Antenna Workshop

Roger Cooke G3LDI, says that a wire antenna may be better than you think. Read on to see his reasons why!

A good friend of mine, now sadly a Silent Key, once said that to me "the problem with this hobby is that you need antennas". And that statement has stuck in my mind! He was, and still is, correct of course, and for antennas read 'the higher and bigger the better'. However, if you don't have a place with high towers and huge beams, but you do have a few trees around, there are possibilities. Or, if you can put up a pole or two, perhaps taking a look at some wire antennas with gain would help!

Many new operators generally go for the ubiquitous G5RV as their first wire antenna, as it can be used on several bands. However, now is the time, with the sunspots at minimum, to try other antennas if you wish to increase your country score on the h.f. bands. You can experiment with wire antennas quite cheaply and with surprising results. So, let's have a look at a few wire antennas and see if there is one or more that you could use. Bear in mind though, that ideally, you'll need two supports, either trees or poles, around 10-15m high.

The antenna I'll start with is the Double Extended Zepp. But you may ask, "what is a Zepp anyway"? Well, the single Zepp (short for Zeppelin) antenna, is any resonant length antenna that is end-fed by ladder line. A Double Zepp antenna is a centre-fed λ/2 antenna. The extended double Zepp antenna is a dipole type antenna consisting of two collinear 0.64λ elements fed in phase, as shown in **Fig. 1**. This double extended version provides 3dB gain over a dipole (dBd) on the band it's designed for. Each element, or leg, is about 5λ/8 long.

To work on 3.5MHz, with the extended Zepp, you'd need a fairly large garden but for operation on 7MHz, the leg length is a more manageable 25.7m. Feeding the antennas with open wire feeder of around 450Ω (with a tuning unit) will provide multi-band use too.

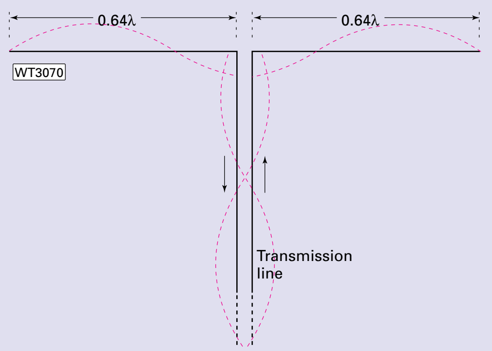

Fig. 1: The simplified lay-out of an extended double Zepp antenna. With the appropriate current levels.

Collinear Array

The simple collinear antenna array is a very effective antenna for the l.f. bands. However, you will definitely need more garden space for this one. Two collinear λ/2 antennas in line are shown in **Fig. 2**, a pairing that will produce gain when they're separated by λ/2. The elements should be fed with equal lengths of transmission lines, when a gain of 3.3dBd can be realised. In **Fig. 3**, a three element pre-cut array for 7MHz operation is shown. This antenna is fed with 300Ω ribbon

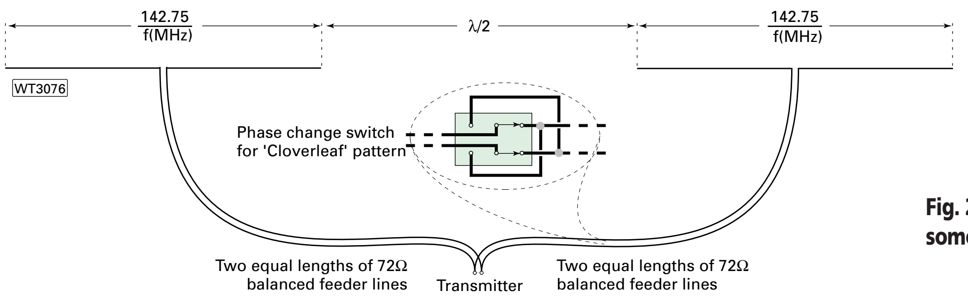

Fig. 2: By in-line spacing two λ/2 antenna by λ/2, some directivity and gain can be achieved.

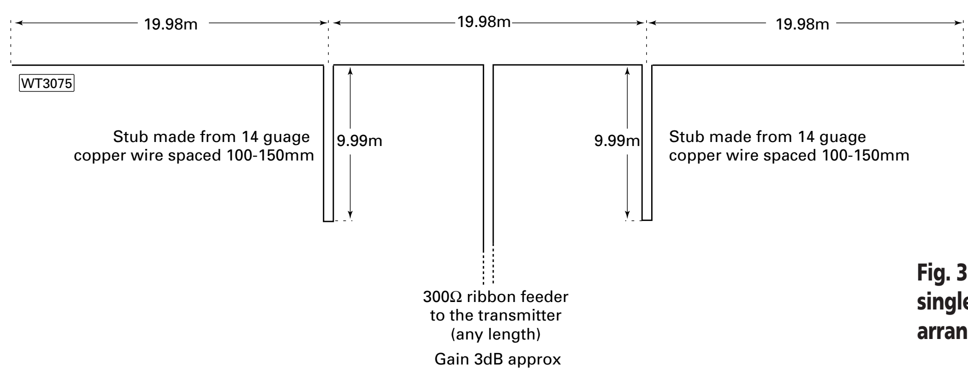

Fig. 3: A modification of in-line spacing allows a single twin feeder to be used, unlike the arrangement of Fig. 2.

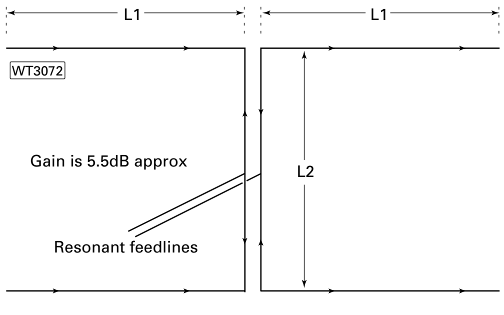

Fig. 4: The Lazy-H antenna fed in the middle of the pair.

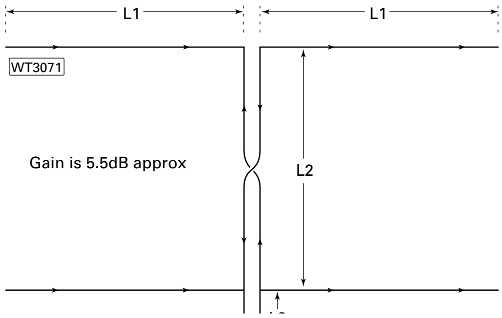

Fig. 5: When using a λ/4 stub to feed the Lazy-H, then the upper element is fed via crossed-over feeder.

feeder, and may be matched to a 50Ω output from the transmitter by means of a 4:1 balun at the shack end of the twin feeder. The antenna again has roughly 3.2dBd gain and a beam width of 40° at the half-power points.

There are numerous variations on the theme of collinear arrays, including using 'stacking' to achieve even higher gains. Antennas such as the Franklin antenna, which uses two or more λ/2 radiating sections separated by resonant quarter-wave tuning stubs, to produce the necessary phase reversal between sections, would give a gain of 4.5dBd. But, such an array would require almost 100m of garden space for the lower h.f. bands.

Lazy-H antenna

The stacked Lazy-H antenna, however, only requires around 42.7m length for operation on 7MHz. And you'd need around 22m of height. However, with only a couple of 12m supports, this antenna is more suited to operation on 14MHz. It also provides a useful gain of 5.5dBd. The Lazy-H can be fed at the centre of the phasing section, **Fig. 4**, or at the bottom **Fig. 5**. When it's fed at the bottom, the phasing section must be twisted through 180°.

Looking at the next few figures, you can see that the higher the gain, the larger the garden space you're going to need. In my youth, antennas such as the Sterba Curtain or Rhombic were just dreams, something to read about and put on the wish list. However, the gain from a large amount of wire can exceed a beam, so don't discard the idea.

Wire antennas may look complex to construct but actually they're not, although some free space is required to lay them out to make the necessary measurements. They're fun to experiment with, as they are relatively cheap to install and, the gains obtained can be quite respectable. However, their only problem is that you cannot rotate them, so try to ensure that the direction of maximum gain is the one you want.

Maximum gain direction is, unfortunately, often determined by the size of your garden or the direction it runs, or both. If you're lucky enough to have a very large garden, you can have the best of both worlds, a rotating beam plus some directional wires. This can be an advantage in hunting for DX, contesting or nets, where you might wish to change directions fast and frequently.

The illustrations of **Fig. 6** show variants of one of the ultimate wire antennas, the Sterba Curtain. The illustrations show only basic arrangements, some installations have numerous elements producing huge gain figures, but these will be mainly commercial installations.

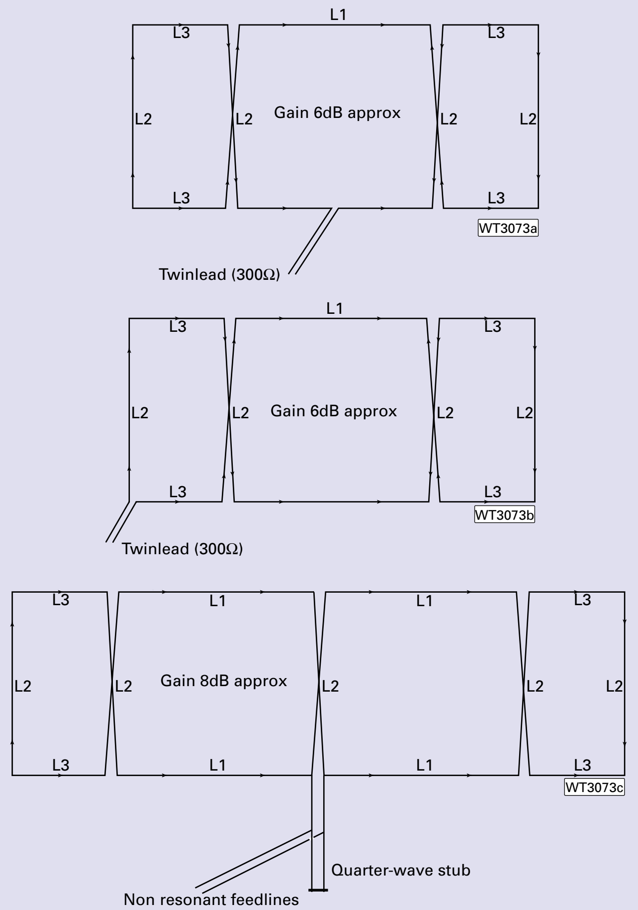

Fig. 6: Just a few combinations of the number of elements and feed arrangements for the Sterba Curtain antenna.

Should you wish to be adventurous, **Table 1** gives you some measurement and gain figures for the Lazy-H and Sterba Curtain antennas at several points throughout the h.f. and v.h.f. bands. Whatever wire you decide to put up, **do experiment** and I feel sure you'll gain a lot of enjoyment and satisfaction. **PW**

F (MHz)	L1 (m)	L2 (m)	L3 (m)
7.0	20.78	21.35	10.68
7.15	20.43	20.97	10.48
14.0	10.39	10.68	5.34
14.2	10.27	10.55	5.26
21.0	6.94	7.09	3.56
21.25	6.86	7.02	3.53
28.0	5.19	5.4	2.67
29.0	5.03	5.19	2.59
50.0	2.93	2.98	1.5
51.0	2.87	2.95	1.46
52.0	2.82	2.87	1.42
144.0	1.01	1.03	0.56
145.0	1.0	1.025	0.54
146.0	0.99	1.02	0.52

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Table 1: Some dimensions for Sterba Curtain and Lazy-H antennas on differing bands. Use this table with the illustrations of Fig.s 4, 5 and 6.