LARGE VERTICAL ARRAYS
FOR 6M CONTESTING

Sometime in the 2004 time frame, Dave Olean-K1WHS and Fred-N1DPM begin investigating the concept of what they called a "Large Vertical Array" or LVA. This must not be confused with the VLA in NM, which is a truly monumental antenna project of dishes. The concept is to use an array of short boom yagis stacked off of a tower leg rather than a typical rotatable antenna.

Dave began with 8 five element yagis for 2M. Five element yagis for 2M are not very long, they are light, and easily mounted to a tower leg with a small bracket and U-bolts. Dave found that he could cover the entire CONUS with his array!! Dave is in a very unique location(FN43) in central Maine, so bear that in mind. After using the 8 antenna array for a season, he added 8 more antennas to end up with 16 x 5el stacked up a tower leg. They were pointed, more or less, at Dallas. By stacking in the vertical plane, Dave achieved a vertical beamwidth of about 3deg, which certainly puts the power on the horizon. However, his beamwidth in the Azimuth plane was still about 58deg. In the past, Dave has pointed out that, because there is so much gain there, you should not worry about the 3db beamwidth, you should be looking at the 10db beamwidth.

So here are the basic concepts of Dave's array and his thinking.

1)Use short boom rear mounted yagis
2)Stack them all vertically up a tower leg.

This achieves large gain but with a wide pattern in Azimuth. The advantages are:

1)Wide beamwidth in AZ
2)High gain(more than a long yagi)
3)Construction is simple and cheap
4)Mounting to the tower is simple and cheap
5)You get to use the support that you already have
6)Matching is straightforward
7)NO Rotor is needed

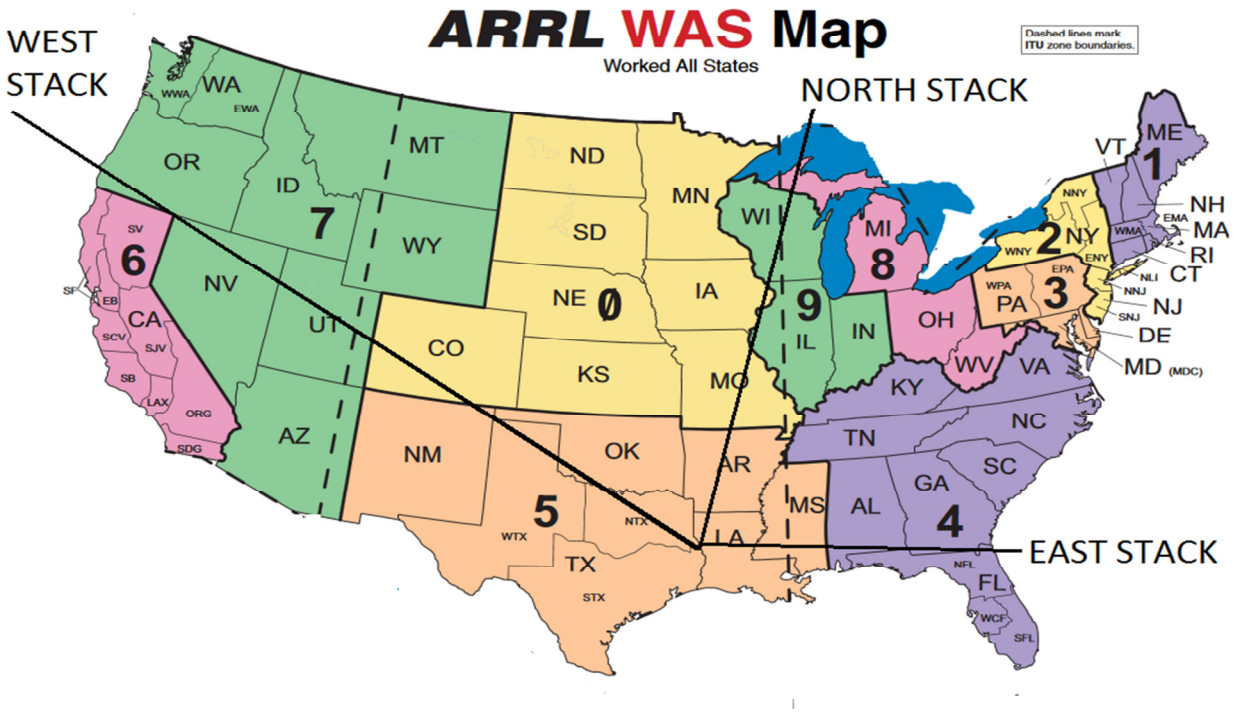
After learning of Dave's antenna, I put up LVAs at the K5QE contest station for 2M and for 432. In order to cover all of TX and OK, I had to put up two of them. The first is pointed at about 230deg(San Antonio) and the second at 310deg(Dallas). We have used these antennas successfully for several years. If you hear a station, just switch back and forth between the Left LVA and the Right LVA. Work him on whichever he sounds best. As a friend once told me, "Nothing outruns a switch".

The LVA concept was so successful for 2M and 432, that I wanted to implement the same ideas for 6M. A friend in the area, Mike-W5UC(now SK) was playing around

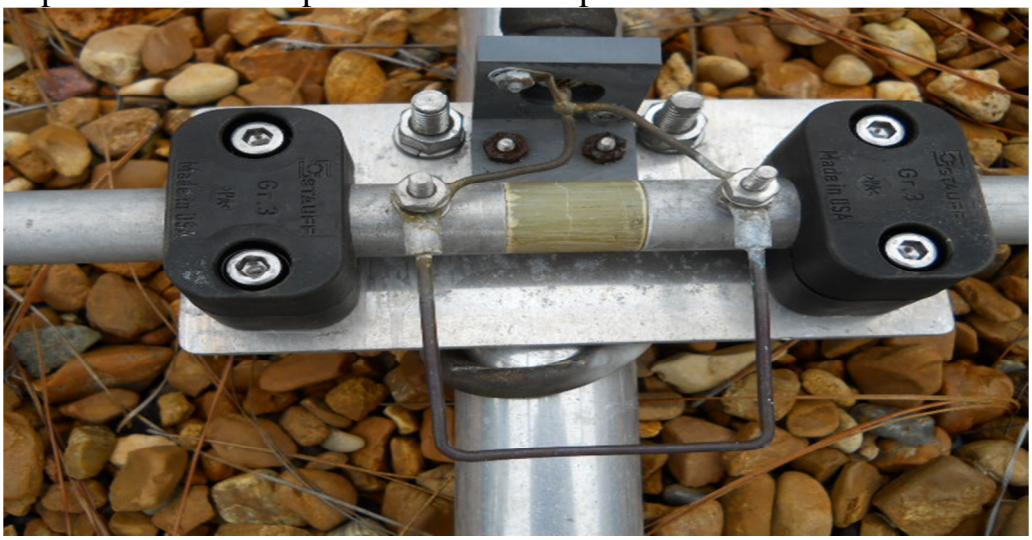
with EZ-NEC and so I challenged him to create a design for a 3el 6M beam that would be easy to rear mount off a tower leg. What we came up with was a nice, simple 3el design which was easy to build. We built 12 of them(three quad-stacks) and placed three different stacks on convenient tower legs. The antennas were placed at 20ft, 30ft, 40ft, and 50ft, giving an effective array height of 35ft. Note the Phillystran trusses and the bottom of the 432 LVA on the right hand tower. Here is a pic of the western stack.

A single 3el beam has a 3db beamwidth of approximately 60deg and a 10db beamwidth of about 110deg. A quad-stack of these beams has a 58deg beamwidth with a 10db beamwidth of about 110deg at 7deg EL. The gain of the stack is 18dbi+ = 16dbd which is equivalent to one of the big M2 6M9KHW antennas which costs $1000+, are big, heavy, and unwieldy. We erected 3 of the quad-stacks to achieve this pattern. SEE BELOW.

Construction details are simple. All elements have a 6ft length of 3/4" Al tubing(.058" wall thickness) at the center and the element tips are 5/8" Al tubing(to correct length). The Director is 116" long, the Driven element is a split dipole with a hairpin match. The length of the DE is 109.25", while the length of D1 is 107.75". Spacing between the Reflector and the DE is 29" while the spacing from the DE to D1 is 40". The hairpin is 2" wide and 1.875" long, made from #14 bare Cu wire. Feed is direct 50Ω, baluns are optional. The boom is just a bit less than 6ft long, but for rear mounting, you will need about 20" more for the tower mounting plates. We used 1.5" Al tubing, but you can use just about anything that you have laying around.



Matching is straightforward, since we have 4 antennas to match. We can just use two quarter wavelengths of 50Ω coax and 3 T-connectors. It works best if the T-connectors are all Female. From the end T-connectors, just use equal lengths of 50Ω coax to the antenna feedpoints. Here is a picture of our feedpoint construction.



Note that the coax connector is mounted on an insulator block. I wanted to use coax connectors so that they could be properly waterproofed. Just splitting the coax to the shield and the center conductor, invariably gets water in the coax. Note the center insulator...approximately 1" long. Obviously, the center insulator has to extend into the inside of the two elements to give mechanical strength and stability. The black clamps are Stoff clamps that are used by the hydraulics industry and are cheap.

It should be made clear, that any decent 3el beam will work for this concept, if you can

rear mount it to your tower. You can use M2 6M3s or some other antenna that you home brew. Cost on these antennas is less than $100 each, even if you buy everything new.

The LVA concept is well proven at this point and should provide a large boost to your contesting scores, as you don't have to spend time rotating antennas back and forth trying to “find” that weak one. TRY IT, YOU WILL LIKE IT!!

73 Marshall K5QE