Antenna Workshop

David Butler G4ASR describes how he bent a length of wire to build a WA5VJB Yagi antenna for the 430MHz band.

David Butler says that the WA5VJB design antenna for 432MHz is a very effective beam antenna that will fit easily in the boot of a smaller car.

Last month in my VHF DXer column I reported that **Paul Webster PE7B** (ex-**G7KVE**) had just become active on the 430MHz band and wanted to build a simple Yagi antenna for use whilst operating portable from local hilltops. He needed an antenna that was simple to build, inexpensive, lightweight and that could provide a reasonable amount of forward gain to boost the effective power from his 5W transceiver.

The 430MHz antenna I'm about to describe was originally designed by **Kent Britain WA5VJB** and meets all these requirements. It's very easy to build using simple hand tools, the materials cost about £10, it's less than 700mm long and it provides a gain of around 11dBd. If you need a directional Yagi for DXing from a local hilltop or general home station communications, then this simple 430MHz antenna might just suit your requirements.

Yagi Configuration

The Yagi antenna described here, has been calculated to have its gain peak on 432.2MHz. The array is comprised of 6-elements: a reflector, driven element and four director elements mounted through a wooden boom. The driven element is a J-pole configuration that raises the antenna impedance to 50Ω and allows the use of an unbalanced feed cable. No baluns or gamma matches are used in this design and the feed method is simplified by directly soldering the coaxial cable to the driven element.

As the Yagi is very short, less than 700mm boom length, it's conveniently attached to the support mast at the rear of the reflector element. The coaxial feed cable is also routed out towards the back of the antenna. This method ensures that neither the support mast or cabling interferes with any of the Yagi elements thus maintaining the integrity of the antenna pattern.

The Boom

The boom is made from a 750mm length of 1/2 x 3/4in batten. Select a suitable piece from a local d.i.y. store making sure that it is not warped or has knots in it. Paint or varnish should be applied to the boom to protect it from the weather. There's little reason why fibreglass tubing wouldn't work just as well.

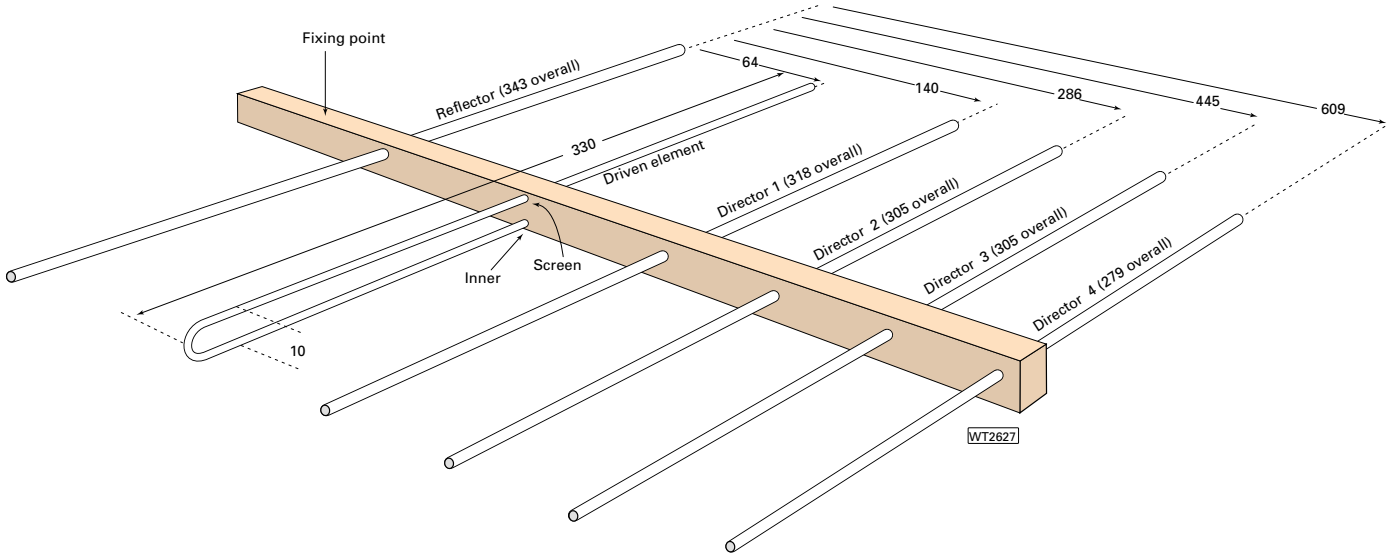
The elements can be made from 1/8in silicon bronze welding rod, hobby tubing and solid grounding wire or aluminium tubing with no change in performance. However, as you need to be able to solder to the driven element it's probably best to use a material for this element that can be easily soldered. Paul was unable to find 1/8in diameter rod in Holland and used 4mm diameter aluminium rod for the parasitic elements instead.

However, as Paul used elements with a diameter slightly larger than the original WA5VJB design, it was necessary to reduce the lengths of the four director elements by 3mm. On the plus side, the reflector and driven element and the other inter-element spacing don't need changing.

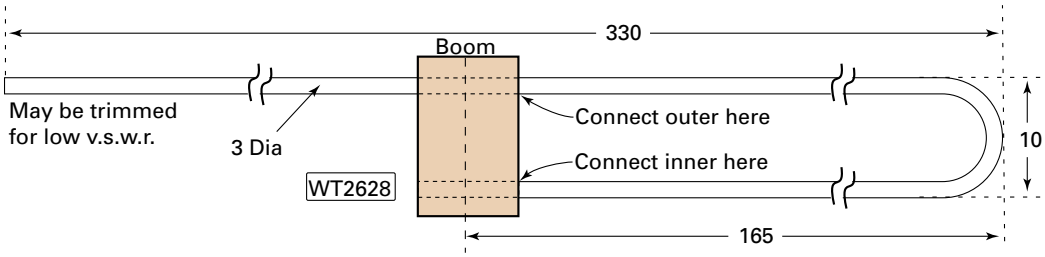
General Layout

The two illustrations, **Fig. 1** and **Fig. 2**, show the general layout of the Yagi antenna and the driven element. All the element spacings are referenced from the reflector position rather than giving individual inter-element dimensions. The measured point is the middle of each element. And by referencing all dimensions to one starting position you reduce inaccuracies along the length of the boom.

Measure, mark out and drill holes in the wooden boom to enable the elements to be secured as a push-fit through the boom. The reflector and driven elements should be cut to length and pushed through the holes in the boom. A drop of superglue or quick-set epoxy resin is used to hold the



● Fig. 1: A simple, but effective Yagi antenna with its optimised point, centred around 432.2MHz, just right for DX working from a local hill top. See Fig. 2 for more details of the driven element.



● Fig. 2: The driven element is constructed as a J-pole, but unlike the normal J-pole, the feed point is nearer to the mid-point. And of course is used horizontally.

elements in place having first made sure that the elements are centrally located about the boom.

The driven element is constructed as shown in the diagram Fig. 2 and then pushed into the wooden boom. Before fixing the driven element in place it is best to solder the coaxial cable to the element. You may either want to connect a short piece of cable with an in-line coaxial connector (so that a larger diameter main feeder may be connected to it) or attach a long piece of cable directly to the driven element. Whatever methods you choose always make sure you use the lowest loss cable that you can get your hands on.

At u.h.f. frequencies, you need to keep losses to a minimum, especially if you are running low power. The cable is soldered to the driven element connecting the inner conductor to the open end of the J-pole and the outer screening to the middle of the element as shown in the diagram Fig. 2.

The cable should be routed to the rear of the antenna fixing it to the wooden boom with tie-wraps or insulating tape, **Fig. 3**. Check the s.w.r. of the antenna and then put a blob of glue over the end of the coaxial cable connection and around the element to fix it to the boom.

The result is that it's a great performer, as Paul Webster PE7B can testify. During a recent tropospheric propagation opening Paul was active from a local hilltop site (JO30) running 5W from a Yaesu FT-817 transceiver into the 6-element 430MHz WA5VJB Yagi. His best DX of the evening was an 880km contact with the station of **GM4ZUK/P**. I hope that more Amateurs will discover the WA5VJB Yagi design and spend an evening or two making a cheap but very effective antenna.

So, what are you waiting for? Get the brazing rod out and make yourself a simple, cheap, but very effective Yagi beam antenna for 430MHz.

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● Fig. 3: On the bench, in more detail, viewed from behind the mounting point. This viewpoint had exaggerated the tapering element lengths.