Project

Fun on 10 metres!

After several years with few sunspots and generally poor high frequency (h.f.) conditions, the 28MHz (10m) band is once again 'on the up' as Cycle 24 gets under way. Within a couple of years it will again become one of the best bands for working worldwide DX!

When 28MHz is open and in very good shape, DX can be worked with very low power (QRP) and the proverbial 'piece of wet string'. However, an effective antenna is important if DX contacts are to be made during less favourable parts of the sunspot cycle.

What follows this month in Part 2 of my feature on the band, is a 28MHz antenna option combining a very small footprint, near omni-directionality, low cost, easy sourcing of parts, easy assembly and easy adjustment. If mounted in the clear, it's capable of very useful performance – just a few dBs down in gain when compared with a large h.f. beam.

Antenna Options Limited?

Many of us live in small homes with even smaller gardens and our options for effective h.f. antennas are limited. Although many of us would love to erect a beam for 10m, our neighbours, local councils and wives may **not** approve! Even a 28MHz two element HB9CV or a Moxon 2-element Yagi look huge when mounted over a small semi-detached roof!

Close up of erected antenna in place at the top of the mast

On 28MHz a half-wave dipole is small but has directionality and nulls unless rotated. Verticals such as CB end fed half-wave antennas or the professionally designed Cushcraft AR-10 can be very effective and are omni-directional but these can easily pick up switch-mode power supply and personal computer (PC) noise as well as cause TVI through coupling into vertical cables and coaxial cable down-leads.

Many readers will be familiar with the Cobwebb design from **Steve Webb G3TPW**, which is a 14-28MHz horizontal, omni-directional, wire antenna. This works well but it is very expensive and, in my opinion, it looks a bit like a rotary clothes line stuck on a pole up in the sky – my neighbours would certainly not approve!

However, before I get 'stuck into' describing the

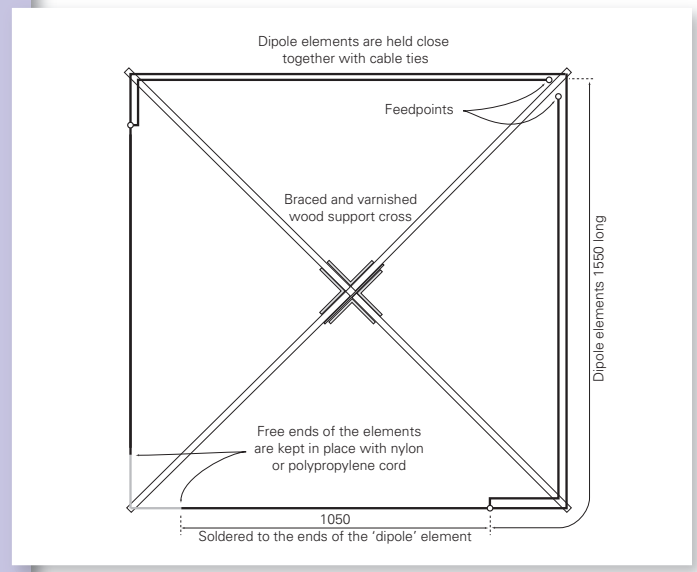


Fig. 1: Overall dimensions of the Home-base 10 antenna .

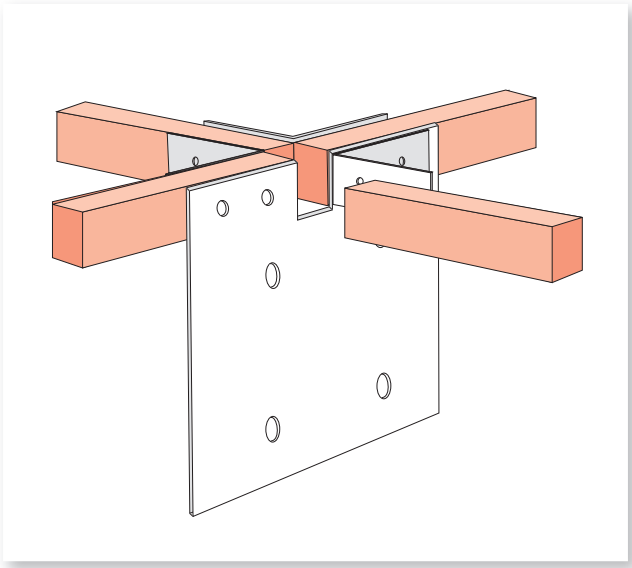


Fig. 2: Details of the method of joining wooden struts with corner braces and mounting plate.

In his second article featuring 28MHz operations, Roger Lapthorn G3XBM describes a simple and efficient weekend antenna project.

28MHz weekend project, I must make it clear that I can make no claims for originality. This antenna takes some of the ideas from various similar concepts such as the v.h.f. halo, the old Cushcraft Squalo, the GM3VLB delta beam and the Cobwebb. On the plus side for constructors the antenna can be assembled for less than £10 and with reasonable luck, the parts required will be available from the junk in the back of the shed.

All the parts required for this antenna may be purchased from the local Homebase, (or B&Q or similar DIY stores) with the coaxial cable, mast clamps and wire available from Maplin. As it is designed for 28MHz (10m) then the name just had to be the 'Home-Base 10' – acknowledging the component source but avoiding trespassing on the company's copyright territory!

Please take the design dimensions and mounting arrangements in **Fig. 1** as starting points for your own version of this antenna. This article is meant to encourage readers to do something similar but be prepared to experiment a little to optimise for personal situations and the materials to hand (wire diameter, support members, etc.).

Wooden Skeleton

The antenna consists of two main parts: (a) a wooden X skeleton section which provides the support struts and (b) a wire dipole folded into a square 'halo' shape. As with the Cobwebb, the centre part of the wire dipole section is made up as a folded dipole, which brings the feed point impedance close to 50Ω.

The folded dipole is made by paralleling up two pieces of the pvc cover multi-strand wire and holding these close together with cable ties. A choke consisting of six turns of the coaxial cable about 50mm diameter close to the feed point helps to keep r.f. from the outer of the cable.

To start the construction first assemble the support strut woodwork by taking four pieces of 21 x 12 mm wood 1m long (with the 21mm side vertical) and drill two holes close to one end to line up with the metal corner brace holes. The four 50mm corner braces and the drilled aluminium plate are screwed together and to the wooden struts **Fig. 2**.

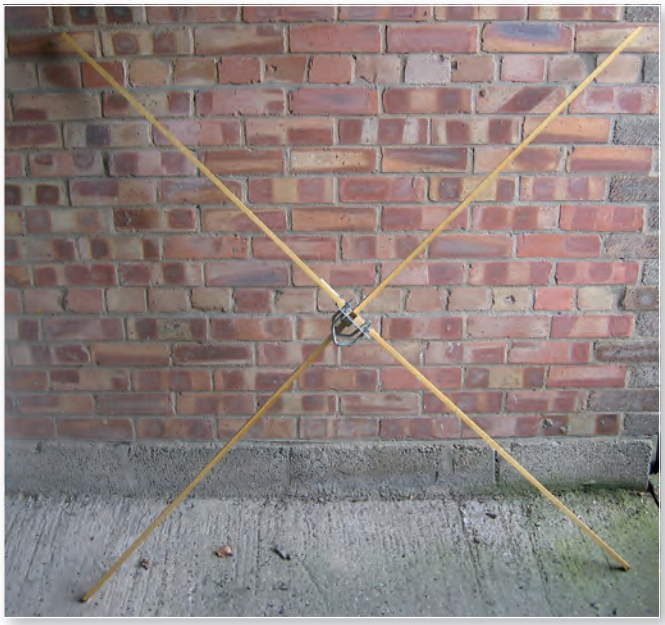
When screwed together the four wooden pieces form a cross, with the aluminium plate trapped between two of the corner braces and the wooden struts. Coat the wood, the assembled brackets and the nuts and bolts with three layers of outdoor yacht varnish to protect them from the elements. A better alternative may have been to use nylon rods but the rectangular wooden struts allowed a simpler mechanical arrangement.

Next, assemble the wire dipole as shown in the diagram, **Fig. 1**. Note how the feed point attaches to the centre of the folded dipole section. Initially it's necessary to 'tack' the wire onto the corners of the cross.

The feed point is then attached at one end of one of the cross members. This helps to provide support as this is the heaviest part because of the added weight of the coiled coaxial choke.

Bring the coaxial feeder away from the feed point back towards the middle of the antenna along the wooden support strut. The free ends of the wires must then be pulled together via a thin piece of insulating nylon or polypropylene cord. Make small loops in the end of each wire to attach the cord.

A closer look at the centre of the assembled antenna



The finished antenna ready for mounting on the mast.

Initial testing of the finished antenna. Note the bird table – a useful support!

Note: The r.f. losses of the material used to connect the wire ends together may be checked by putting a short length of it in a powered microwave oven for 60 seconds. This is to see how hot it gets – if it remains cool the chosen material should be okay.

Testing & Adjustment

To start the testing and adjustment stage, connect a 28MHz rig via an standing wave ratio bridge to the antenna. **Note:** Position the antenna in the air clear of other wires and metalwork. This is best done in the garden as some adjustment of the wire length may be needed.

Next, check the s.w.r. at the bottom, middle and top of the 28MHz band. If all is well, the match should be <1.5:1 over about 600kHz of the band dropping to 1:1 in the centre. If adjustment is needed, lengthen or shorten the free ends of the wire until the lowest s.w.r. is centred wherever the constructor requires to operate within the band.

My version was adjusted to give a low s.w.r. between 28-28.6MHz where most of the single sideband (s.s.b.), c.w. (Morse) and data DX activity is found. Try to position the antenna in the clear when checking resonance each time. Adjustment shouldn't be too critical.

Once adjustments have been completed, attach the antenna wire to the corners of the cross in a more permanent fashion. Make sure that the soldered connections – joining the folded dipole section to the end wires and the feed point junction to the coaxial cable – are suitably waterproofed.

Joints should be covered in heat-shrink sleeving or waterproof tape. Use nylon cable ties to secure the folded dipole wires to each other, the coaxial cable choke and feeder. In my version I added a small extra piece of wood joining the tops of the wooden strut supporting the coaxial cable feeder and its opposite part to give this additional strength.

As High As Possible!

When completed, you'll have a small, lightweight but effective 10m DX antenna that should last a good few years and provide plenty of fun – erect the antenna as high as possible and start collecting 28MHz DXCC countries! If anything should fail, you'll know the whole thing can be rebuilt in a few hours for less than the price of a take-away meal.

Contacts I've made so far suggest the antenna is working as planned with a near omni-directional radiation pattern. Despite running only 5 or 10W on s.s.b. and c.w., reports I've received have been excellent.

Note: The antenna doesn't need any matching when it's used over the intended part of the band but an auto-antenna tuning unit (a.a.t.u.) such as that in the IC-703 helps to optimise the match in other parts of the band.

Other Bands

Unexpectedly, the antenna also performs pretty well on other higher h.f. bands too! Indeed, I had contacts on 14MHz (20m), matching the antenna (and its feeder) successfully with the IC-703 a.a.t.u., before the 10m band 'opened up'.

Although only tested at 5-10W (the most I can run!) the antenna should work with full legal power as long as the losses in the support cord joining the free antenna ends are low.

During a recent c.w. contest I had no trouble working four European stations when running just 50mW into the Home-Base10 antenna – so it definitely works! ●

Parts List

Insulated (pvc) multi-strand wire 10m total approx (including some for prototyping. I used 32 x 0.2mm wire with an outside diameter of 2mm)

Timber 12 x21 x 1000mm	4 off
50mm corner braces	4 off
M4 nuts 15mm long	8 off
M4 bolts	8 off (to secure corner braces to struts)
Self-tap screws	4 off (to support wires at all 4 corners)
Nylon cable ties	As required
50 ohm coax cable e.g. RG58	As required (for feeder and choke)
100 x 200 x 2mm aluminium sheet	As shown (for mast fixing)
Mast clamps	2 off (to fix antenna to mast)
Yacht varnish	As required
pvc tape or heat-shrink	As required to waterproof joints.
Polypropylene or nylon cord	As required to tie free ends

All parts except the coaxial cable may be obtained from DIY stores. Coaxial cable is available from many sources including Maplin.

Originally the wire end-sections should be overlong and adjusted by folding the ends back on themselves before making them securely to the tensioning cords of polypropylene or nylon.

The Home-base 10 antenna erected and in use at G3XBM.