Radio Basics

This month in Radio Basics Rob G3XFD takes a look at antennas for the beginner, following feedback from readers at the Leicester Show. And it looks from his advice that a good antenna is the heart of success!

For the first time this year at the Leicester Show I was provided with a facility to meet readers. It came about because I was invited to provide a *PW* 'State of the Nation' talk at the event. The first talk on the Friday was reasonable for a first effort. However, the Saturday talk provided myself and other people working on the magazine with a great deal of feedback from the most important people of all the *PW* readers.

During the talk there were some interesting general questions directed at me as *PW* Editor! Later on though, some other questions and ideas came forward when readers joined me on the *PW* stand. A number of the people coming to chat were Radio Basics (RB) readers who were asking the same sort of questions, namely; "What's the best antennas to use with simpler home brewed equipment", and "how do I manage in a small garden"?

So, with the readers' questions and concerns in mind I've decided to devote a larger than usual RB slot entirely to antennas and associated projects.

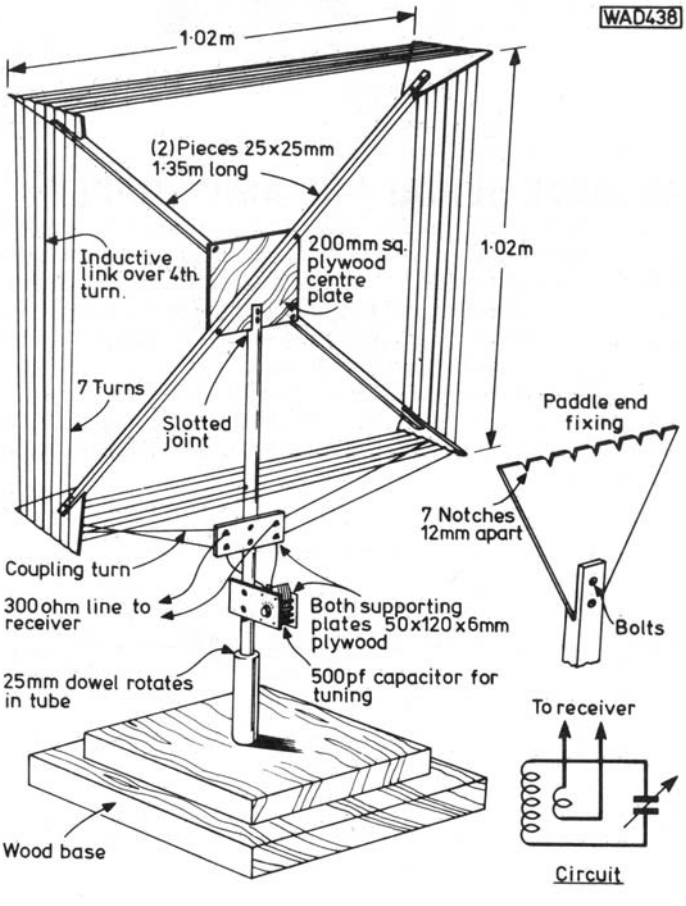


Fig. 1: The loop shown is one of the designs favoured by Charles Molloy G8BUS. The design (it features in the *Out of Thin Air* reprint) is for medium-wave DXing, but is easily re-scaleable for 1.8MHz and above (see text).

Big Antenna Secret?

If there is a big secret regarding high frequency (h.f.) antennas it has to be; "Put the greatest amount of wire you can into the air, as high as possible and as far always from buildings and electrical noise sources as you can"! The problem is that most of us can't do that every easily!

Even when I lived in the beautiful Hampshire Downlands northeast of Winchester, near Alresford I had problems! Yes, we were in the country and a G5RV antenna was no problem but due to the shape of our cottage garden the antenna ran parallel with overheard electrical cables feeding the local farm's dairy unit and grain driers. Both used high power three phase motor driven equipment!

Additionally, during the time my family and I lived in Wester Ross in the Scottish Highlands despite the fact our nearest neighbours were 200 metres away my antenna choices were restricted and we had the usual overhead line problems! However, despite these problems I managed quite well, as you can in your own situation! So, let's now look at some ideas to help get the best signal in and (if you're a transmitting Amateur) out of your main station.

Part Of The Problem

Part of the problem seemingly shared by a number of RB readers is that along with having fairly simple receivers, many live in small houses or flats with extremely difficult antenna restrictions. But despite these difficulties, I can assure readers they can be overcome in most situations

Some readers tell me they've used the TV antenna feed within their blocks of flats as an h.f. antenna. They've often achieved good results, but the more sensitive the receiver, the more likely you are to pick up the many spurious signals that seem to abound in amplified distribution systems! So, unless you have no alternative I suggest you avoid using anything other than your own wire antenna it will improve safety and reception.

One reader tells me he lives high up in a tower block. He using a lightweight 2m long cane (to take the antenna away from the side of the building) to permit a 6m length of wire to dangle from the end. Fed into his portable h.f. receiver via a good antenna tuner, the system provides good reception. Additionally, because of the constant breeze such buildings attract the wire blows in the wind and it's horizontal much of the time!

If you can have a short wire antenna in my opinion it's certainly the best, especially if you can get it clear from any building, wiring (with switch mode power supply interference and TV time base signals). Antennas of this type can be fed into an active pre selector unit. This can be made up from a simple switched inductance (coil) unit with variable capacitors to provide matching, followed by a simple field effect transistor (f.e.t.) r.f. amplifier, using my favourite, cheap MPF102. As a receiving only system it will prove excellent results for little effort.

However, bearing in mind the idea of this article is to help those RB readers who don't have much space, I'll be providing as much information on compromise antenna systems as I can. And some of those

Fig. 2: Richard Marris G2BZQ is a keen user of loop and table top antennas. This transmitting 3.5MHz antenna was published in the August 2001 issue (see text).

compromise antennas can provide superb results!

Vertical Antennas

One of most versatile antennas I use nowadays is well known to *PW* readers. The 10m long 'roach pole' fibreglass fishing rod antenna has proved incredible reliable and versatile. The photographs of the system have appeared many times in *PW,* literally every time I've written about my /P operations because I wish to encourage others to try the same system. Because of this I'm not going to waste space in publishing them again! Just look back at your *PW*s and you'll find a photo of the system several times in the last two years or so.

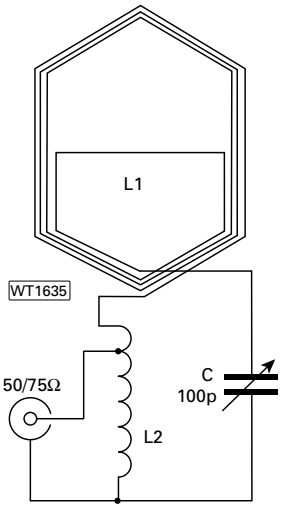
With the mast extended to its full length and used in conjunction with the **Tennamast (Scotland) Ltd.**, Tenna Tourer drive on mast base it's a simple vertical system that can be used temporarily or be left erected throughout the year. They cope with the weather extremely well, and I've only lost one in the south coast gales here in Dorset.

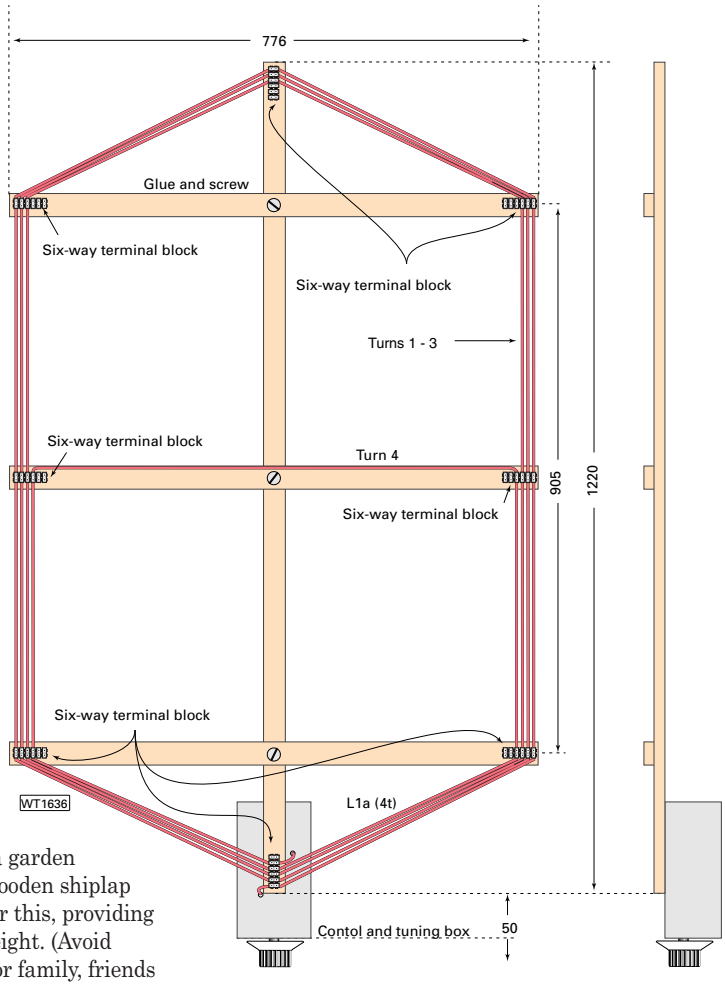
On inspecting the mast I found that I'd over tightened the metal base clamp and the fibreglass (extremely tough at the base) had split. The replacement has done well over the last three years or so. Incidentally, **Robin Sykes G3NFV** of Sycom (who supplied the fibreglass pole to me) told me that he has a customer in the far north east of Scotland who also leaves his 'mast' erected over the winter. They're certainly tough!

I use the mast with pvc insulated wire anchored to the top with tape and then spiralled round the erected pole (making about five complete turns). When used with an earth system of 'floating radial' (the radial wire is trailed across the ground but not actually earthed) I've worked the world on low power (not quite QRP) c.w. and s.s.b.

At the moment at home I've got two antenna systems up and working. The main system is based on the fibreglass mast and it works so well I've decided to have it as a permanent set up when I eventually have my Tennamast Adaptamast assembled and ready to go.

Of course, if you have trees in your garden you can utilise them as anchor points for antenna especially short wires. However, you have to ensure you provide movable counterweights for when the trees sway in the wind.





You can also run a wire round the top of a garden fence. The thin wooden shiplap fencing is ideal for this, providing it's about head height. (Avoid providing traps for family, friends or pets!).

Loop Antennas

Although I'm not a keen exponent of the non full wave loop antenna, they certainly have a big following. They can be extremely effective for the keen short wave listener (s.w.l.) who has limited antenna space facilities.

I prefer the full wave loop. Examples of these are the quad loop (four sided) and the delta loop (three sided). I'll be discussing these later in this article.

The loop antenna in its many forms favoured by some of our specialist authors including **Richard Marris G2BZQ** attracts a large number of users. Those who are keen on them often report just how effective they are for specialised reception in noisy conditions with QRM and QRN (interference form other stations and electrical interference/noise, direction finding and perhaps most importantly where there's not much space.

The loop shown, in **Fig. 1**, is one of the designs produced by **Charles Molloy G8BUS** in *PW*. The design (it features in the *Out of Thin Air* reprint) is for medium wave DXing, but is easily re scaleable for 1.8MHz and above.

And of course, the same design antenna can be used for transmitting purposes one of the methods so much favoured by G2BZQ. However, if you are interested in trying a loop antenna for yourself, I strongly advise that you read one of G2BZQ's articles in *PW* on the subject, **Fig. 2** (a 3.5MHz loop).

There are many things to consider with home made transmitting loops flashover of variable capacitor tuning plates is the most obvious. Any attempt at using small plastic cased polyvaricon variable capacitors will easily lead to something melting, possibly catching fire and a damaged transmitter. So, take very great care to follow the directions provided by any of our experienced authors such as Richard G2BZQ.

Resonant Loops

Once armed with the knowledge that the quad loop requires each side to be a quarter wavelength for the frequency on the band being used it's simple to make a single band system. In practice I've found that if you keep all sides the same length the loop will work very well even when it's very much offset in shape.

To convey the quad loop shaping possibilities, let's imagine there's an empty cardboard box about to collapse sideways, and into itself as it folds flat. All the sides are the same length but it's certainly not a square! The flexibility of wire quad loops means that many of us could probably squeeze a loop of some sort into our gardens, resonating on 14, 18MHz and the

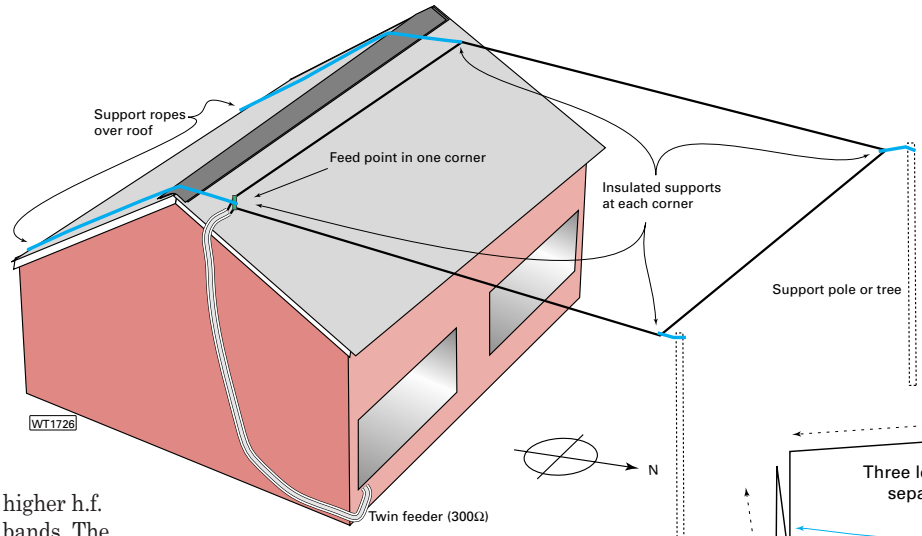
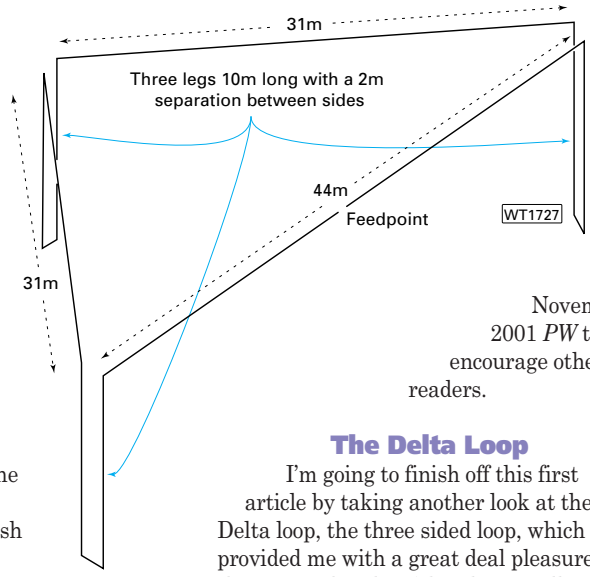


Fig. 3: The diagram shows an interesting horizontal loop system used by Robin Trebilcock GW3ZCF. Robin had a very successful time with this system, and the article was originally published in the November 2001 *PW*, which includes more details of Des M0APK's loop shown below.

higher h.f. bands. The higher in frequency you go the shorter the loop sides!

Hung from a tree or by using supporting ropes and perhaps even garden canes, the loop can be extremely effective. All the Amateur radio manuals and antenna books carry much detail. The one book I can thoroughly recommend (a must for your library) is the truly superb *ARRL Antenna Book*. This continually growing publication is all you'll ever need on antennas. Once purchased you'll never regret buying it the section on loops and the large number and variety of designs is particularly good.



Finally, before leaving resonant quad loops, did you know you can actually have a horizontal loop in the garden for working and listening to inter G and Irish stations? This form of antenna can be disguised on a low fence (perhaps round a lawn) or perhaps around the garden at above head height.

The horizontal loop antenna literally 'fires' upwards. And the angle of propagation is such that although you won't work much DX you will work stations within the UK, Ireland and the near Europe at very good signal levels.

One of the keenest advocates of the horizontal loop antenna is my friend **John Tait EI7BA** from Midleton in County Cork in Ireland. John has had some excellent results working in EI and G with his ground based resonant loops on 3.5MHz. His signal strength has to be heard to be believed. I've been working hard on John (he's a busy chap) to write some articles on the subject, but when he reads this perhaps he'll find time to share some ideas with *PW* readers!

The diagram, **Fig. 3**, shows an interesting horizontal loop system used by *PW* author **Robin Trebilcock GW3ZCF**. Robin had a very successful time with this system. and produced the article in the November 2001 *PW* to encourage other readers.

The Delta Loop

I'm going to finish off this first article by taking another look at the Delta loop, the three sided loop, which provided me with a great deal pleasure on the 18MHz band with only a small outlay in energy and cash! The delta loop is shown in **Fig. 4**, and readers will no doubt remember the article (on portable operating portable) published on page 54 of the September 2002 Issue of *PW*. It's a real DX chaser antenna.

Obviously, the Delta loop as shown is not huge, but it's on the other hand it's not pocket sized! With the three sided loop hanging from the top of the bamboo pole, the system can rotate around the pole itself, taking advantage of the directional properties of the antenna. The shape of the delta loop is maintained by the bamboo pole (I used garden canes from our local garden centre). The rigidity provided by the bottom cane allows the easily erected system to rotate easily.

Of course, it's possible to make the loop system for 7MHz, but it will be quite big! The 14MHz band delta loop is a bit more manageable. It's my ambition to make a delta loop for 7MHz and when I do I promise to share the results with readers. If it's as successful as the 18MHz version it will be superb!

Next month, I'm planning to chat about other antennas, including verticals, mobile antennas and some ideas for antenna tuning. Cheerio until then.

PW

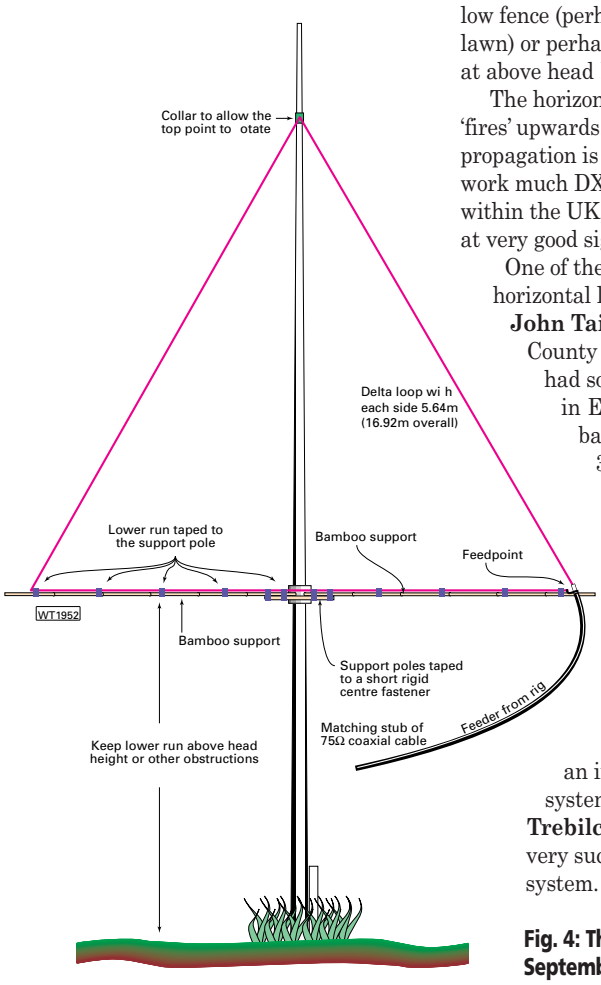


Fig. 4: The portable delta loop for 18MHz. Originally published on page 54 of the September 2002 issue of *PW*, Rob G3XFD says it's a real DX-chaser antenna.