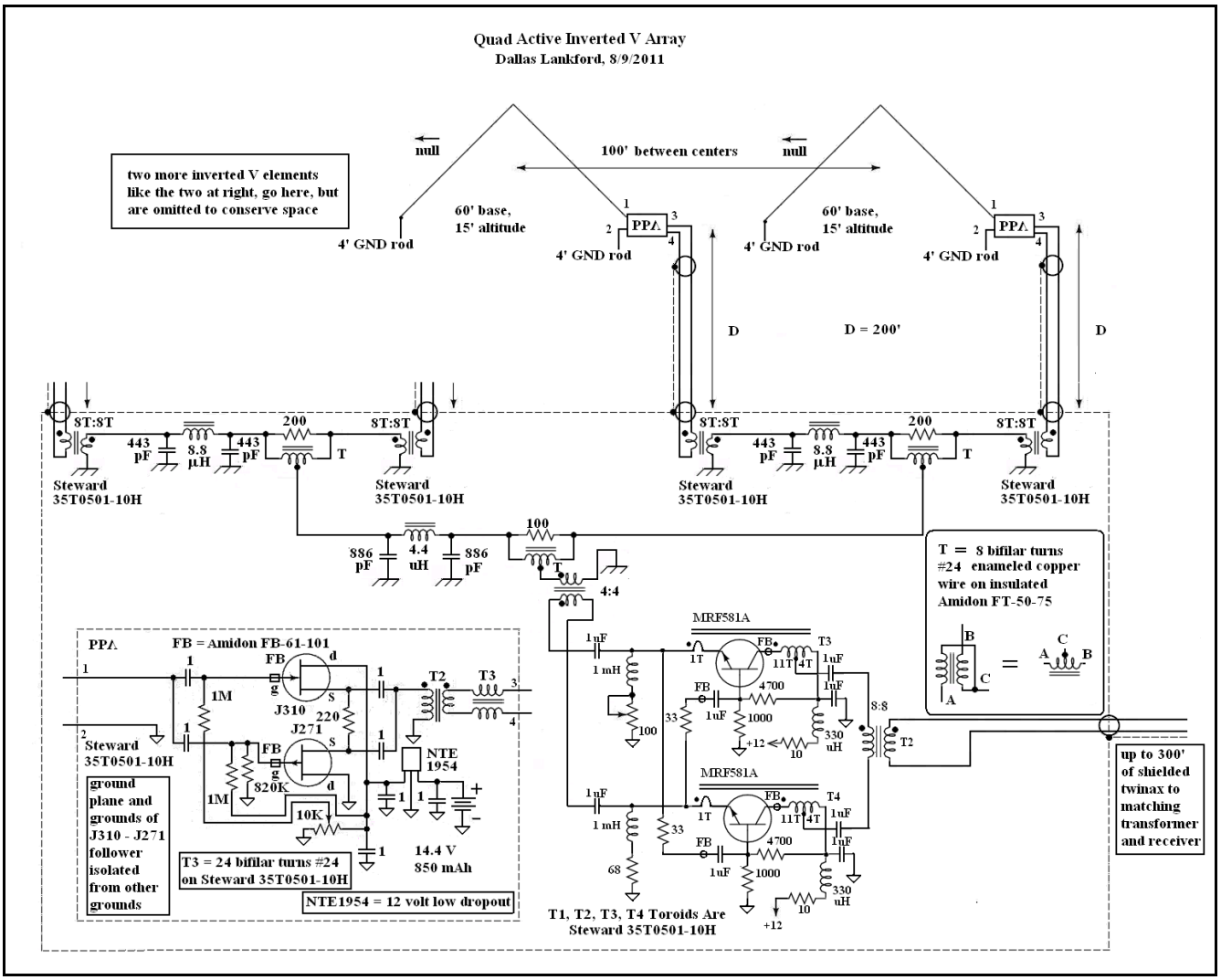
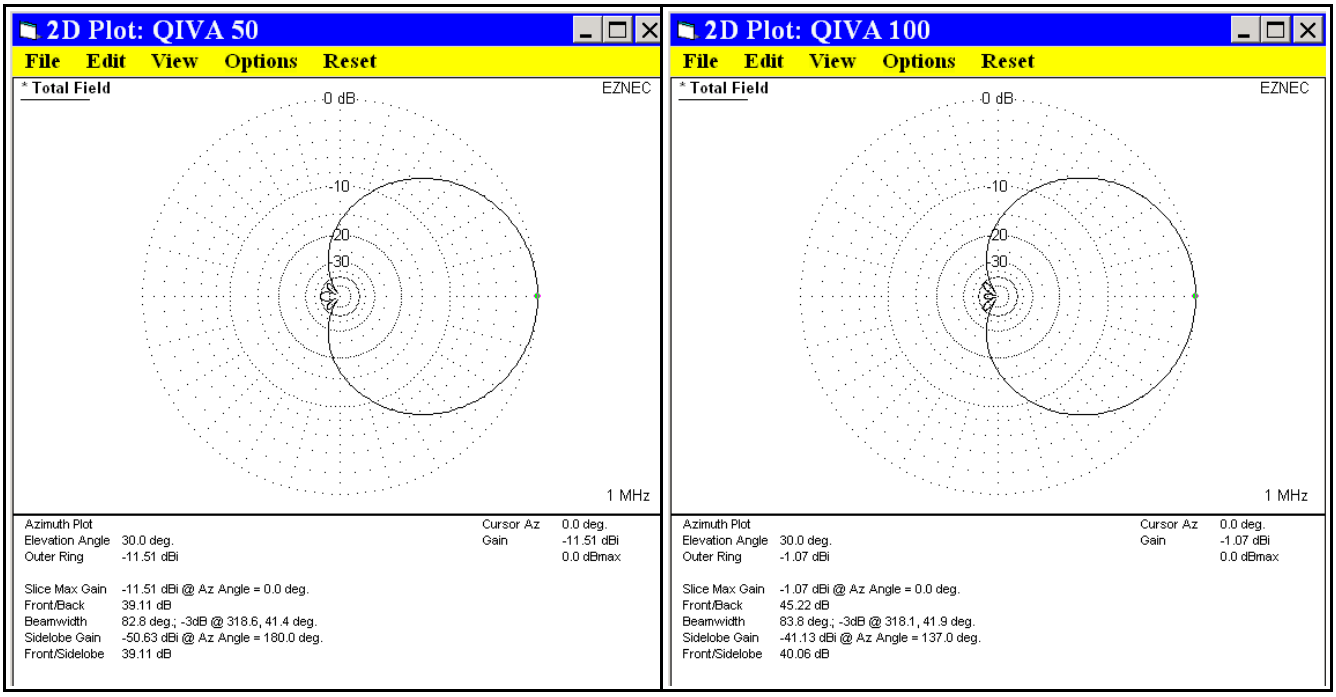
Quad Active Inverted V Arrays

Dallas Lankford, 7/18/2011, rev. 8/9/2011



Quad active inverted V arrays were discovered while simulating staggered offset grounded terminated beverage (and BOG) and ground terminated delta arrays with EZNEZ. Staggered offset ground terminated beverage (and BOG) arrays were simulated first (for no other reason than curiosity) where it was discovered that short ground terminated staggered offset beverage (and BOG) arrays have narrower beam widths than much longer beverage (and BOG) arrays. Ground terminated delta arrays did not have narrower beam widths, but did have increased signal output levels compared to delta flag and delta loop arrays, which in principal improve their weak signal performance. These simulations led in turn to inverted V array (without ground termination) simulations with further increased signal output levels. The elimination of the ground termination in the case of the inverted V makes the inverted V more ground independent than the ground terminated delta. In the case of the inverted V (and ground terminated delta) high performance FET followers are required at the antenna elements for impedance matching. The schematic at the beginning of this article above is for a 100 foot spaced quad active inverted V array. A schematic of a hyper-supercharged variant is given at the end of this article; the higher signal level output which it provides is probably not necessary. A 50 foot spaced QIVA (with 30 foot base antenna elements) has about 10 dB less output than the 100 foot spaced QIVA (according to EZNEC) and requires only 165 feet of linear space. At night the 100 foot spaced hyper-supercharged QIVA has such high signal level output that it can easily overload Perseus when too much preamp gain precedes Perseus and without

a 3 MHz low pass filter (these arrays are intended for MW use only, although arrays smaller antenna elements and closer spacing would be suitable for SW bands). Below are EZNEC graphic simulations of the 50 and 100 QIVA's; patterns are similar from one end of the MW band to the other.



A dual 100' spaced active hyper-supercharged inverted V array was tested and signal output of the dual inverted V was found to be about 9 dB greater than the corresponding dual 100' spaced active hyper-supercharged delta flag array, which is in agreement with the EZNEC prediction. The null of the dual inverted V is not nearly as good as the dual delta flag, again as EZNEC predicted. However, the dual inverted V was never recommended as a state of the art splatter reducing MW antenna array. It is the quad inverted V which is a state of the art splatter reducing MW antenna array. The dual array tests and comparisons were made only to verify EZNEC predictions for the dual arrays in order to have sufficient confidence to proceed with quad inverted V tests and measurements. Such tests will probably not be made until later in the year or next year due to upcoming tests of the dual active hyper-supercharged delta flag at a remote location.

The PPΛ FET followers may be replaced with 3:1 turns ratio broadband step down transformers for about 9 dB loss. This is still about 10 dB greater signal output than the original QDFA and should have a considerably lower thermal noise floor than the original QDFA.

Neither the QIVA 50 nor the QIVA 100 has been implemented or tested. Initially I was inclined to believe that the QIVA 50 and QIVA 100 will perform as predicted by EZNEC, but I had forgotten about the infamous quad loop arrays. So maybe not. We shall eventually see. Even if they don't, they may be suitable for pre sunset and post sunrise reception because of their low thermal noise and higher signal level outputs.

Ground Termination

It was just discovered (8/8/2011) that without ground termination, both the QIVA 50 and QIVA 100 have negative resistance sources according to EZNEC simulations, and thus mutual impedance problems. That implies the phases required to generate the patterns above will ***not*** be the the phases predicted by EZNEC above unless the inverted V antenna elements are ground terminated. All of the quad active inverted V array antenna elements ***must*** be ground terminated to have excellent splatter reduction throughout the entire MW band.

Quad Hyper-supercharged Active Inverted V Array

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