The Dual Beam Pro

A small and light five band antenna from Pro Antennas

PHOTO 1: The completed Dual Beam Pro.

INTRODUCTION. The Dual Beam Pro from Pro Antennas is Carl, G4GTW's latest creation, aimed at amateurs who want to get a five-band antenna in as small and light a package as possible. The antenna is effectively a non-resonant dipole with capacity hat end loading. It has been specifically designed to be non-resonant on any of the amateur bands, but uses a balun/impedance transformer at the feed point to lower the resultant SWR down to a more manageable level. More of that later.

At first glance you may wonder why Pro Antennas has taken this approach to the design, but on closer inspection it all becomes clear. Carl points out that with a conventional half-wave dipole you get significant nulls off the ends. This means that when fixed in any one direction you will find that signals being received 'off the ends' will be down considerably – perhaps by up to 3 or 4 S-points. Plus, to get five band operation (20m-10m) you normally need either traps, parallel-fed radiators or some other form of matching to get the SWR down to 1:1 on each of the bands. The result can be quite a heavy, complex antenna that still needs to be rotated to give 360° coverage.

With the Dual Beam Pro, its non-resonant nature and impedance transformer means that you can find a match more easily, the construction becomes much simpler and the antenna much lighter. Also, the capacity hat end loading makes the overall length shorter.

At higher radiation angles the Dual Beam Pro starts to become more omnidirectional when mounted at a height of, say, 10m. But at take-off angles less than 10° (such as needed for DX) you can see the nulls off the ends of the antenna quite clearly.

These can easily amount to 10-48dB (2-8 S-points) depending on the band and height above ground (as confirmed in Carl's tests with Mike, G3SED). This was also seen by me when I modelled the Dual Beam Pro in the MMANA-GAL antenna modelling software. Therefore, you should rotate the antenna to get the best results.

Now, the purists will already be pointing out that you may get losses in the balun, the non-resonant nature of the antenna may rob you of an S-point or two, and the resultant higher SWR on the feedline may result in losses. Indeed, this is what I thought, but the tests showed that these fears were largely unfounded. Pro Antennas uses a low-loss balun and the low-ish SWR on the (relatively short) feedline means that any losses are minimised.

The worst case scenario was less than 2dB loss on 10m (28MHz) using 20m of RG213 coax.

However, ultimately the proof of the pudding is in the eating and tests showed the antenna to be a good performer.

CONSTRUCTION. The Dual Beam Pro arrived in two boxes – one long tube containing the radiating elements and a smaller box with the balun and mounting hardware.

I built and tested the antenna at the QTH of Chris, G0DWV, where he has an extensive antenna farm and a trailer-mounted Versatower that was used for the Dual Beam Pro.

Using Chris' set up we were able to compare it with sloping/horizontal dipoles, a doublet and a G5RV all suspended at about 50ft – and even a Force 12 beam at 80ft. The Dual Beam Pro was mounted lower than the other antennas and about 100ft away to minimise interaction.

The antenna looks like a giant H on its back, with a 5m aluminium boom and two thinner aluminium end-capacity hats, each 2.5m long. It is very light, very easy to construct and is designed to be mounted on a lightweight mast, gable wall or chimney. The hardware includes stainless steel fittings and a galvanised mast head bracket. The centre support insulator is solid GRP rod that provides good structural strength together with very low moisture absorption characteristics.

It took less than one hour to assemble the antenna and you need little more than a couple of spanners – it is very easy to build and the instructions are clear.

Carl recommends that you feed the antenna with at least 20m of coax, which helps reduce the SWR that the rig and ATU will see. The result is that most internal ATUs will be able to match the antenna down to an SWR of 1:1.

In reality, with the antenna on a Versatower at about 25ft and fed with 100ft (30m) of brand new RG-213 coax I found that the resultant SWR was below 3:1 on most bands, rising to a maximum of 4.7:1 on 14.000MHz (see table).

My own rig's internal ATU will tune antennas with an SWR of up to about 10:1, but I know that other manufacturer's will only manage about 3:1, so you might have to use an external ATU if you have problems finding a match on some bands.

TESTING. On hooking the Dual Beam Pro up to Chris' station, testing could be started in earnest. The HF bands were humming with the solar flux at 155.

First impressions were that the antenna is quiet, noise-wise. This is probably as a result of it being horizontally polarised and balun-fed. In a noisy suburban

Pro Antennas Dual Beam Pro

(At 25ft above ground, at the end of 100ft RG213 coax)

7.100MHz	SWR 20.9:1
10.120MHz	SWR 10.6:1
14.000MHz	SWR 4.7:1
14.350MHz	SWR 4.3:1
18.070-18.168MHz	SWR 3:1
21.000-21.450MHz	SWR 2.8:1
24.930MHz	SWR 2.6:1
28.000MHz	SWR 2.6:1
29.700MHz	SWR 3.2:1

neighbourhood this could be a major boon.

The next impression was that this is no compromise antenna. It heard better than Chris's doublet and G5RV and was roughly equal to resonant half-wave dipoles (as you would expect). It was also electrically quieter than the G5RV, doublet and a half-wave sloper on 17m suspended with the top at 55ft.

On tests with the SV5TEN beacon on 28.180MHz we found that rotating the Dual Beam Pro so that it was end on rather than side on resulted in the signal strength dropping by about 2 to 3 S-points. This was about what my modelling predicted and shows that for best results the antenna should ideally be fitted on a rotator. Its lightweight construction, however, means that a smaller, less expensive, rotator should be fine.

A list of DX worked and heard doesn't really tell you about the antenna's performance, but in tests with VU2DSI in Mumbai, India on 10m (28MHz); VK4JUZ in Australia and W4UWC in Knoxville, Tennessee on 17m (18MHz); and BA3AO in China on 20m (14MHz) the Dual Beam Pro bettered all the aforementioned antennas in terms of the signal-to-noise ratio and overall signal strength. Only a Force 12 beam at 80ft performed better, usually beating the Dual Beam Pro by about three S-points (as you would expect).

Back-to-back tests with a station in Sweden on 17m SSB confirmed that it was either equal to or better than all the other wire antennas by about 1 S-point.

CONCLUSIONS. A further week of testing by Chris confirmed that is a very quiet, usable antenna that performs well on all bands 20-10m. I must admit we were both surprised as conventional wisdom would have it that the design should result in mismatched losses due to higher a SWR on the feedline and potential losses in the balun.

In reality, this wasn't borne out and perhaps proves that a rotatable, low-noise dipole-like antenna (even if non-resonant),

PHOTO 2: The balun and mounting hardware.

can give better performance than a fixed wire antenna like a dipole, doublet, G5RV or noisy vertical. The antenna can also be used on 30m (10MHz) and 40m (7MHz) with reduced performance. It is down on a dipole on these bands due to its small size.

If you want an antenna that outperforms your compromise wire antenna or trap vertical on HF, but don't have the space or money for a tower and conventional beam, the Dual Beam Pro has a lot to offer.

I would suggest you mount it as high as you can, at least chimney height if possible, and use a rotator too for the best results. It isn't a directional beam (with gain) in the traditional sense, but then it doesn't pretend to be, weigh as much or cost as much.

What you do have is an electrically-quiet, simply-constructed antenna that can be used on 20m-10m with little fuss. You can rotate it to peak signals or null out the ones you don't want.

You will need a good internal or external ATU and it is best fed with quality coax like RG213 rather than the thinner RG58. Carl suggests Mini RG8 as a good compromise for cable lengths between 20 to 30m.

In conclusion, both Chris and I started the tests thinking that the antenna would be a compromise. In the end we were both very impressed - and when it comes to antenna testing that doesn't happen very often.

The Dual Beam Pro costs £219 and is available direct from the UK manufacturer

PHOTO 3: It took less than one hour to assemble the antenna.

PHOTO 4: A trailer-mounted Versatower was used for the Dual Beam Pro.