One Wire - three bands

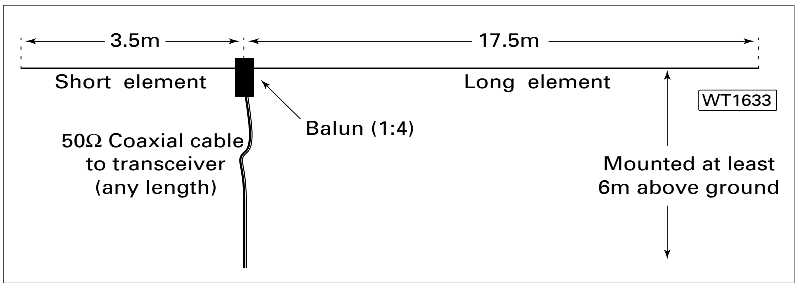


Fig. 1: The simple layout for the asymmetric dipole covering 14, 21 and 28MHz.

Denis Payne G3KCR describes a three band dipole that has excellent characteristics on the three Amateur bands of 14, 21 and 28MHz.

I have been using a Windom antenna, fed via a 4:1 balun, for some time on the 14, 21 and 28MHz bands. One advantage of this antenna is the feed-point, being close to one end it reduces the sag and the feeder length. But, in the spirit of experimentation, I decided to try variations as I wanted a better match for all three bands and felt certain that there had to be a better solution.

My Aims

To achieve my aims on all three bands the antenna would have to be about 20m long. Initially, finding a point off-centre which offered a similar radiation resistance was by 'guesstimation'. The mounting height was also important and six metres was chosen as the starting point.

I also found that I would still require the use of a step-up balun at the feed-point. In the end, I selected the 4:1 balun which would match the 50Ω coaxial cable to the 200Ω feed-point. Having found the best position for 14MHz and adjusted the overall length, I found that it was also close to a match on 21 and 28MHz.

My next step was to adjust the feed position and length for optimum performance on all three bands. After several experiments, I found that the best overall length was 21m as I've shown in **Fig. 1**. This length gave s.w.r. figures of less than 2:1 when fed 3.5m from one end for all three bands.

Software Aid

Then, with the aid of software, I calculated the predicted radiation patterns for all the bands. The results appeared to be very good, copies of my printouts are shown in the diagrams. The gains shown in the patterns are with reference to an isotropic radiator (dBi), and so 2.15 should be deducted from the 'dBi' figure to find the gain compared to a dipole (dBd).

For example, the 8.35dBi gain on 28.5MHz is 6.2dBd (6.2dB better than a basic dipole), and similar to the gain of a small yagi antenna. The patterns and angles of the lobes, are subject to change due to height and nearby objects.

I found that on the 7MHz band, I had an s.w.r. reading of less than 2:1. But computer modelling showed the radiation pattern and maximum radiation were mainly vertical. To reduce the launch angle would require mounting the antenna at a much greater height than I could achieve.

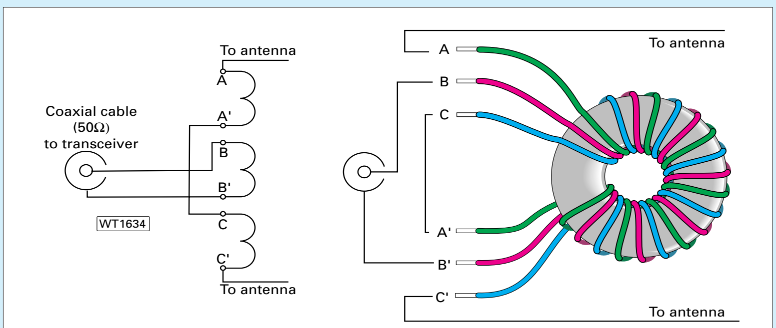


Fig. 2: These should make winding the trifilliar 1:4 balun much easier.

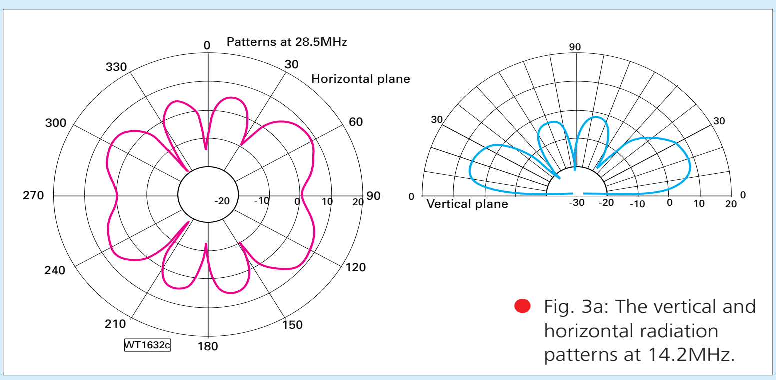


Fig. 3a: The vertical and horizontal radiation patterns at 14.2MHz.

Balun Building

Now to build the 4:1 balun, which consists of a toroid (Fair-Rite 43) with a diameter of 35mm. It's trifilliar wound with seven turns of (24/0.2mm) insulated flex. I used three wires with different colour insulation, which I find makes it easier to identify the windings.

The centre winding (of the three forming the balun) is connected to the coaxial cable. The other two windings in series become the feed to the antenna. The balun should be fitted into a small, but strong, plastic box.

The circuit and the general wiring are shown in the illustration of **Fig. 2**. To complete the unit, I used a long grommet through the box for the coaxial cable to prevent water entering. I also used stainless steel screws for the antenna connections to prevent corrosion.

Top Ring

I also included a fixing ring in the top of the box. This allows the antenna to have an alternative support at this point, leaving the short end to be angled downward, making the installation shorter overall. I found that this made very little difference to the s.w.r. readings and performance. However, both end should be kept clear of any metal objects such as masts.

So that's it, an easy antenna covering three popular bands with the minimum of fuss! I wish you good DX.

PW

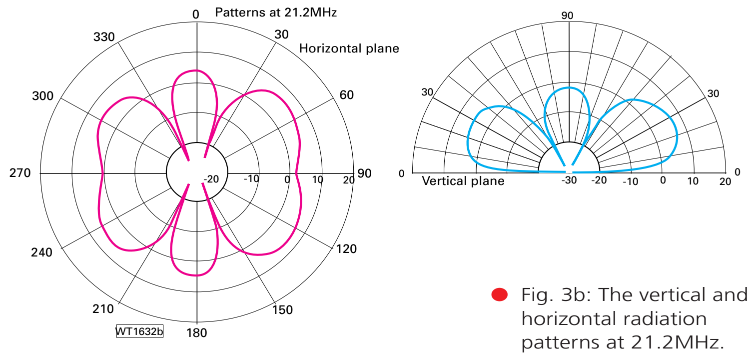


Fig. 3b: The vertical and horizontal radiation patterns at 21.2MHz.

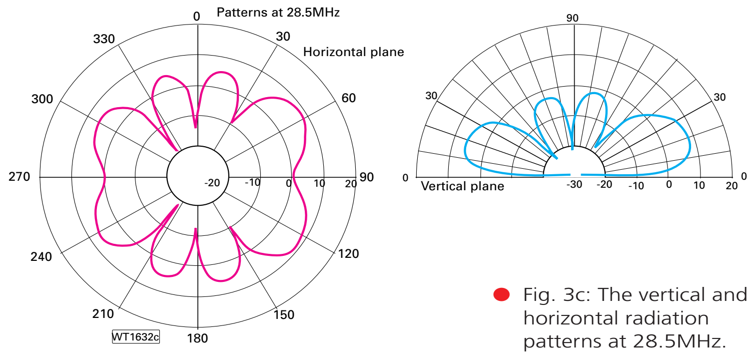


Fig. 3c: The vertical and horizontal radiation patterns at 28.5MHz.

Errors & Updates

I'm sorry to report that the Gremlins have obviously been hard at work on recent issues of *PW*. Please note the following changes need to be made.

Looking At ...

On pages 19 and 20 of the May 2001 issue of *PW*, the article **Looking At ... The Signal Strength Meter** by **Gordon King G4VFV**, every instance of a signal level value given in millivolts (mV) should in reality have been microvolts (µV). A problem of final computer text translation caused the error.

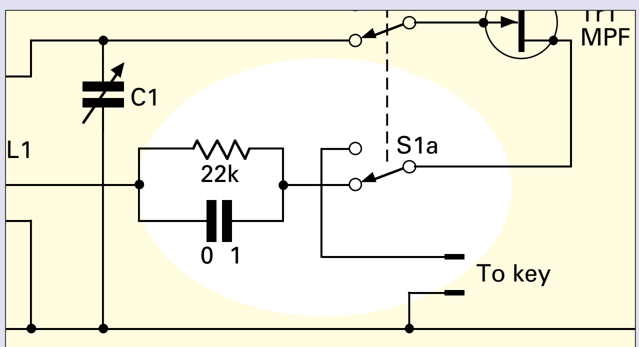
Windfall Antenna

Also in the May 2001 issue, on page 28, in **The Windfall Antenna article** by **Tony Harwood G4HHZ**, the paragraph in the left hand column (alongside Fig. 3) beginning, "Initially the design aimed ..." should actually read: "Initially the design aimed for a non-reactive dipole impedance at the arithmetic mean frequency of each band ie. 14.174 and 21.225MHz. The calculated lengths being 10.05 (5.025 for each leg) and 6.87m (3.435m for each leg) for the two bands of 14 and 21MHz. Calculation of the characteristic impedance gave values of 890Ω on 21MHz and 940Ω on 14MHz, with reactances at band edges of ±j15Ω on 21MHz and ±j18Ω on 14MHz. These impedance values give calculated s.w.r. values of 1.2:1 (21MHz) and 1.36:1 (14MHz) on the 75Ω feeder."

The error was caused by a misunderstanding with Tony's original manuscript in preparation for publishing.

Carrying On

Now the final problem to be reported, occurred in the June 2001 issue of *PW*.On page 44 of the June 2001 *PW* a problem crept into the circuit diagram of Fig. 1 in **George Dobbs G3RJV**'s article **Carrying On The Practical Way**. The error concerned the connections to S1a in Fig. 1. A corrected circuit is published here, please amend you own issues to show the change highlighted.



My apologies to all readers and authors for these errors.
Rob Mannion G3XFD, **Editor**