Rethinking 144MHz EME Yagi Arrays

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For many years, the ranking of antennas and their stacking distances as detailed in the G/T tables compiled by Lionel Edwards, VE7BQH, has remained the de-facto standard for many amateurs. The G/T calculations are based upon ground and sky temperature assumptions and the pattern of the antenna. The calculations are based upon 'optimum' conditions for 144MHz EME which only exist for a few days each month, whereas 144MHz EME activity now occurs on 24 days out of each 28-day lunar cycle. This includes days when the sun is close to the moon, a significant noise source. Unfortunately, today, most amateurs active on 144MHz EME are surrounded by many large terrestrial noise sources which are often picked up in the antenna side lobes and can add to the antenna noise temperature. Our contention is that when stacking multiple Yagi arrays that the side lobe suppression should be -14dB or greater compared with the -9 to -11dB that usually results from optimising G/T using the VE7BQH method.

The authors will present NEC4 modelling results for increased side lobe suppression where the ranking of different Yagi designs differs from the listing in the VE7BQH tables. They will also show some practical results where terrestrial noise in the first vertical side lobes has been almost eliminated.

On 144MHz EME most amateurs, the authors included, have used varieties of 'H' shaped stacking frames. This design often results in the array being in balance only at one angle of elevation and elevation rotators being put under considerable strain. A new mechanical design is presented which maintains balance at all elevations and is well suited to X-pol Yagi arrays. This mechanical design also includes a robust screw-jack elevation system with an analogue voltage output sensor for elevation readout. Apart from commercial bearings and U-bolts all mechanical parts were made from sheet materials in a garage workshop with a pillar drill.