
Stacked Antennas for 6m

Paul Simons, G4CCZ

During the last sunspot cycles I used a pair of 7 element Create antennas very successfully, but I took them down a few years ago to make way for a single 7 element M2JHV antenna plus different beams for the HF bands (KT-34, AW-3S). I recently decided to replace the HF antennas with a single SteppIR beam which left space to put up a stacked pair of 7 element JHV antennas. Rather than installing the antennas with a traditional phasing harness, I decided to adopt a more flexible approach and use a Stackmatch II from Array Solutions together with their 180 degree switchable phase shifter. Full specifications of these products can be found on the www.arrayolutions.com website. The antennas are mounted on top of my 80 foot crank up Versatower.

The first challenge was to assemble the 2nd antenna and make up the cabling between the antennas and the Stackmatch II. These lines can be any length as long as they are electrically equal in length allowing for the phase



The 180 degree phase shifting switch box.

shifter when out of circuit. The lines were made with Westflex 103 which has a similar performance to LDF-250 Heliax but is much more manageable.



The Stackmatch and Phase Shifter mounted on the tower.

The Array Solutions phase shifter is a special order single band model rather than their standard wideband 180 deg shifter, and requires an electrical $\frac{1}{2}$ wave at 50.110 (2.54m) of Westflex 103. To help with the installation I also purchased an AIM470 Antenna Analyser from Array

Solutions. Much has been written about the AIM4170 recently in QST and RadCom, but needless to say it is a very impressive and accurate piece of test equipment which I would recommend to anyone interested in experimenting with antennas. I used the 4170 to cut the 1/2 wave delay line and measure the performance of the individual antennas. I must add that Jay WØXB at Array Solutions has been extremely helpful with his support by email and phone.



Array Solution Stackmatch Control Box in the shack.

The Array Solutions Stack Match II allows me to remotely select either the top, bottom antenna or both antennas.

In addition the 180 degree phase shifting box gives the option of flipping one antenna 180 deg out of phase with the other by adding an electrical 1/2 wave of coax in one feed line. The antennas are mounted 5/8 wavelength apart on the top of the tower, and the bottom JHV is 4 feet above the SteppIR. When on 6m the SteppIR elements can be retracted so they have no effect on the 6m performance. The proximity of the bottom 6m beams appears to have little or no effect when using the SteppIR on 10 - 40m. The system is fed with LDF-450 Heliax.

The antennas have been in use now for a couple of months and I am very pleased with the performance. The first tests were conducted by monitoring the



The complete installation on top of the tower.

Cornwall beacon, GB3MCB. With my previous installation the Cornwall beacon was barely readable and typically in and out of the noise at my QTH (distance is 335 Km (208 miles)). With the stacked antennas in phase the beacon is now always audible and with the antennas out of phase I get similar results to the single antenna in the old setup.

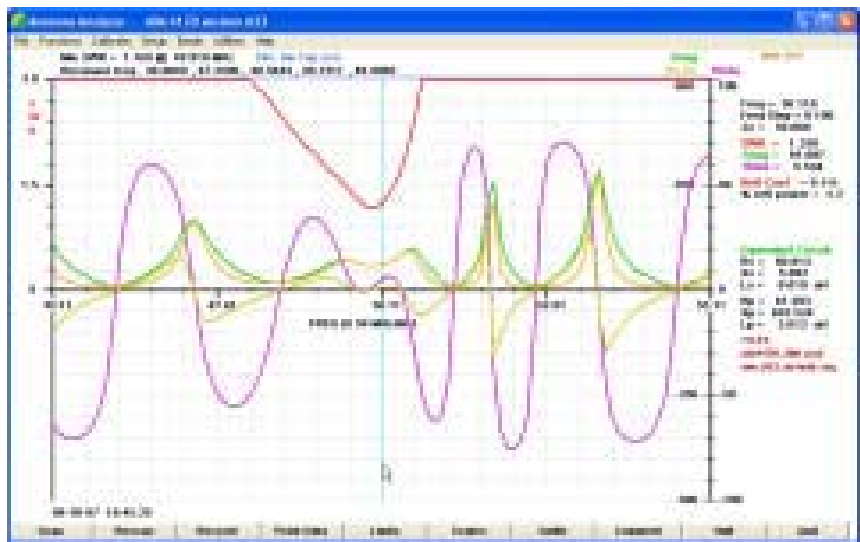
DX signals are far better on the pair in phase. Listening to the FY7THF beacon back in July the 'S' meter on my IC-7800 showed a good 2 'S' points difference between individual antennas and the pair. Interestingly the top antenna although only 13 feet above the lower gave better results on most DX signals than the lower antenna.

When listening to the Europeans on Sporadic E then the phase shifter really comes into its' own and makes a significant difference to signals. Short skip E signals from regions such as Italy are up to 10dB – 15dB stronger with the antennas out of phase.

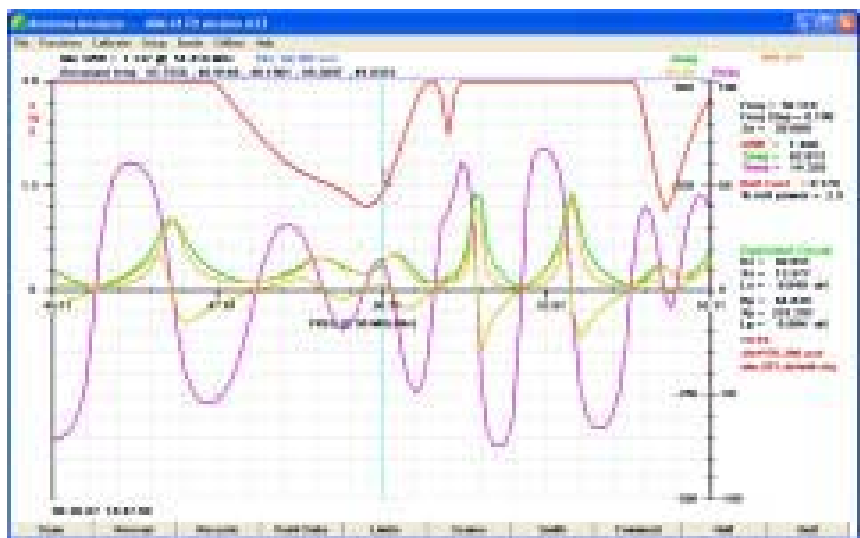
Unfortunately since the stacked antennas have been installed we have not had much in the way of long distance propagation into North America or the Caribbean to prove how well they really perform at pulling out the DX. However from the results so far, I have no doubt that I shall be in a good position to seek out the weak DX signals once the Magic

Bands opens up again. If anyone is interested in working both the short skip Es and long haul DX then I can thoroughly recommend the installation of the 180 degree phase shifter. You will be impressed with the results.

Editors Note: I was interested to read that Paul's M2 JHV antennas are resonating just below the band. I had similar results with my single JHV antenna, but this was eventually resolved by giving the driven element a good clean up as there was some whitening on the tubing at the T match.



Plots of the top antenna taken with the Array Solutions AIM4170.



Plots of the both antennas in phase.