



Colin Redwood's

# what next?

This month Colin Redwood G6MXL looks at techniques to erect the antenna and keep it erected safely!

**W**elcome to *What Next?* (W/N?), where this month I'm looking at some techniques for mounting the v.h.f. and u.h.f. antennas that I discussed last time. I'll start by considering height above ground level.

Height really is important at v.h.f. and above, so that signals are not obstructed by local buildings and vegetation. The three techniques I will be discussing are mounting antennas on chimney stacks, wall-mounting and free-standing masts. These techniques are also applicable to some smaller h.f. antennas.

## Chimney Mount Advantages

Chimney mounting can have advantages! This is because from the ground many very high frequency (v.h.f.) and ultra high frequency (u.h.f.) antennas appear to be similar in size to those used for terrestrial broadcast radio and television reception.

Radio Amateurs sometimes mount their antennas either using brackets attached to the walls of houses or on a chimney stack (Fig. 1). It's even possible to do this with a small high frequency (h.f.) beam. A chimney stack can also provide a useful support for a wire antenna for the h.f. or low frequency (l.f.) bands.

The advantage of mounting antennas on the chimney is that they are up in the clear and unlikely to provoke adverse reactions from neighbours – it's where most people have their television antennas! The disadvantages are that the antennas are at precisely the same height as the neighbours' television antennas and thus more prone to electromagnetic compatibility (EMC) issues, and that the antennas are not readily accessible for maintenance.

## Safety Considerations

Safety considerations must be taken into account when working 'aloft'. Clambering around on a roof at chimney height is not something that everyone will feel comfortable doing! If you have any doubts, then I suggest getting your local specialist antenna contractor in to do the job. The good ones will already

have some familiarity with Amateur Radio antennas and may be Radio Amateurs themselves. The type of job we're likely to offer them is the 'bread and butter' of a contractors business.

## Wall Mounting

A good choice for a gable end is to use a pair of wall brackets to hold a vertical pole with an antenna system on the top. (Fig. 2). Make sure that the wall brackets are sufficient to get the pole clear of gutters. The two wall brackets should be well separated vertically (at least five courses of bricks as an absolute minimum, and at least a few courses of bricks below the top of the wall (Fig. 3). Make sure that the clamps and wall brackets are suitable for the diameter of the pole you are proposing to use.

## Installing A Mast

If you decide that the chimney and wall brackets approach does not meet all your needs, inevitably thoughts will turn to masts. Installing a mast is not something to be taken lightly – they are certainly not cheap if bought new – but considerations need to be given to where to place a mast, planning permission, tilting arrangements, rotators, antennas, etc.

You'll need to consider how you will support the mast, and how you will tilt it over for maintenance work. There are a number of mast suppliers, including Tennamast who advertise in the Specialist Dealers section of *PW*. I strongly recommend looking at their web site and contacting them to get all the information you can before making a decision. (If you've entered the *PW* Tennamast Competition – the lucky winner should know he, or she, is by now).

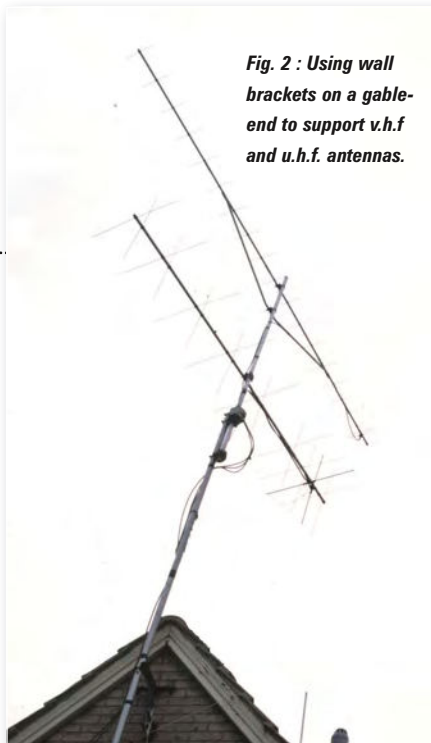
Probably the most popular type of mast is one which can be tilted over for maintenance, and when vertical has one or more sections telescoped inside which allows the height to be increased. Tilting over ('luffing') needs to be done in a controlled manner, so that the mast and antennas do not come crashing to the ground. A longer mast, when it's luffed, the harder it is to control. This is why most tilt-over masts are telescoped in some way.

## Mast Support

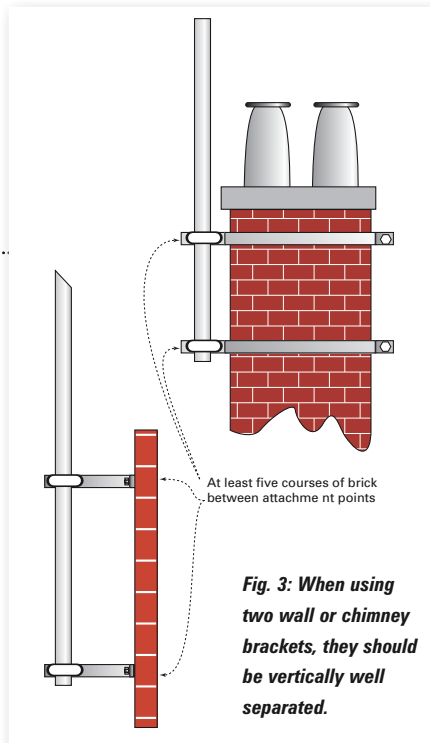
There are broadly two ways that masts are supported. One is to mount them close to a building and tilt them parallel to an outer wall or at 90° to the outer



*Fig. 1: A compact 50MHz chimney-mounted Yagi antenna with a 145/433MHz dual-band omnidirectional vertical. Note how the Yagi is mounted close to the rotator to minimise the strain on the rotator in high winds.*



**Fig. 2 :** Using wall brackets on a gable-end to support v.h.f and u.h.f. antennas.



**Fig. 3:** When using two wall or chimney brackets, they should be vertically well separated.

wall. The mast is supported at the base and when vertical by some bracket arrangement on the building. The other is to mount the mast free-standing away from building with the base in a large block of concrete.

Which of the two options you choose may well be dictated by the particular circumstances of the property in question. If there's a choice, remember that the further away from the building the greater length of feeder will be needed, and at v.h.f. and above, feeder losses could become a significant factor. In contrast, the closer to the property

the mast is located the greater the radio frequency (r.f.) fields and the potential for EMC problems to occur.

So, before considering the purchase of a proper mast, I suggest trying out the proposed location with a temporary arrangement. This could – perhaps – employ some aluminium scaffold poles or a portable mast.

### Tilting Clearance

When tilting over a mast with a large antenna, bear in mind that the antenna will take up a lot of space near the ground. So you'll need to consider this



**Fig. 4:** When a mast is tilted over, it can take a lot of space. Vegetation growth also needs to be considered.

## Colin Redwood G6MXL

PW Publishing Ltd.,  
 Arrowsmith Court,  
 Station Approach,  
 Broadstone,  
 Dorset BH18 8PW  
 E-mail: what.next@pwpublishing.ltd.uk

in choosing where you site the mast.

If considering a mast close to a building, the clearances needed may prevent the mast being in the centre of a wall, unless you luff away from the wall rather than parallel to the wall. Even this may not be possible as many masts – when luffed – protude (quite a bit!) from the rear of the assembly.

We can all make mistakes and I remember when I put a mast up at a previous home, I forgot to consider a newly planted bush near the base of the mast – which was only 1m tall at the time. However, 20 years later the bush had grown to over 2m, and had to be pruned quite drastically in order to tilt the mast over (Fig. 4).

Having decided where you would like to locate the mast, you need to find a suitable mast. Contact the mast suppliers, and ideally visit them with a plan of your proposed location. Discuss the options available to you. Please also make sure that you get a full specification of the mast you are considering.

### Ground Sleeve

One of the options available when buying a mast is a ground sleeve. In essence this means that the bottom post slides into a sleeve which is concreted into the ground rather than the post being concreted directly into the ground. So, if you're likely to move house, then a sleeve is certainly a good idea.

### Planning Permission

Before you start the planning permission process, the **Radio Society of Great Britain (RSGB)** publish a really excellent booklet, which I can strongly recommend. It's available to RSGB members to download from the member's only part of their web-site.

A chat with the planning officer at your local town hall can certainly be recommended at this point as you are likely to need planning permission. You'll need to get them on your side if you possibly can! Explain what you want to do. Show them plans and show them photos.

In all your discussions with the

council officials describe your proposed mast as a mast and not a tower. The planners may suggest a slightly different location, which would make the mast less visually intrusive. If you hadn't considered this, I suggest that you take suggestion away and consider the implications.

Once you have got your ideas 'firmed up', it will be time to apply for planning permission. The council officials will have (no doubt) given you the necessary forms, etc. that you'll need to complete. They'll also want drawings and maps showing the proposed location.

One of the first actions that planning officials will take on receipt of your planning application will be to write to your neighbours, informing them of your application and giving them the chance to object. I therefore suggest discussing your proposal with neighbours before submitting the application.

Neighbours may have a preference on the location of the mast, which you can accommodate and turn them from objectors to supporters. At least you'll be able to demonstrate that you have minimised the visual impact of your proposal on your neighbours. Council planning officers will frequently want to impose conditions on any application that's granted and a common one is that the mast must be reduced in height when not in use.

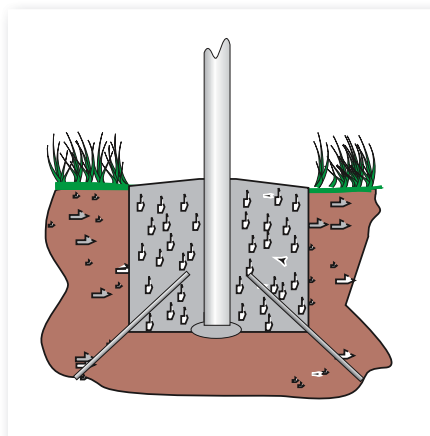
### Start Digging!

Having got planning permission, you can order the mast and while you're waiting for it to arrive, I suggest that you make a start on digging the hole to support the mast. For those not used to manual labour this can be hard work. The deeper you go, the harder it becomes! Lifting the soil out of a hole can really take its toll on a back if you are not used to this type of work.

Read the instructions and guidance that come with your mast carefully, it's frustrating if you have to remove freshly laid concrete for a problem that could have been avoided by reading the instructions!

It's quite likely that you'll need to make a hole roughly 1m x 1m that is 1m deep – quite a bit of digging!). I found a little digging each day was best and after a while you will get the hole to the size you require. (Be prepared for the spoil heap to look as there's much more soil than you originally dug out!).

When you get to the bottom of the hole, if the ground is soft (e.g. sandy



**Fig. 5:** Hammering some metal stakes into soft ground will form metallic roots for extra stability in soft ground.

soil), you may want to hammer some metal stakes into the bottom of the hole at 45°, so that they form metallic roots (Fig. 5). This will give some extra stability.

Whilst it can be very tempting to rush the preparations, once a cubic metre of concrete has set hard, you really don't want to have to remove it! (Hence my tip that you read the mast instructions very thoroughly!). To mix a cubic metre of concrete is a back-breaking task. I think it makes a lot of sense to arrange for a local company to deliver it pre-mixed, so that you just have to wheel barrow it from the road to the hole.

No matter whether you concrete the post directly or in a sleeve, it's absolutely essential that it is mounted vertically and that it remains vertical as the concrete sets. When I was installing my mast I tied string around the post in the form of guys to temporary stakes in the ground – to ensure that the post stayed where I wanted it as the concrete was poured (Fig. 6). It is a good idea to check that the post is vertical as the pouring starts and again a couple of times during the pouring.

Trying to move the post against a cubic metre of wet concrete is quite difficult – it's easier I think to check at every stage. Whilst a good spirit level will help, I found that checking the post is absolutely parallel with vertical walls of nearby buildings helpful.

Once all the concrete is poured, smooth it off, and make sure that it slopes away from the centre in all directions so that rain water doesn't collect and run into the hole if you are using a sleeve. There's no point in immersing your sleeve and mast in water when you don't need to! Then,



**Fig. 6:** To keep the mast vertical while the concrete sets, Colin G6MXL tied string around the post in the form of guys to temporary stakes in the ground.

after a final check that all is well, just leave the concrete to dry and harden off. Leaving it for a full week should be sufficient. In winter – don't forget protect the concrete from frost.

Assembling the mast is usually quite straightforward. Following the instructions, I needed few tools – just a couple of spanners. Make sure that you apply grease as instructed. Lifting the main mast on to the ground post will need at least three people, two to lift and one to insert the fulcrum bearing – obviously belonging to a club can help here as you'll have willing friends to help!

### Very Heavy!

A tilt-over mast loaded with antennas and a rotator is very heavy. Initially, I suggest that practising tilting and telescoping are done without any antennas. Pay particular attention to the clamp that needs to be put in place before tilting the mast over.

The winch that comes with the mast will need to be locked in place and a ratchet on the winch will need to be released to lower and tilt the mast. Be very careful not to lose grip of the winch handle when you're using it. (I know of at least one Amateur who had his wrist broken by an out of control rotating winch handle). If you have young children who might have access to the mast, I suggest fitting extra pad-locked chains to prevent tampering.

Next month I will be looking at rotators and I suggest you wait and read next month's column before parting with your hard earned cash! This is because you also need to consider how you might mount a rotator when considering the mast. See you next time!