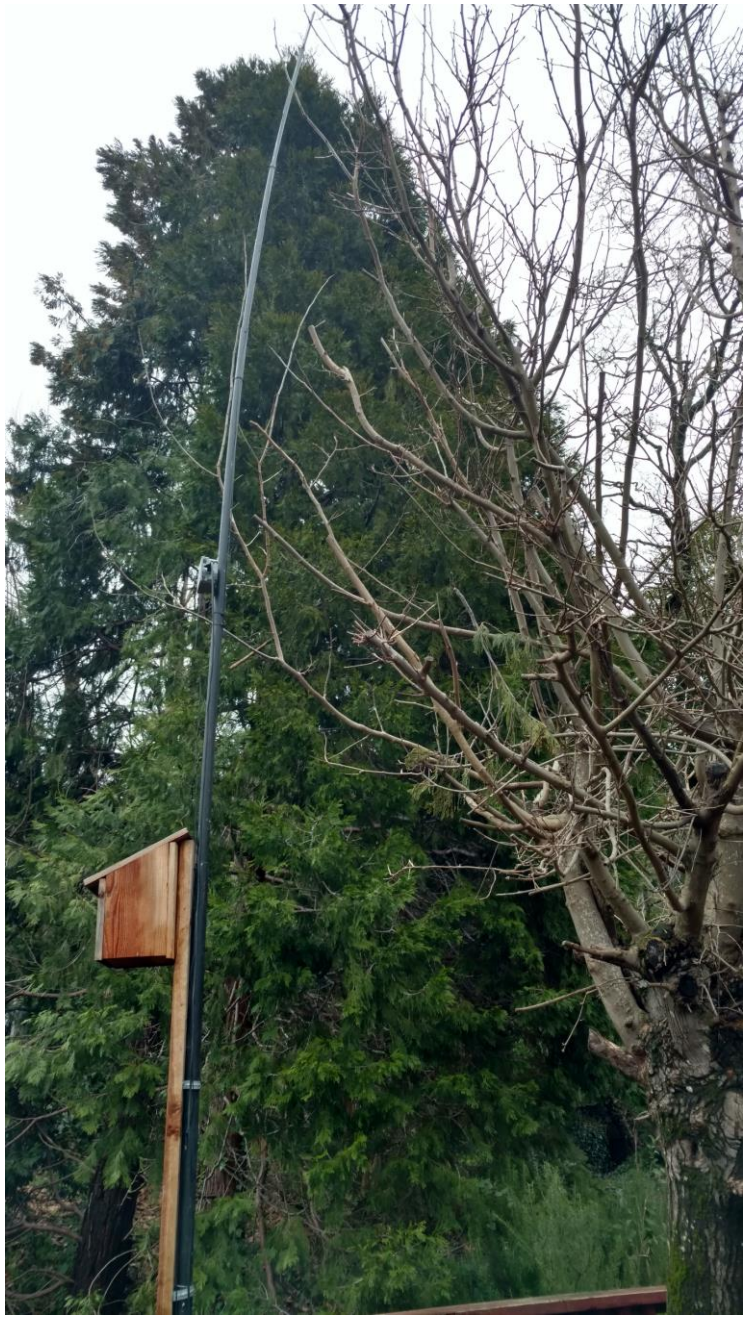
Low Band DX Antennas - RX

DXE NCC-2



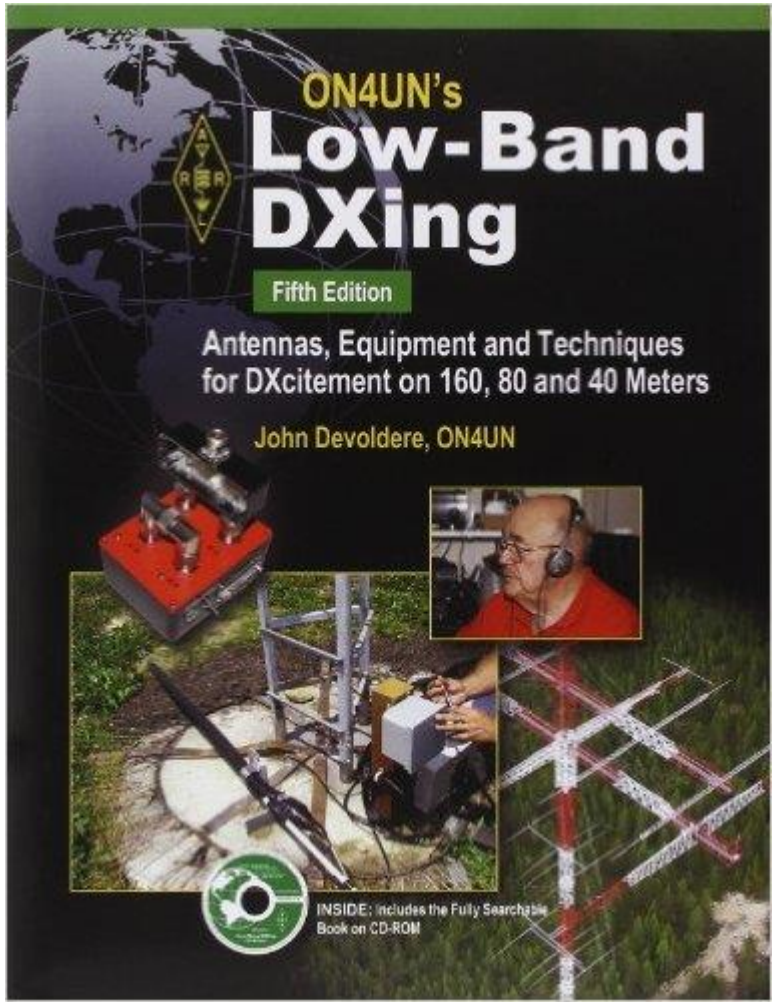
Common Mode Chokes and RBOG Boxes

RX Phased Vertical
Tuned Circuits



KY6R Optimized K6SE Dual Feed Flag

Low Band DX Antennas



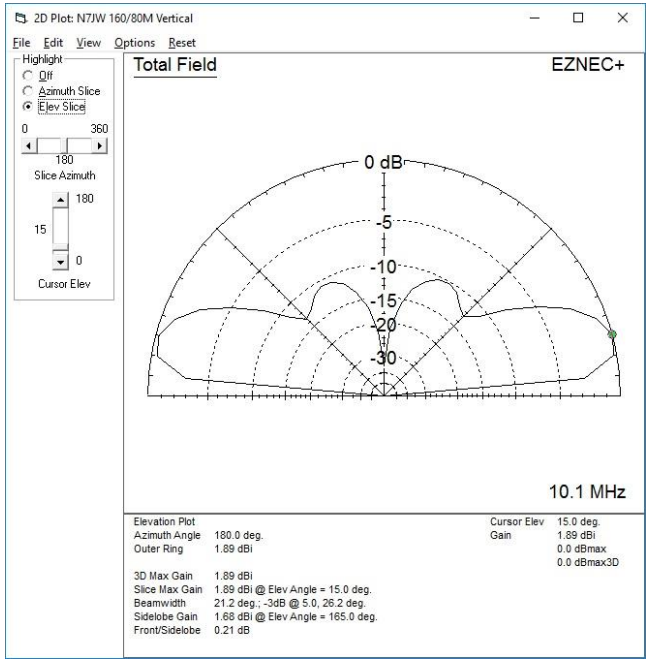
If you only buy one book about Low Band DX-ing, this is it – it's a must

It will take you years to get through it – but every time you open it up – you will learn something new that is very valuable

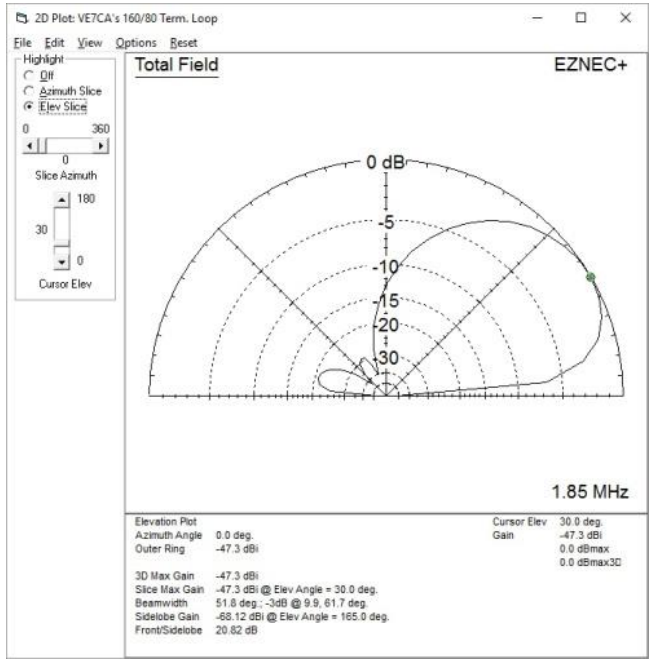
I've purchased other books on all aspects of Low Band Dx-ing – and after Using this book for years, the others look like cartoons in comparisons

Low Band DX Antennas

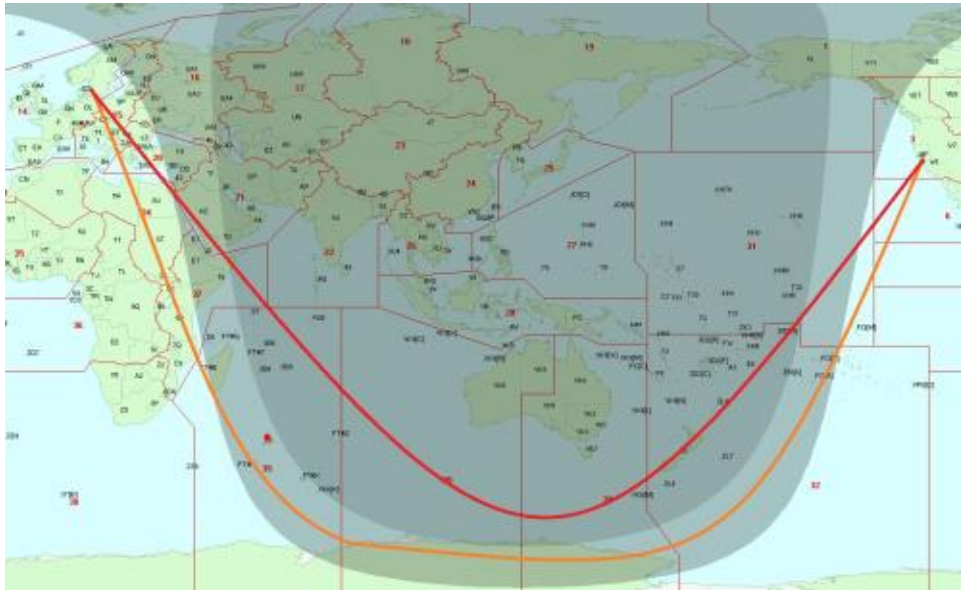
- Some Low Band “Physics”
  - Verticals are “low angle radiators” – Take Off Angles are low
  - Not all incoming or outgoing signals should be low angle
    - During sunup and sundown (greyline) propagation brings varying angles – usually high to low or low to high



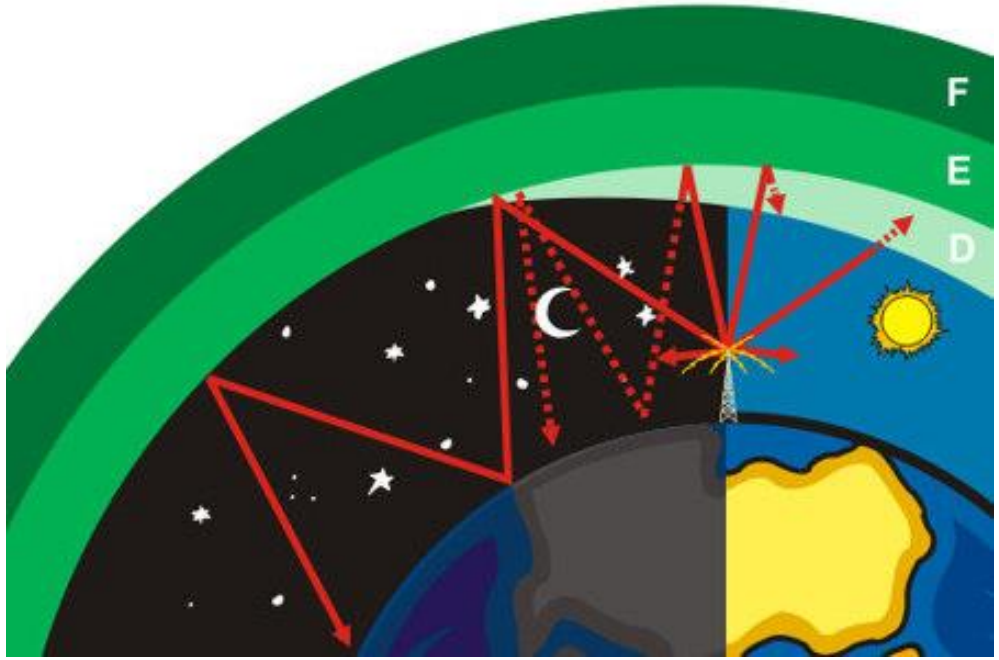
Low Angle Radiator



All angle receive antenna

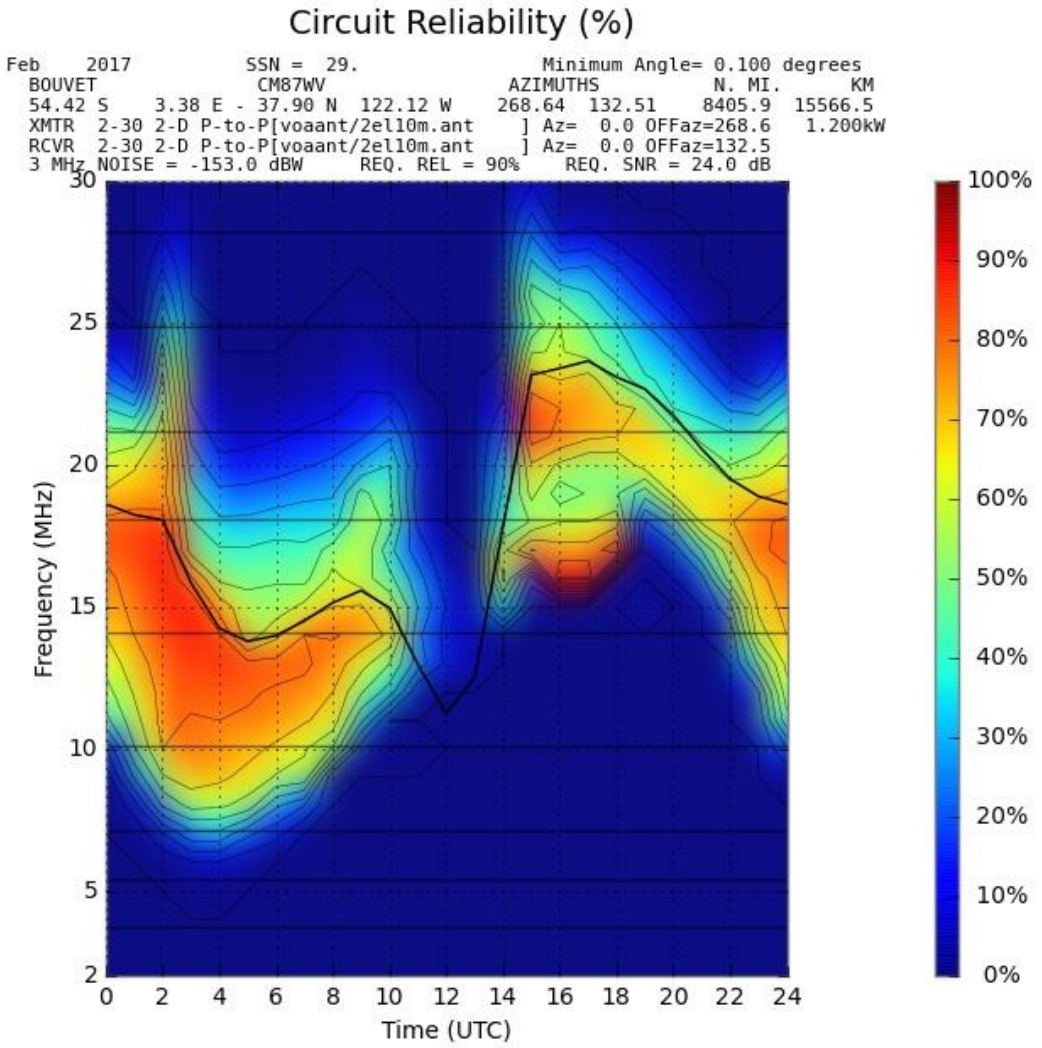


Sunup / Sundown “Greyline”



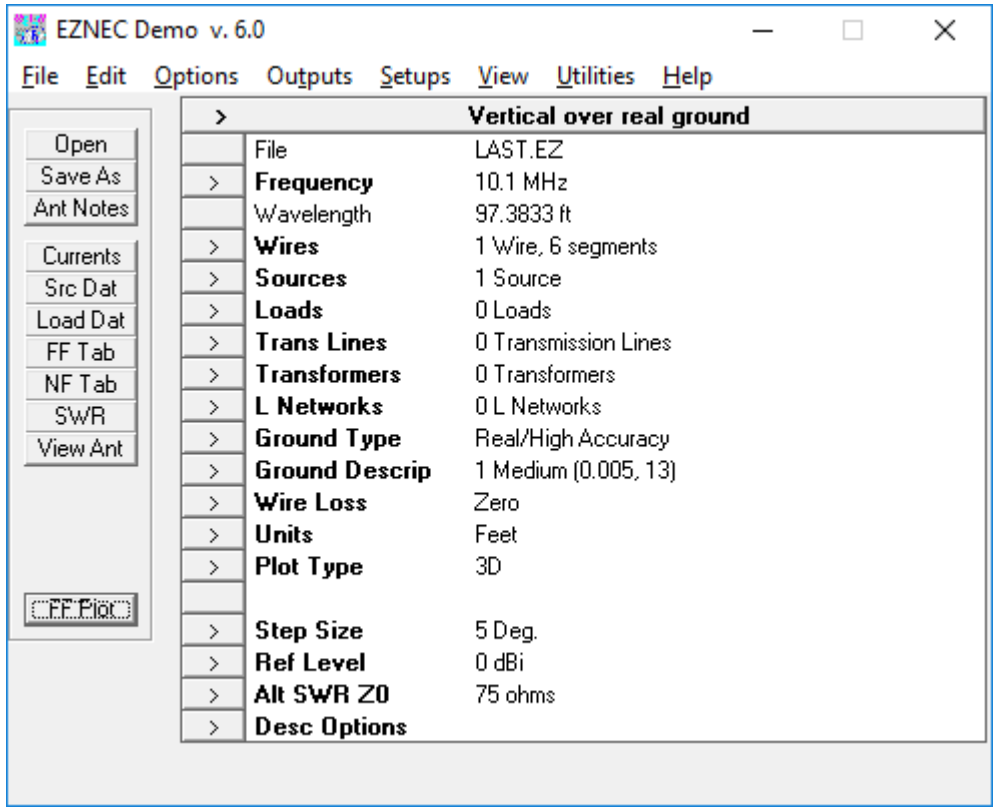
Daytime D Layer Absorption

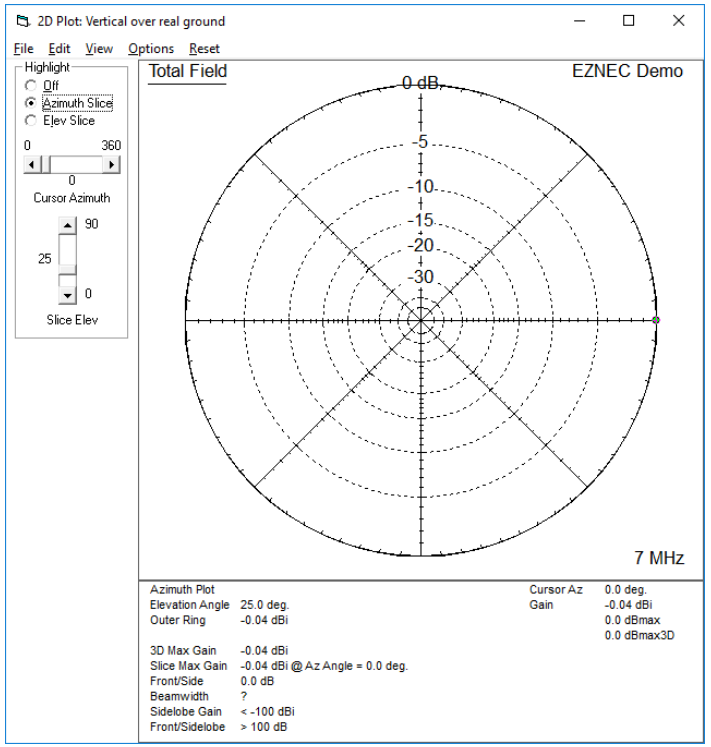
Low Band DX Antennas – VOACAP Online

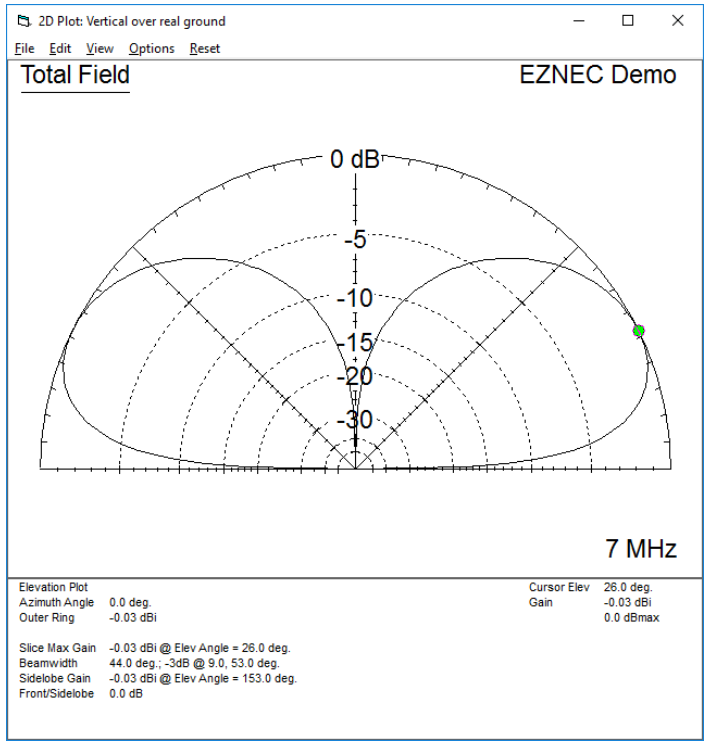


There are no prediction tools for 160, and even 80M is not represented well

Low Band DX Antennas – EZNec is Your Friend



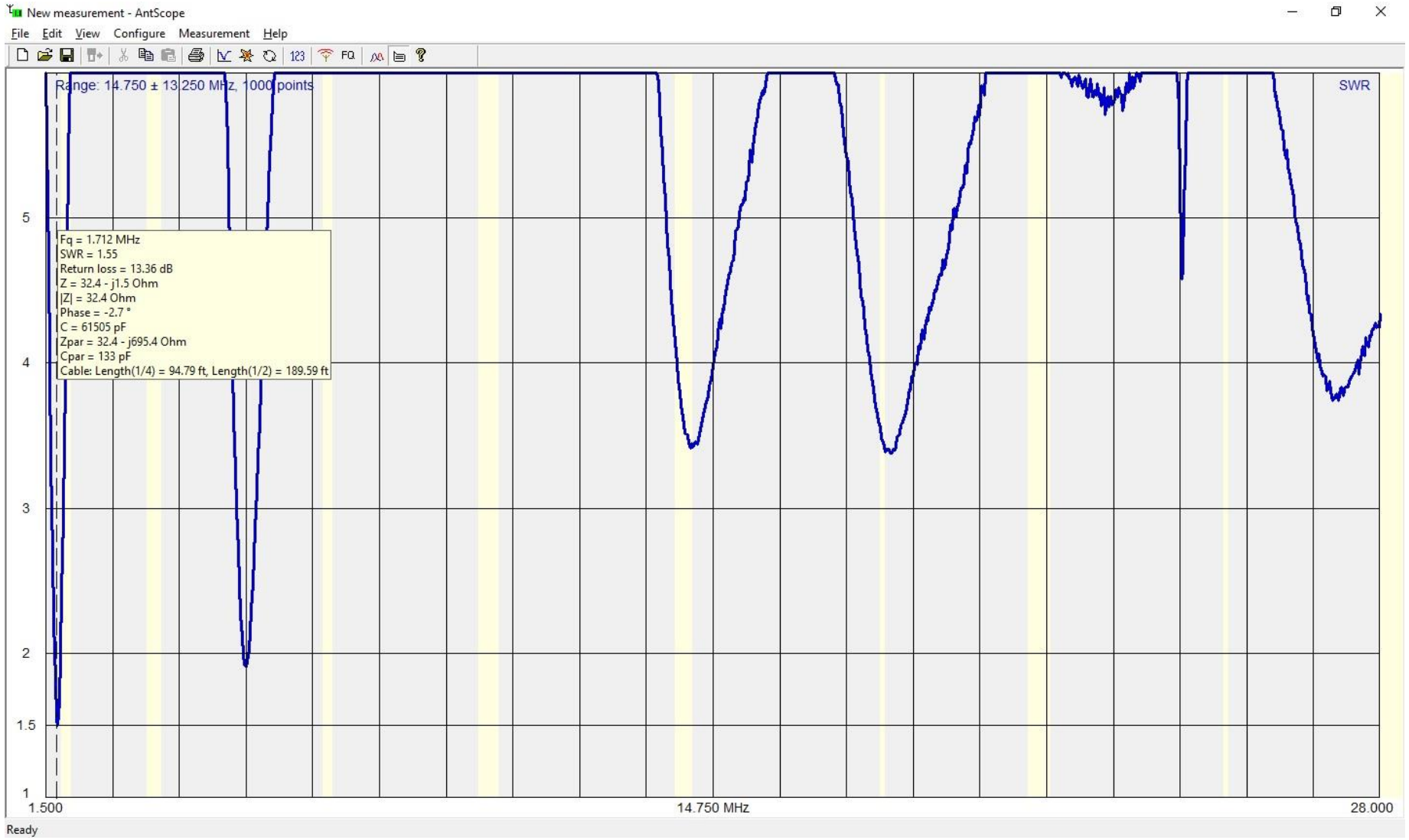


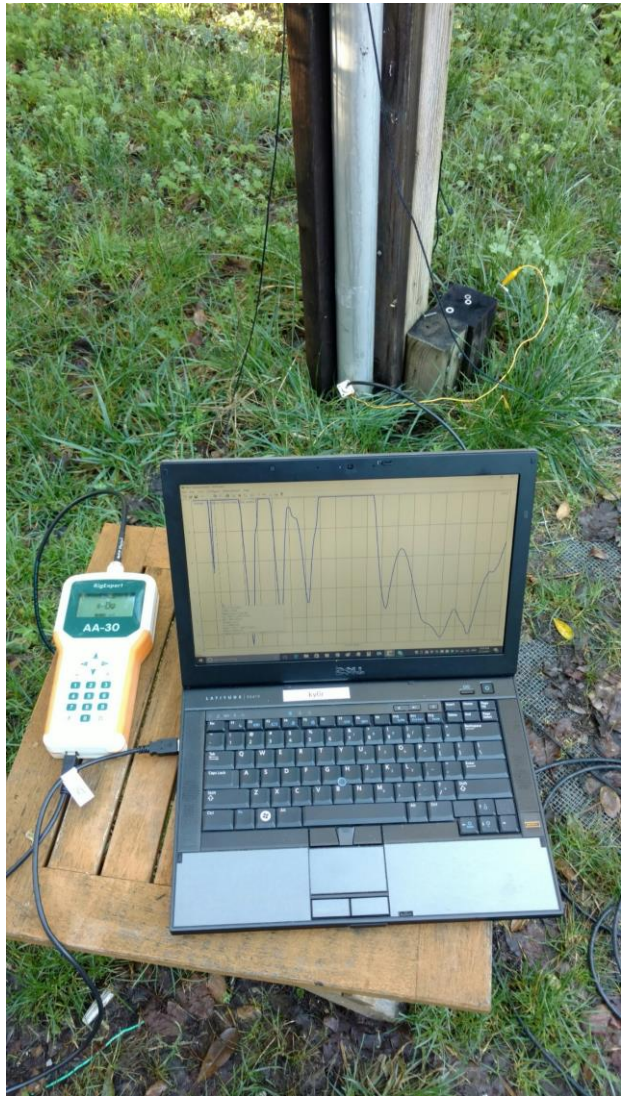


Not great with ground, but still a very valuable tool

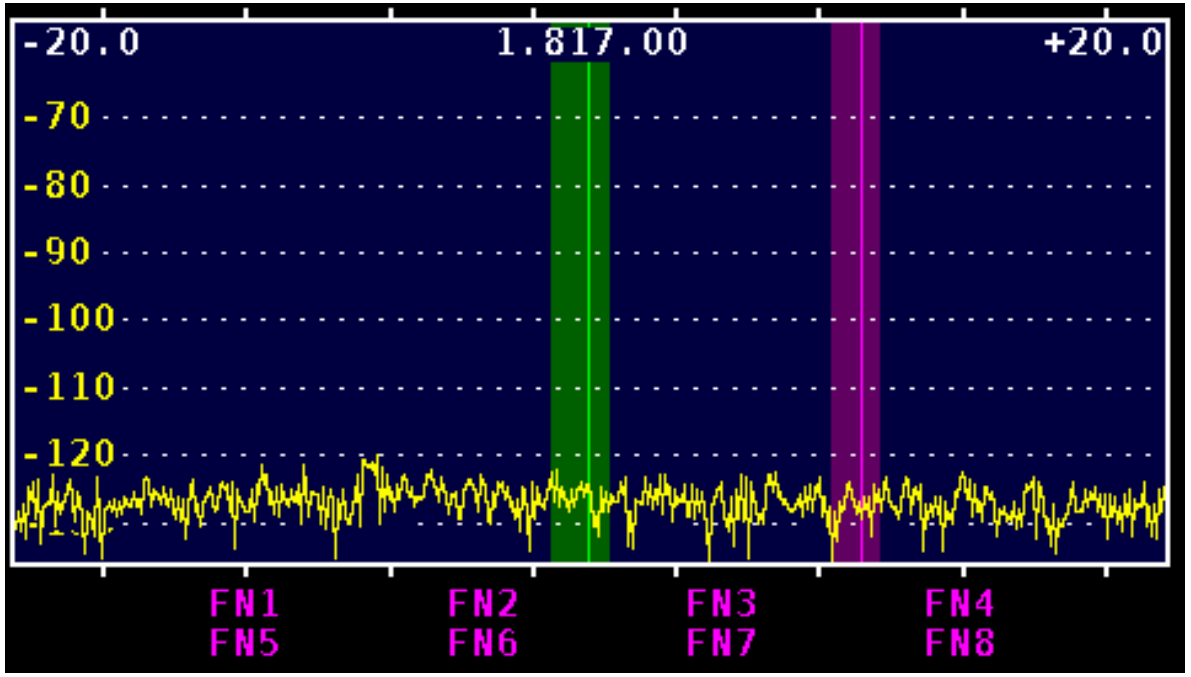
Single vertical based patterns are pretty easy to understand

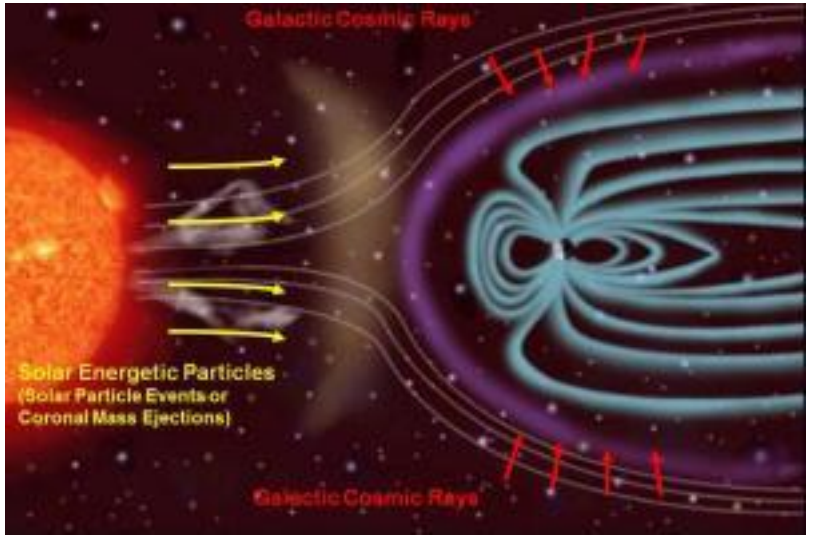
Low Band DX Antennas – Antenna Analyzer (AA-30)





Low Band DX Antennas - Noise





During the decining part of a cycle, cosmic rays (from CME's) can keep the D Layer charged at night

160M has a big problem that the other bands do not have – NOISE!

The name of the game is trying to hear weak signals through the noise