RADCOM TECHNICAL FEATURE

Hamtenna With the Lot

by Ron Holmes, VK5VH

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IF YOUR FAVOURITE antenna is the inverted Vee - this has a double helping. If you like phased verticals, there are four of them: and if you go for 80 metre loops, here is another version - all in one antenna! What is more, it fits into a normal size backyard, is only 10m high, and you feed it with 50Ω coax.

Performance wise, a number of tests with a G5RV as reference antenna, and immediate switching facilities, are the basis of a claim that on 80 metres it is superior, on 40 it compares satisfactorily, being better in some directions and worse in others, while on 20 metres the great majority of reports surprised me by indicating two S points improvement, even in directions favoured by the G5RV.

The 'Hamtenna' is similar to the Stepped Loop Antenna of VK5XI (*Amateur Radio*, June '86) but has some significant differences (See **Fig 1**). At each end is an inverted Vee 10 metres high at the apex and 3 metres high at the ends. The Vees are approximately 14 metres apart. In my case the distance between the pergola and the shed.

On the permapine poles to which the bottom ends of the Vees are anchored are erected aluminium verticals, 2.75 metres (9 feet) long. The tops of these are joined with horizontal wires 14.5 metres long, ie the verticals are 14.5 metres apart.

Without a calculator you can work out that 2.75 twice, plus 14.5, makes 20 metres: so that along each side of the loop we have, on 20 metres, a pair of quarter wave verticals. The top 2.25 metres of each is bent over, and they are joined to each other by 10 metres of wire. The ends of the Vees are joined to the bases of the verticals.

The total length of the loop is about 84 metres and it is fed at the top of the most convenient Vee. In my case this is at the Western end. My block runs approximately East/West but the back of it is a little North of East.

I use 70Ω coax to a transmatch, but tried it with a 4 to 1 balun and 50Ω coax, then with 50Ω coax direct. Without a tuner the SWR on the direct 50Ω coax was as good as with the 4 to 1 balun on the five regular bands. Also it compared favourably with the G5RV SWR figures.

GUYS IN THE BACKYARD

A WORD OR TWO about the engineering. My backyard is 18 metres (60 feet) wide and about 16 metres deep (52 feet). The rear Vee is a couple of metres in from the back fence to allow room for guying. I use aluminium poles which require only light guys and can be put up and down on my own. The main guys are the legs of the inverted Vees which are tied to insulated crew eyes on the permapine posts fixed to the fence. The light verticals need only 'invisible' nylon fishing line to put a strain on the wire joining their tops.

The base of each vertical is insulated with PVC tubing and fixed to the post with a couple of saddle brackets. Wires are well tinned at the ends and fixed to the aluminium with PK screws. It might be noted that the whole antenna is fitted in a space which will take only one leg of a G5RV.

The exceptionally good results on 20 metres possibly stem from the fact that we have two pairs of 'in phase' vertical sections at the diagonal corners (**Fig 2**). The vertical sections are indicated by the heavy lines on the dotted circle which represents the total loop. Note the end of each labelled 'base'. The current flow and direction at 20 metres indicates that the current is flowing 'up' in vertical sections 1 and 3 while it is flowing 'down' in sections 2 and 4. Note also that the vertical sections come at points where there is maximum current.

The radiation pattern of the antenna is of course very complicated, but on 20, 40 and 80 it appears to have a good all round operational area. I have made comparatively few tests on 10 and 15, but it does work on those bands.

Experience on 20 metres suggests that the radiation pattern tends to be a cloverleaf formation. My antenna runs East/West and I get good propagation to Europe long path (SE) and USA short path (NE). Due north, ie off the side of the antenna, signals were scarcer, especially on the original lower arrangement. This was overcome by running a 20m dipole between the masts to cover the Northern null.

It would seem that the size of the antenna could be adapted to whatever space you have available, so long as the lengths of the

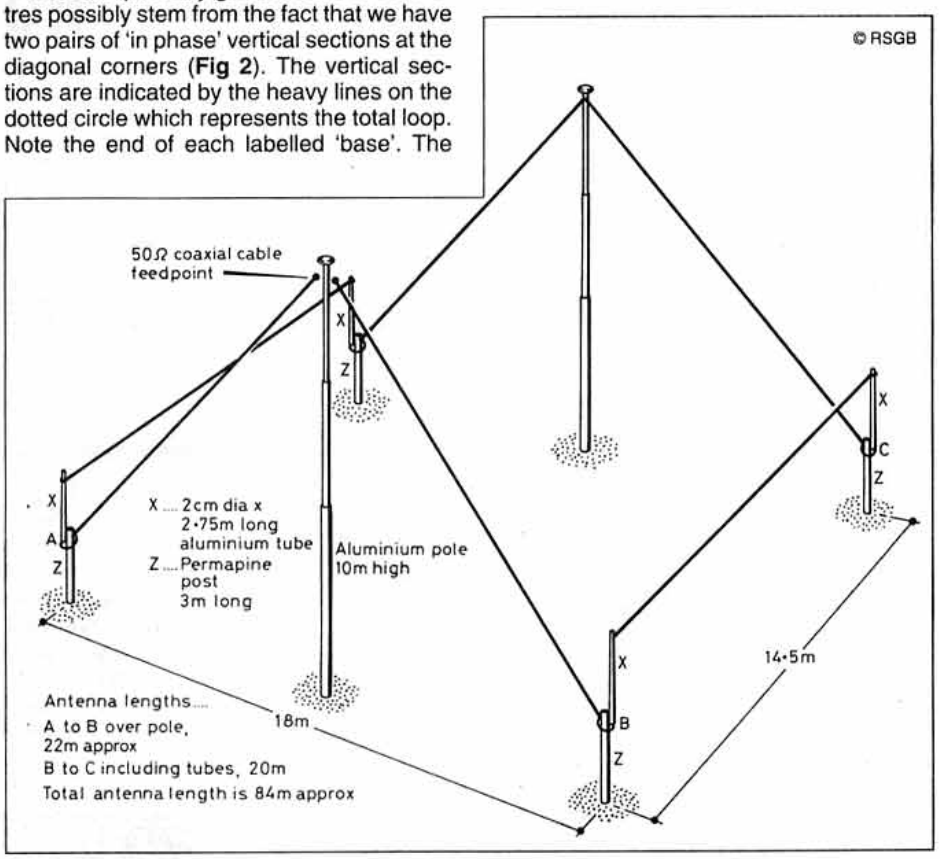

Fig 1: This antenna has current anti-nodes at its highest points, for maximum effectiveness.

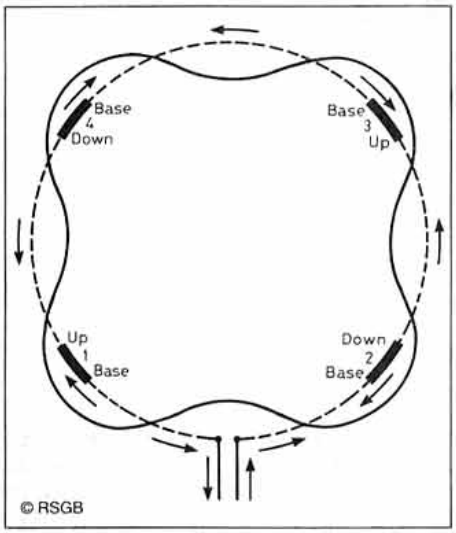

Fig 2: Current distribution around the antenna.

side and end sections each total approximately 20 metres.

VARIANTS OF THE ANTENNA

I HAVE TRIED IT without the inverted Vees by running the wires from the base of the verticals straight across the yard lifted only to a height sufficient to clear obstacles. It works nearly as well on 20m; down about half an S-point on average. It may be necessary to fold a portion of the wire each side of the feed point to maintain the full 80 metre resonance. Another alternative would be to make the verticals 5m long and the space between them along the side only 10m. I have not tried this but it could work even better on some bands. If you only have one mast or one high point an inverted Vee could be used at that end and straight across at the other.

It could be convenient to feed it at one corner. The main reason for feeding at the top of the inverted Vee is to provide maximum current at the highest points for the 80 metre bands. It is worth noting that at either of these points the feed line can be strapped to the mast (if my type construction is followed) or to the short pole in any case. Thus the problem of a swinging piece of coax is avoided. Heavy grade coax can also be used more easily. If desired, a balun can be used at the feed point. I have tried both 1 to 1 and 4 to 1 without noting much difference in the result.

Since first erecting the antenna some 3 years ago I have made a couple of improvements to the engineering side. Instead of fixing the verticals directly to the posts I have used a 2 metre (6ft 6in) length of 2in by 1in Oregon (pine) fixed as in **Fig 3** with the aluminium verticals held to these by hose clamps. This not only raises the height of the side sections of the antenna but also makes it easier to lower the verticals to work on them.

This is an all band antenna and will tune up on the WARC bands as well using my transmatch. If you don't have an ATU the SWR is low on all the harmonic bands with the arrangement as shown. While this antenna is more complicated than the '5RV, it would appear to work as well, or better, and in many locations could be as easy to build, and easier to fit in the space available. Antennas are like motor cars - there is no best car. It is a question of what will best do what you want: what you can afford; and what will fit in your car port. For an all-band, omnidirectional antenna, to fit the average back yard, the 'Hamtenna ' is worth trying!

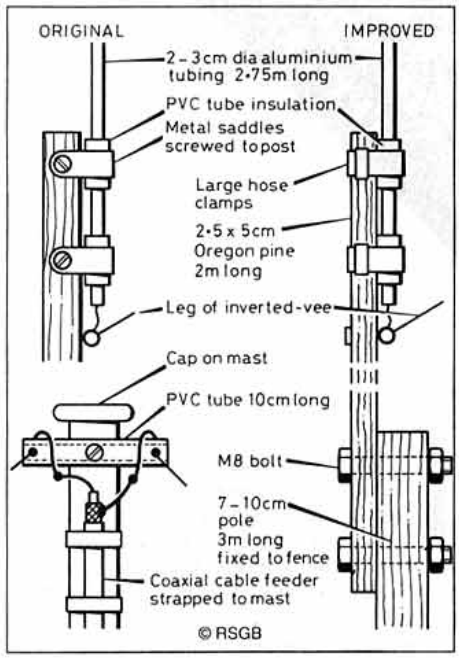

Fig 3: Detail of the coaxial feed point, and the four side posts.