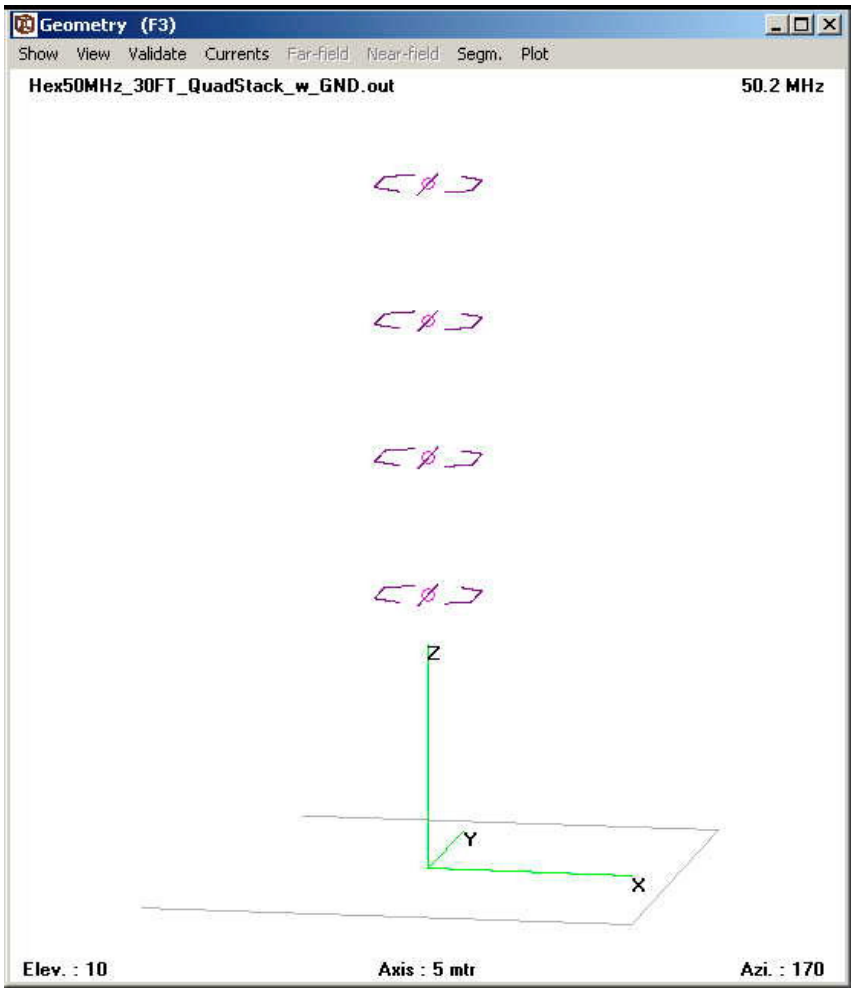
Put a Hex on the Magic Band Part 2 Stacking

A Three Element Hex Beam Stack for 50 MHz

Harry Johnson, WB3BEL
June 04 2007



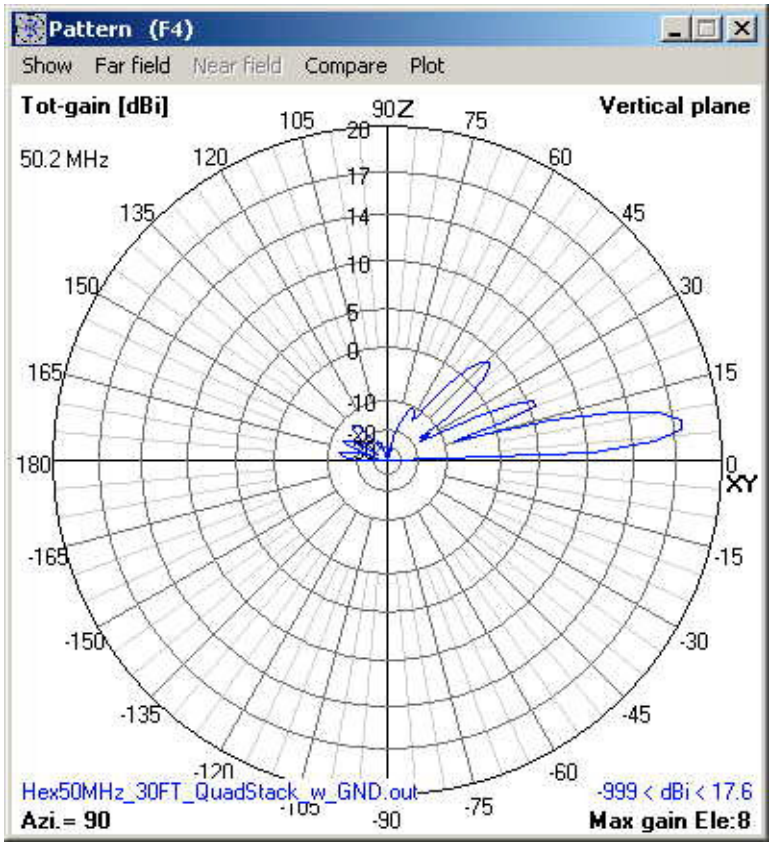
Design of a three element hex beam stack for 50 MHz (6 meters) Harry Johnson WB3BEL Copyright 2007.

Having built a lightweight three element hex beam for 50 MHz, I became interested to see how it would perform when stacked.

The previous figure shows the geometry of a 4 stack of 3 element six meter hex beams above real ground as modeled in 4NEC2. The lower antenna is at 20 feet elevation above ground. The antennas are spaced every 10 feet. You can obtain slightly better performance with wider spacing, but I set a limit of 50 feet total height as something that could be implemented. I have not actually built this array, but I may. If I can get the antenna weight down, it is possible to use a single level of guys at the 20 or 30 foot level with lightweight mast for temporary field operation as long as the wind conditions are not too severe. The weight will be dominated by the mast and so will the wind load. Simulations were performed with ideal sources of equal amplitude at each of the antennas in the array. Obviously there will be some losses in the power splitter and feedlines that does not appear in this simulation.

Figure 1 shows that the ground enhanced gain is 17.6 dBi and the pattern is exceptionally clean. (the element dimensions were tuned to obtain optimum performance at this stack spacing). If low angle radiation is desired with a wide azimuth pattern as would be ideal under dxpedition conditions, then this antenna array looks very promising.

Figure 1



The three stack also looks tantalizing with spacing as small as 9 feet between antennas if 38 feet is the highest mast desired 16.6 dBi gain over ground may be realized. The lowest antenna is at 20 feet and there are antennas at 29 and 38 feet.

If additional spacing up to about 15 feet can be tolerated between antennas in the array, higher gains may be realized without too much loss in side-lobe performance.

73, and I hope to see you on six meters soon!

Harry Johnson
WB3BEL