

## **"AERIALS FOR THE MASSES!"**

**By Victor Brand, G3JNB**

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Amateur radio is a delightful hobby. It can be enjoyed by enthusiasts of all ages and in an endless variety of ways. In common with the majority of sports and other leisure pastimes, it is often thought that a heavy financial investment is necessary if success is to be achieved. The fact is, of course, that no matter how much you spend or however hard you strive for the 'mega' station, there will always be someone who has a bigger and better set-up.

The radio magazines are full of people who have stacked HF monobanders at 120ft. and run a cool kilowatt. For them, the special Dxpedition on a remote island presents no real difficulty: they step into the shack, swing the beam, press the transmit button, work the station and, a few minutes later, are sitting back in front of the TV with the family. 'Fine business' you may think, but is this amateur radio?

We may gaze in awe at their soaring towers in 20 acres and envy their powerful station but, for the masses of ordinary amateurs, reality is a modest garden. If we are lucky there is a handy tree and our aerial farm is governed by a sensible responsibility with respect to the views of the 'Management' and those of our immediate neighbours.

With the changes in our licence qualifications and the continuing good conditions, it is to be hoped that many more WACRAL members will venture onto the long distance HF frequencies and taste the joys of DXing.

Talking to WACRAL members, at times I have been struck by a perception that an 80m dipole or half-size G5RV is the only aerial that can be entertained and is not really appropriate for working anything more than relatively local stations, yet alone the real DX. Well, there are other more attractive options than these, believe me!

### **WHAT IS DX?**

It can be said that one man's DX is another man's routine QSO. Many 'experts' tend to forget that contacting Brazil, Ghana or Japan is a high point for the average amateur with a bit of 'best bent wire' for an aerial. Early morning VK contacts are relatively easy for the UK station with a good 20m dipole, but, say, how about the much rarer Cook Islands (ZK1)? To work the more remote Pacific island groups such as Cook, one needs both a reasonable, low-angle aerial and, because of the pile-ups, a degree of expertise in operating.

So just what is your own concept of DX? However you may choose to answer, it is probable that the distance to be attempted will increase steadily, as both your 'nerve' and your skills improve. Today, as a keen QRP operator, you may find it a challenge to work down as far as Italy on 20m. However, tomorrow, after a few dozen Italian contacts, Egypt is suddenly worked and so on, until the next radio stop is Cape Town.

It seems to me that there are five conditions governing your enjoyment of amateur radio contacts outside your immediate region:

1. Your own expectations of what can be worked from your home
2. Your equipment and power
3. Band conditions
4. Your level of skill
5. The effectiveness of your aerial.

I believe that of these, the most important is number 5 - your aerial. Get that as right as it can be for your own location and the remaining points are of secondary importance.

## **YOUR PRESENT AERIAL**

Some amateurs content themselves with a 2m hand-held and HF operations restricted to a little 80m net activity for fear of TVI/PCI, or in the belief that they cannot 'get out' on the long distance bands. Whilst a QTH at the bottom of a valley is a real problem at VHF, HF is very forgiving and many people squirt their RF up at a high angle and work all over the place, if not to the exotic islands.

The ubiquitous G5RV at full or half size does a grand job, particularly on 20m. If you are a fan of this antenna, then stick with it for general usage. However, if you are finding it is just not so hot on 12 or 10m, then perhaps an additional little aerial is called for?

The 80m dipole you erected to join in the WACRAL and local nets has its bit of coaxial feeder, running back to the rig. With or without a weighty balun making it sag in the middle, it is essentially a single band wire. Can it do better? Why, yes!

Simply remove the coax feed-line and replace it with 300 ohm twin ladder line (the slotted variety is good) right back to your aerial matching unit. You will then have a multi-band doublet aerial that is probably good all the way from 160m to 10m, subject to height and the length of feeder.

Keep the ladder-line feeder spaced away from the garden fence with plastic spacers a foot or two off the ground and adjust

its length a little to give you an easy load on all required bands. Yes, I know all this is 'in the book' but have you actually tried doing it?

## **KEEPING THE PEACE!**

Lacking the nerve or 'authorisation' for a multi-band beam hanging out over the bedroom windows, most 'little guns' in the DX world depend on getting a lot of 'wire in the sky'. The books recommend 16 SWG hard drawn copper wire and big glass insulators. Fine if you can use these but, believe me, at 100 watts thin wire works well, can be nearly invisible up at 25ft. whilst needing only light insulators and fishing line to hold it up.

TVI should now be but a minor possibility these days with the modern television sets and the judicious use of a low pass filter in your own transmitting aerial circuit. However, TVs with long downleads, PCs festooned with unscreened connectors, phones, answer machines and the inevitable audio systems with long speaker cables, all continue to pose a problem for the station with neighbours close by. Believe me, since moving house I have 'been there, done that' and definitely have 'got the tee-shirt'!

To keep clear of all of these problems, in so far as they are caused by your transmissions and to keep the peace in your own household, there are four basic rules:

1. Use horizontal polarisation. Great though vertical is for low angle stuff, it is murder when it is pouring RF into your neighbour's house.
- 2 Use a balanced feed line. Coaxial cable is nice and handy but if you use 50, 75, 300 or 400 ohm twin feeder, most of your problems will disappear or be much reduced. Earthing is also less important.
- 3 Move the feed point away from the house! Put it away down the garden and all the goings-on at the junction of feeder and antenna wire tend not to bother the consumer electronics in the house.
- 4 Use only the power necessary to work the station you are chasing. If after following the first three points you have some residual trouble, then you will be amazed how it can simply disappear by reducing your power output. So you cannot use 100 watts of SSB but find that using 25 watts means you have absolutely no interference problems? Who cares about being "20 over 9 OM" when you can be still belting in on 25W, let alone 5 watts QRP?

Yes, I agree that is all well-known fact, but how many people have set out to overcome problems by systematic aerial planning and testing? After thirty years of trouble-free operating, I had to go through the whole routine to overcome snags with the ultra sensitive and unfiltered PC systems of my immediate neighbour. I had simply forgotten the lessons of my youth!

The above formula has the problem cracked and I am enjoying 100 watts on all bands.

### **AERIALS FOR SMALL PROPERTIES**

If you are already tempted to start working new bands or even to get back onto HF in a serious manner, then it will pay to sit down with books like the ARRL Antenna Handbook (any old edition) and Les Moxon's 'HF Antennas For All Locations'. Mug it all up before you go any further.

If you find that these worthy volumes simply confuse you, then the following notes may get you out there with the wire and iron. By the way, plastic 'choc blocks' are great to cobble together a new 'killer' antenna for testing but BEWARE... they will cause you terrible interference if you leave them in circuit! Corrosion sets in immediately and the resultant tiny spark of poor contact will wipe out 'Crossroads'!

Always, always go back out there and solder your antenna connections firmly, before wrapping in self-amalgamating tape.

### **COMMERCIAL OPTIONS**

Buying an off-the-shelf-and-ready-to-go aerial is certainly an option if you are not in a position to roll your own. The retailers sell a variety of aerials like the G5RV, Carolina Windom and trap dipoles. Not all of these will be suitable for your QTH or are quite expensive for what they are.

## **HOMEBREW**

For low profile aerials, use thin wire, small insulators and light twin or ribbon feeder. Halliards of 20lb fishing line (invisible at 20ft up) or good cord can run over some tiny pulleys that can be found at yacht chandlers. Much stronger line is used to tether the pulleys to their anchors. To absorb the swaying of the antenna wire and perhaps a tree, insert rubber luggage cords at the bottom of a halyard. These cords will stretch with the wind pressure, but do need regular replacement due to weathering and stretch.

### The single band dipole

Keeping your regular aerial for general use is fine, but have you considered putting up a simple dipole for a DX band. By choosing a HF band/length that will fit into a handy space, horizontal or sloping, you can enjoy DXing with the best of them. By selecting, say, 12 metres and a dipole of only a tiny 5.73m length overall, you will be away from the weekend contests, much of the QRM and can enjoy propagation around the world. By concentrating on a particular band, you become very familiar with its possibilities and who will be on at any given time.

If you feed this dipole with light 50/75 ohm twin, it will minimise any TVI/PCI problems. You should still put it through your ATU via a 1:1 balanced-to-unbalanced balun, which may well already be in the tuner unit. If not, then look in the book and just wind up the few turns of coaxial cable on a ferrite core to form a choke balun and hang it behind the tuner.

### Loops

Loops are now cool! After years of being virtually ignored, the loop is back in a big way. A balanced feed is available, they are relatively low noise aerials and just do not seem to mind being hung at domestically handy heights of 25/35ft. Indeed, many users have a horizontal loop around their fences and bushes, or even the house guttering, and nobody knows that it exists!

You can enclose the biggest area available and pop in a length of feeder at a handy point. The aerial will work with an ATU on lots of bands.

Look in the books for the various shapes of vertical loop delta, quad and even diamond. Choose the feed point shown that will give you horizontal polarisation for minimum interaction with next door's leisure electronics. If you are free of such problems, then a vertically polarised loop will bring down the radiation angle and improve your DX reach.

Really a loop is best when it is a full wave of wire in the sky at the lowest band of your choice. The impedance at the feed point on that band will be around 100 ohms and for single bander, if you must use coax, insert a quarter wave matching length of 75 ohm coax between the aerial and your 50 ohm line.

However, the trick is to use twin feeders right back to the ATU, either 300 or 50 ohms depending on what you have got in stock. An aerial fed in this way will tune most bands above the one where it is a full-wavelength in circumference. If the ATU dip is 'iffy', just add in about an eighth wave of feeder for the band where this occurs and usually it will solve the problem.

Every multi-band aerial is a compromise. Much will depend upon your environment, the height of the aerial and its feed. However, I can recommend a loop featured on page 15 of the September 2000 edition of the now defunct "Radio Today" magazine.

### The Small Delta Loop

Conceived by the legendary Les Moxon G6XN and described by Steve Ireland VK6VZ, this aerial is giving me my best yet results on 80 - 10m and even provides a Top Band capability. Horizontally polarised, the loop is hung vertically as an inverted delta or triangle and consists of a total circumference of 37.2 metres. The feed point at the bottom is only seven feet off the ground and accepts 300 ohm balanced line back to the shack.

VK6VZ tilts his version sideways across the garden to enable the loop to fit into his height availability. The top wire should measure 14.8m and the two down wires 11.16m but, in my case, I made the top wire a few metres longer and the two down wires shorter, still maintaining the require length. No tilt is now necessary and it works like a charm!

For use on 160m, one side of the feeder is opened at the feed point and connected to a quarter wave radial. This makes it into a rather bent-over vertical for 160m of around the quarter wavelength mark, but it does the business. To switch one side of the feeder open-circuit when I want to use 160m, I have a 12 volt car headlight relay with strapped contacts, sitting inside a small Tupperware box! Some silica gel keeps the moisture at bay.

### Micro space aerials

For those who are challenged by a tiny space, fibreglass fishing rods are cheaply available in many market places up to around 7m long. These make excellent aerials when wound with thin wire. I space a helical winding out up the pole and bring the bottom end to a small ATU. The aerial needs a couple of radials, or a handy wire fence, and usually loads well on all bands 80 to 10m with a loading coil in circuit for 80m! Mounted on a fence, on the roof or chimney, you will be amazed just how well you get out on the upper bands. Keep the power down to a reasonable level.

## Hedge your bets

A dipole just 5ft off the ground in the top of, or just in front of, a hedge can work remarkably well. Neighbours will be unaware and you will be on-air! No, it will not be a DX wire but you will work out around Europe at night and will be amazed how quiet it is on receive! Bury the coax in the ground and wind it up into a coil at the feed point. In fact, try this aerial as a receive-only wire and you will probably find that the QRM/QRN drops away on HF bands, leaving just your wanted signal, quiet but in the clear!

## Mobile whips

Finally for the desperate, mount an HF mobile antenna with the band coil of your choice on a big sheet of metal as a ground plane and put it on top of the roof. Keep the power down and work away on your apparently new 'TV aerial'.

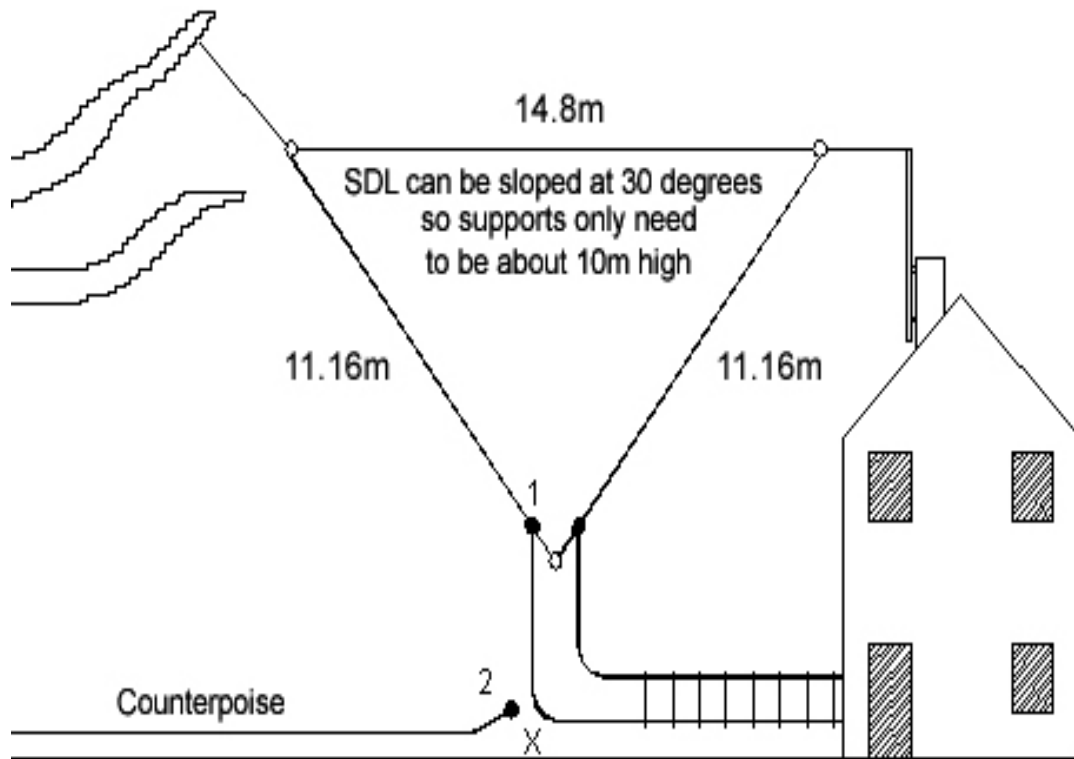
## Last word?

There is no 'last word'. Aerials will continue to be a favourite topic with amateurs. These notes are merely intended to stir your imagination as to possibilities and to encourage you to greater efforts.

## Good DX!

Freq Range (MHz)	Loop Length (0.85 )	Sloping Sides	Third Side
3.5-9.8	74.4m	22.32m	29.6m
7.0-19.6	37.2m	11.16m	14.8m
14-39.2	18.6m	5.58m	7.4m
Table 1	Dimensions for small delta loops		

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Quarter wave counterpoise can be in a straight line or bent to fit shape of garden. Feeder conductor is connected to point 1 when antenna is fed as a loop (i.e. 3.5-28Mhz) and point 2 when antenna is used on 1.8 Mhz.

Fig 1 Horizontally polarised version of 37.2 meter circumference for 1.8 to 28Mhz.

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