Antennas

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I RECEIVED a further e-mail from Peter Martinez, G3PLX, regarding the EWE antenna discussed in May 'Antennas'. He writes "Imagine a 1 metre cube which is metallised on the top and bottom surfaces. Between the centre of one edge of the top face and the corresponding point on the bottom face, connect a 377Ω resistor. A signal generator is then connected to the centres of the opposite faces, which is set to give an output of 1V. Now, stand in the centre of the cube with an E-field and an H-field probe. The E field here is clearly 1 volt per metre. Because of the presence of the 377Ω resistor at one edge, you can work out the current (=1 / 377A) flowing 'around' you and deduce the H field, which is exactly in the 377Ω ratio. It follows that the field at the centre of the cube is a true free-space TEM field (transverse electromagnetic field). Furthermore, it is also everywhere else (since it gets everywhere else by radiating from the centre). This antenna has no near field region. What I have described is known in the trade as a TEM cell and is used for EMC immunity measurements, but it is a crossed field antenna in that it intrinsically generates E and H in the 'right' ratio."

However, it is not a transmitting antenna. It has a calculated gain of around -15dBi on 28MHz and -50dBi on 3.5MHz.

W4RNL

AN E-MAIL has been received from L B Cebik, W4RNL, who designed the Moxon rectangle, described in the March 'Antennas'. He writes: "I thought I might add some quick notes about my design aims. Initially, I strove for versions of the antenna with the best performance combined with a 50Ω feedpoint impedance for direct feed (with the usual choke for suppression of currents on the braid of the coax). This work culminated in a *GW BASIC* utility for designing rectangles with only two input variables - the element diameter and the design frequency (which I usually recommend to be about 1/3 up from the bottom of the desired band, given the manner in which performance and SWR curves go). This program is included in *HAMCALC* by VE3ERP, and a model-by-equation model for NEC-Win Plus is available at the NSI web site [1]. The benefit of the equation-based model is that one can run the emergent model and obtain a full profile of projected performance. The relevant item describing the program is at my site [2].

"I have used VHF and UHF Moxon rectangles as well as HF varieties. Vertically, their null is an almost ideal direction finder for 'foxhunts'. Or we can use three at equal angles and poll them for a repeater receiving antenna. Pointed straight up, we can turnstile a pair for a pattern with a broad dome of very nearly even gain above about 30° elevation. To simplify turnstiling, I redeveloped the design program, striving for about 95Ω feedpoint impedance (RG-62 becomes the phaseline and the result is a direct 50Ω feed from the turnstile array). The article shows the revised regression-based values for the equation-based model, which one can also plug into the *GW BASIC* program in place of the values for 50Ω versions, see [3]. As your March column shows, there is slightly less peak forward gain in the squarer 95Ω rectangle but, in satellite use, the dome is equal to the 50Ω version. However, the program itself is perfectly general (in both 50Ω and 95Ω versions), yielding buildable designs from very thin wire to quite fat tubing from the AM broadcast band through to 900MHz or so - where we should be using PCB construction."

THE 'EFA' ANTENNA

IF YOU ARE a 160m or 80m operator, with an average-size garden, the EFA (Elevated Feed Antenna) described by Colin Draper, G3TSK, may be of interest to you. The layout is shown in **Fig 1**. It has a feedpoint at resonance of around 50Ω for a fair portion of the bands, so an ATU is not required.

The antenna is fed against earth, so a good RF earth is required for efficient operation. It also has a single buried insulated counterpoise. High voltages can be generated at the ends of the ground wire, (even with modest power levels), so the wire is insulated and taped at the end.

The antenna can be used with just the RF earth and no counterpoise, but the minimum SWR is about 1.4:1.

The loading coil is wound on a 21.5mm diameter round former, 254mm long. The windings consist of 292 turns of 21 or 22SWG enamelled copper wire (close wound), occupying a length of 240mm for the main body of the coil, with four turns at the high end occupying 10mm and three turns at the low end (nearest to the feedpoint) occupying 6mm. The winding is covered with shellac and the former and coil are then wrapped with 'stretch rubber tape' layered to give protection against the weather. The measured inductance using a home-brew inductance meter was approximately 150 H.

The EFA is adjusted for resonance using a dip meter coupled into a two-turn link at the feed point, altering the lengths shown in Fig 1. ♦

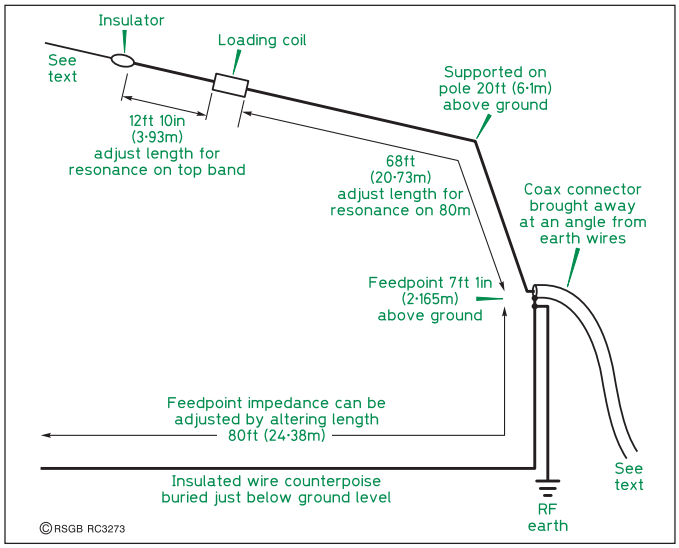

Fig 1: The EFA antenna. The antenna feeder is coiled several times at ground level to choke off any antenna current that may be present on the feeder.

WWW.

[1] NEC Win Plus www.nittany-scientific.com
[2] Equation-based model www.cebik.com/moxgen.html
[3] Use of [2] www.cebik.com/ms2.html

THE 50 - 50 JUBILEE ANTENNA COMPETITION

I AM OFTEN ASKED, usually by those who live in restricted locations, if certain commercial antenna products will solve their antenna problems. In many cases, a simple wire antenna suitably placed and fed will outperform most of them, even in the most restricted of locations. I propose the following experiment in the form of a competition to illustrate this.

The competition is to construct the cheapest of all antennas - a 50ft piece of wire. The objective is to see how many stations you can work using the 50ft wire, over a period of 50 days from 1 September to 20 October 2002. You can use any band and any mode, although only one station on any band or any mode counts towards the total. Each DXCC country that you work will give a multiplier of 1 (ie 10 countries give a multiplier of 10). Maximum transmit power is 100W (or 1W ERP on 136kHz). There is a QRP section for stations with a maximum transmit power of 5W.

Because these are normal QSOs, there is no need to have special serial numbers or contest identifiers. However, if you *do* enter a contest during the test period, these QSOs count provided they meet the conditions already described.

The antenna can be constructed from wire, and be of any diameter up to 2mm (excluding insulation). The wire can be orientated in any direction, folded to fit any space, and even wound as a continuously-loaded antenna on, say, a fibreglass rod. The maximum height of any part of the wire must not exceed 10m. The wire can be fed at any point using any length of feeder, but the feeder must not be part of the radiating system.

If the wire is end-fed then elevated radial(s) cannot be used as they could be deemed to be part of a wire longer than 50ft. Ground radials are OK because they are part of the RF ground system.

If the wire is end-fed from a first floor shack, the shack RF ground system may be used.

You are permitted to re-orientate the antenna during the test period as part of the experimental process.

If you participate, please write and describe your findings as well as the results. It is hoped that these will form part of an article on the competition. Book prizes will be awarded for the highest scores in each category.

Send entries to 'Peter Dodd "Antennas" Competition', Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE (no e-mail entries accepted), to arrive by **31 October**. Please do not send any other correspondence with your entry.