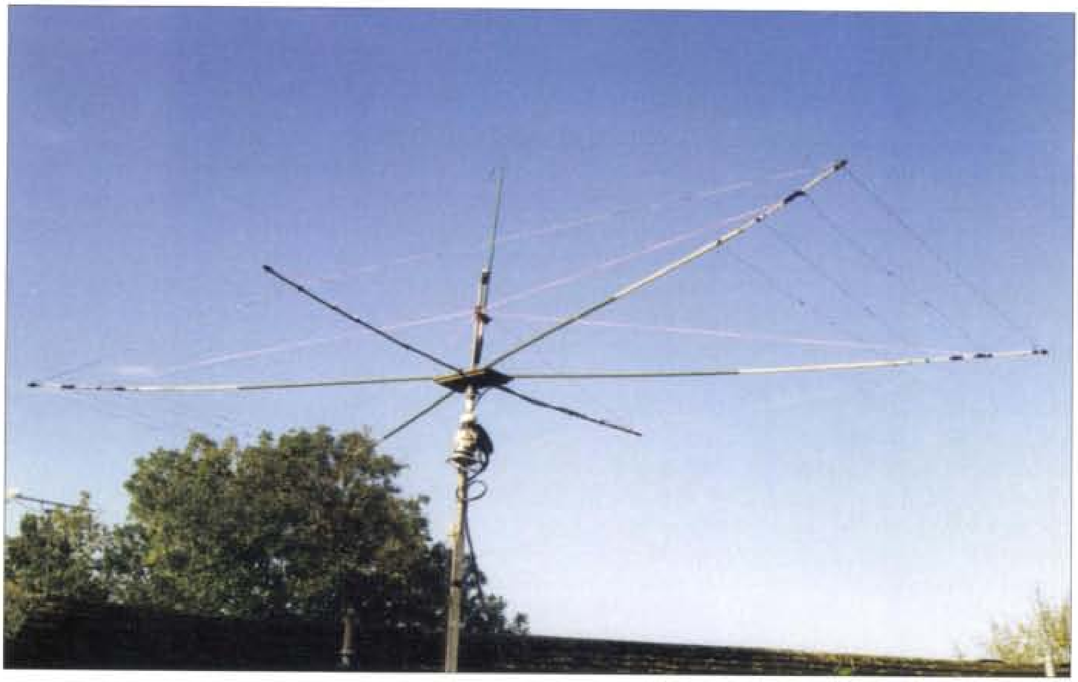
Vic G3HKQ describes his very own VK2ABQ

THE VK2ABQ ANTENNA REVISITED

Vic Westmoreland G3HKQ describes how he designed and built his very own oblong version on the VK2ABQ antenna. He says that it's relatively simple, so why not have a go yourself?



Vic's completed VK2ABQ beam in position.

It must be nearly 30 years since the VK2ABQ antenna, originated by **Fred Caton**, first made its appearance and during that period I've built three square ones with varying degrees of success. I already had a three-element Yagi and a 41m centre feed 'V' beam, which between them have given me excellent results, so I didn't put the time and effort into improving them.

A few years later I retired and went to live in a bungalow that had a very small garden and back on air, I used a simple indoor antenna centre feed in the attic which gave me some very good results.

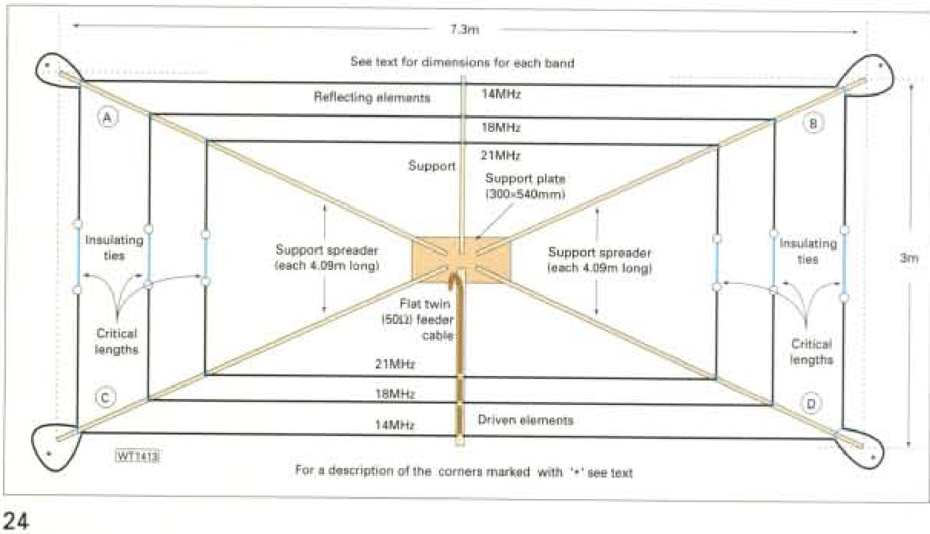
After obtaining planning permission, I later bought a Tennamast that I could lift up to eight metres whilst I was operating. I built a super beam antenna for 24MHz and this, for me, was one of the best beams I ever built.

I later decided to build another beam, a VK2ABQ to cover the 14, 17 and 21MHz bands and, at a later stage, 28.5MHz and maybe 24MHz. There was a lot more information on this type of beam then I ever imagined there would be and nearly every VK2ABQ I'd read about was built using different materials, different sizes and shapes (square ones, oblong ones and occasionally some like the XYL, pinched in at the waist) and using different methods.

Oblong Beam

I built an oblong beam, spending many hours designing and testing it. Again I was satisfied with the results, I could operate on three bands - 14, 18 and 21MHz and contact was made with all continents several times.

Fig. 1: Scale drawing of the VK2ABQ oblong beam.



I'd tried to make the beam as sturdy as possible, using two bamboo canes in each leg, joined by hose clips. This seemed to give it an ungainly appearance which I'd tried to avoid in the first place and when the wind blew the beam would waggle all over the place. A visit to the Lincoln Rally meant I was able to obtain several hollow fibreglass army tent poles, each about a metre long. A short time later, through an advertisement in ***Sprat***, I was able to obtain two more sizes of fibreglass rod, one lot hollow and the other lot solid.

The fibreglass rods would enable me to get the length required for an oblong VK2ABQ beam and the antenna would be much stronger and not as ungainly. I certainly believe that the hardest part of building any fibreglass beam is getting the materials!

The previous bamboo beam had been built from a design on oblong VK2ABQ beams by Les Moxon* and I decided to use the same design. In my opinion, an oblong beam gives slightly better results than a square one and I would just be able to get it in my garden.

***See Les Moxon's book: *HF Antennas For All Locations*, available from the *PW* Book Store, priced £14.65.**

Two pieces of plywood were screwed together and given several coats of ship's varnish, with provision being made to fit the underside of this to a rotator when required. I then marked on top of the plywood the place where the fibreglass poles would be fitted.

For the four lengths of fibreglass poles, I first joined two army tent poles together to give me a length of 186cm. The second fibreglass rods were cut to a length of 123cm and filed as round as I could for a length of 90mm to fit inside the tent poles.

The last four lengths of rod were solid and fitted nicely into the second rods - the three sets of fibreglass rods were very strong and had a gradual taper from the centre to the ends. I would stress that fibreglass (when filed) has many small glass splinters and as it weathers, splinters occur so it's imperative that you wear gloves at all times - I usually then rub it over with a cloth.

Finally, the rods were dismantled, given a coat of 'Fast Glas Polyester' resin (obtained from the local car store) then joined and fitted. The resin dries quickly and makes very firm joints that have never moved. (See **Fig. 1**).

A 1.2m piece of brushtail, after being varnished for protection, was secured to the centre of the plywood by a metal socket. Primarily this would support the fibre rods or poles as I now like to call them and secondly, at a later stage, a two metre fibreglass vertical could be fitted for local QSOs and Packet operation.

Due to my small garden which contained shrubs and a fishpond, I would be unable to build my beam on the ground. The flat plywood base was fitted to the rotator and this in turn was fitted to the mast.

Fortunately, with the Tennamast I was able to bend it over parallel to the ground at a height of 1.5m and so could stand on the ground to work. It meant, however, that I would have to keep lifting and lowering the mast as each part was completed and turning the structure round.

My fibreglass poles were fitted loosely in each of the marked sections of the plywood base by saddle clamps, then the length and width of the pole ends measured and made correct for the band measurements. Finally, the clamps were tightened to make the poles secure. (See **Fig. 2**).

At a height of 750mm above the plywood base, four double lengths of polythene orange garden line were fastened to the wooden brushtail and these terminated at the ends of fibreglass poles to keep the beam from drooping. The set-up was then placed in a vertical position to check all was level and that there was no droop.

Back to the nearly horizontal position again and two bamboo canes, previously varnished and covered with grey electrician's tape, were fitted with conduit clips to the plywood base. The ends were then secured to the brushtail by one length of the polythene garden line (the purpose of these being to support the 50Ω flat cable from each band and also the driven elements).

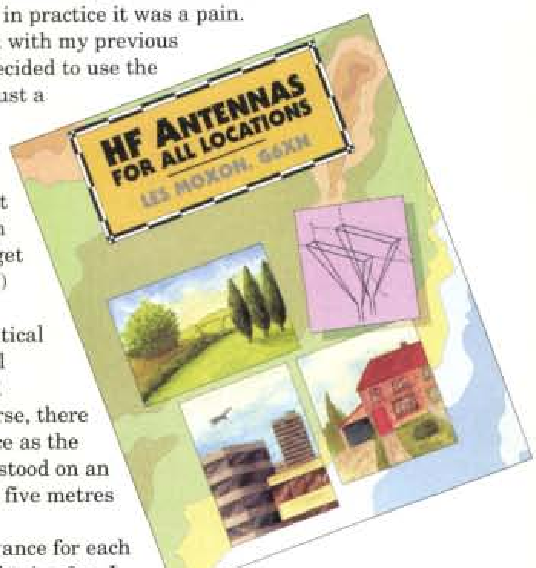
Fig. 2: Vic's fibreglass (and bamboo) poles fitted to plywood with conduit clamps.

The other cane on the opposite side was to support the reflector elements. These along with the fibreglass poles would prevent sagging wires and keep the array as level and flat as possible.

My favourite band is 18MHz, so I decided to complete this first then place 14 and 21MHz on either side of it. As I'd already built a similar shaped beam, I had an idea of the amount of wire I would need for each band.

I prefer to use 16swg hard drawn copper wire, as I believe this is better than many stranded insulated wires. You can, of course, use insulated wire, but it would have to be about 3-5% less in length.

If you wanted to, you could spend a lot of time measuring each band, altering the length of the wires, altering the critical distance - I have done this in the past. Every time something was altered, all the VK2ABQs had to be tightened up or slackened off - in theory this is fine, but in practice it was a pain.



As I had been satisfied with my previous VK2ABQ oblong beam I decided to use the same measurement with just a little extra for any correction. What I finally did was adjust the driven elements to obtain the best match I could for 50Ω then adjusted the reflectors to get the best front to back (F/B) ratio.

I later adjusted the critical distance to try to get equal currents in the driven and reflector elements. Of course, there would be a slight difference as the beam was rotated when I stood on an outhouse and the beam at five metres passed over it.

I'd made a small allowance for each band at its operating height, i.e. 8m. I wasn't sure what the breaking strain of the fishing line I used for the critical distance would be so I used three lengths and this seemed adequate.

To get a good tension at the corners of the VK2ABQs I used an insulation gap of 3mm, consisting of five lengths of fishing line into a cable strap fitted round the fibreglass poles.

I hit a snag with 14MHz and, in order to keep this band within the confines of my garden, I did have to

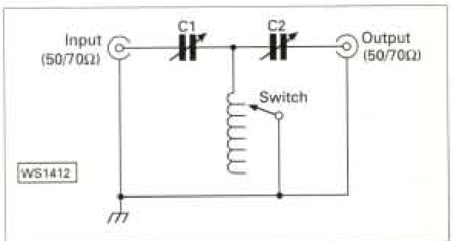


Fig. 3: Circuit drawing of the T-match unit used by Vic in the design of his antenna.

Table of wire and fishing line required for each band and critical coupling

Length of A to B & C to D = 7.3m
Length of A to C & B to D = 3m
Length of each fibre pole = 4.09m

MHz	Driven Element	Reflector Element	Critical Distance
18.1	8667mm	8642mm	275mm
21.2	7371mm	7345mm	370mm
14.2	10929mm	10903mm	480mm

Above use 16swg hard drawn bare copper wire. Critical distance uses fishing line.
All bands set up originally 200mm extra length.
Small length of 50Ω flat twin cable.
Plywood base, two pieces of 300 × 540mm 6mm plywood.
Length of fishing line.
Cable straps.

make a loop of 200mm at each end of the poles. Even so, it only just fitted.

When I managed to get the s.w.r. of each of the separate band's down low, the ends of the 16swg hard drawn copper wire were passed through a small terminal block previously fastened through the bamboo with a nut and screw. The wire was tensioned, the screws in the terminal block were tightened to 50Ω coaxial cable and also soldered.

The connections were wrapped with white PTFE and Duncil tape. Finally, the whole joint was covered with black electrician's tape to make it waterproof.

As near as possible to the joining, the coaxial cable was made into a coil of ten turns, 220mm diameter taped together and then on to the shack. In my opinion, a coil like this is better than a balun for TVI prevention.

Shopping list

2 Variable capacitors
1 coil s.w.g. bare copper wire double spaced, 17 turns tapped for 6 turns from capacitors, Tu5b ceramic coil is 51mm diameter.
1 4 position switch
2 50Ω sockets SO239
1 metal case

A T-Match ATU

I decided to use a T-match a.t.u. (see **Fig. 3**) which consisted of two variable capacitors and a ceramic coil former of the TU5B variety. This set-up worked excellently and I was able to get zero s.w.r. with no difference in the result of different s.w.r. and more protection to my transceiver.

At this stage, the 28MHz band was in the doldrums and there was a possibility that I might have problems with 21MHz, so it was decided to leave this band until a later date. With the T-match unit, much to my surprise, I was able to have QSOs on 10 and 12MHz.

There you have it, another set of VK2ABQs - in this case of the oblong variety that will give you up to 4.6dB gain, relative to a dipole and 25 or more F/B ratio - depending on how much time you spend improving the critical distance. Better in my opinion than a nest of dipoles and a beam that can be made neat.

My QTHR height is only 23m a.s.l. and there's a large hill 229m to the east and I've had consistently good reports. In the last 32 QSOs on the three bands I had weak reports from seven stations, strong reports from ten stations and in 15 reports, both stations had the same report.

No reports were below a readability of 4 and no European stations were included and maximum power was 100W. Go ahead and give this antenna a try - I'm sure you'll be surprised. *PW*

Appendix to 'The VK2ABQ Antenna Revisited'

After submitting this article for publication in *PW*, Vic G3HKQ sent in an update to his saga with the VK2ABQ antenna that he had been building. After his success with the 14, 17 and 21MHz bands he decided to have a go at extending the range to include 24 and 28MHz (as well as the f.m. band on 29MHz). Here's how he got on...

As the conditions on 24 and 28MHz began to improve, I decided to add another VK2ABQ and make a compromise beam to try to cover the 24 and 28MHz bands as well as the f.m. band on 29MHz. I thought it would be possible to have interactions between 20 and 21MHz but decided I'd cross that bridge when (or if) it occurred.

At first, a loop was built near the ground for just below 28MHz using four vertical garden canes and 16swg hard drawn solid copper wire. Using previous measurements, I obtained a frequency readout of below 28MHz.

To measure the frequency I used another of Les G6XN's excellent ideas of using a coat hanger coil. I also made the loop slightly larger so I would have enough wire to use for securing the VK2ABQ when it was made.

Next, I disconnected the three VK2ABQs I'd already built from the 50Ω feeder cable, then fitted the loop on the inside of the 21MHz beam. I cut the wire in the loop to form the familiar oblong VK2ABQ shape and fixed it to the fibre rods using the same system as used in the previous designs.

The driven element was made up of two lengths of 2.8m wire fastened to the other 50Ω cable, the opposite ends were fastened to the fishing line 200mm long. The reflector was made up of one length of wire 5640mm long and fastened to the opposite end of the fishing line - the fishing line being the critical distance.

For The Purists

To the purists who would question the measurements of this VK2ABQ, I would say that I was trying to cover three bands and with my T-match a.t.u., thought it would be a good compromise. I spent a few days operating on the new bands and the results were very good without an a.t.u. I must admit, though, that the s.w.r. on the c.w. section of 28MHz and the high end of 29.5MHz were high.

I fastened and soldered the driven element ends to the remaining three VK2ABQs I'd already built and connected them all to the 50Ω coaxial feeder cables. Again, without the a.t.u., all bands (except where mentioned on 28MHz) were below 1.5:1 s.w.r.

Using the T-match a.t.u., I was able to get unity s.w.r. easily. A further point was that there appeared to be no interaction between the 21 and 28MHz bands.

Results over the air were excellent on 14, 18 and 21MHz and, in addition, results on 24, 28 and the 29MHz f.m. section were as good. I'm not interested in DX as such and much prefer to ragchew mainly with c.w. stations.

Some of the stations I contacted on 24MHz include: N9WQ, HC5AI, VE3HTX, ZF2AF, VE7OM and K8EHE - none of whom were below 5 and 5 or 559. On 28MHz I made contact with: VA3JPM, ZS6ME, PY4PZ, LU9AFZ, KH6DX/M6, VE7VF, VE6KG, W6/G3MHV, W9PEA and 9J2BO - again none below 5 and 5 or 559. I only worked one station on the 29MHz f.m. band as I don't usually use this band, however EC8AUZ gave me a 5 and 9 report.

I'm highly satisfied now with the VK2ABQ and can now 'row out' with most, my signal reports are roughly the same as other stations that I work. All in all the VK2ABQ is an excellent beam and much under rated.