THE TILTED TERMINATED FOLDED DIPOLE

A PRACTICAL BUILDING GUIDE

By ROB WAGNER

Recently, I have been experimenting with the Tilted Terminated Folded Dipole, a.k.a. TTFD, a.k.a. T2FD. I have not previously used one of these antennas, so it was most interesting checking out the design specifications and construction details. The design has been around for many years now, first coming to prominence in the June 1949 issue of QST Magazine.

It is not my intention to describe this antenna here. You can get further details on construction from the following recommended sites:

An introductory article by Guy Atkins describing the antenna's design, performance and construction can be found at:

http://www.hard-core-dx.com/nordicdx/antenna/wire/t2fd.html

Arnie Coro, of Radio Havana Cuba fame, and being an amateur radio operator, describes the antenna from both a receiving and transmitting point of view:

http://www.radiohc.org/Distributions/Dxers/ttfd2.html

Antenna expert, Lou Cebik (W4RNL) provides a more technical modeling of the antenna's performance in an article that raises some interesting pros and cons for the T2FD:

http://www.cebik.com/t2fd.html

In addition, Wellbrook Communications has a commercially made balun suitable for the T2FD using a 9:1 impedance match, and also offers some description of construction:

http://www.wellbrook.uk.com/UMBT2FD.html

However, my comments here set out to describe my own experiences with its construction and performance. It is, indeed, a more complex antenna to assemble than your simple longwire or dipole.

The construction requires some thought and sturdy assembly methods. Because of the spacers, the folded nature of the wire, and the weight of the balun and terminating resistor assemblage, the distance required for a long T2FD does require some strong end supports. In my situation, one end is anchored to a tree while the other end is attached to a metal pole attached to the side of the house.

The issue of the balun, for reception only situations, is a little confusing….as you will read from the reference articles listed above. The antenna is broadbanded, meaning that it operates effectively over a wide range of frequencies. Being a folded dipole, it also has a high feedpoint impedance of anywhere between 300 and 600 ohms, depending on a host of factors, including the angle of the tilt, surrounding objects and structures, etc. Some references recommend 4:1, 6:1 and all the way up to 9:1 baluns in order to match the antenna to a 50 or 75 ohm coax lead-in.

I have to say that I have tried ALL of these baluns on the antenna at my installation and have really found little difference between the lot of them in a receiving situation! It must have been comical to the

neighbours to see me jumping up and down the ladder, swapping baluns, and then running inside to the receiver to compare signal strenghts!

However…….(there's ALWAYS an "however"), if I was using this antenna for transmitting purposes on the ham bands, I'd be far more fussy about matching the antenna and lead-in through a balun. The choice of a balun would be more critical for transmitting purposes.

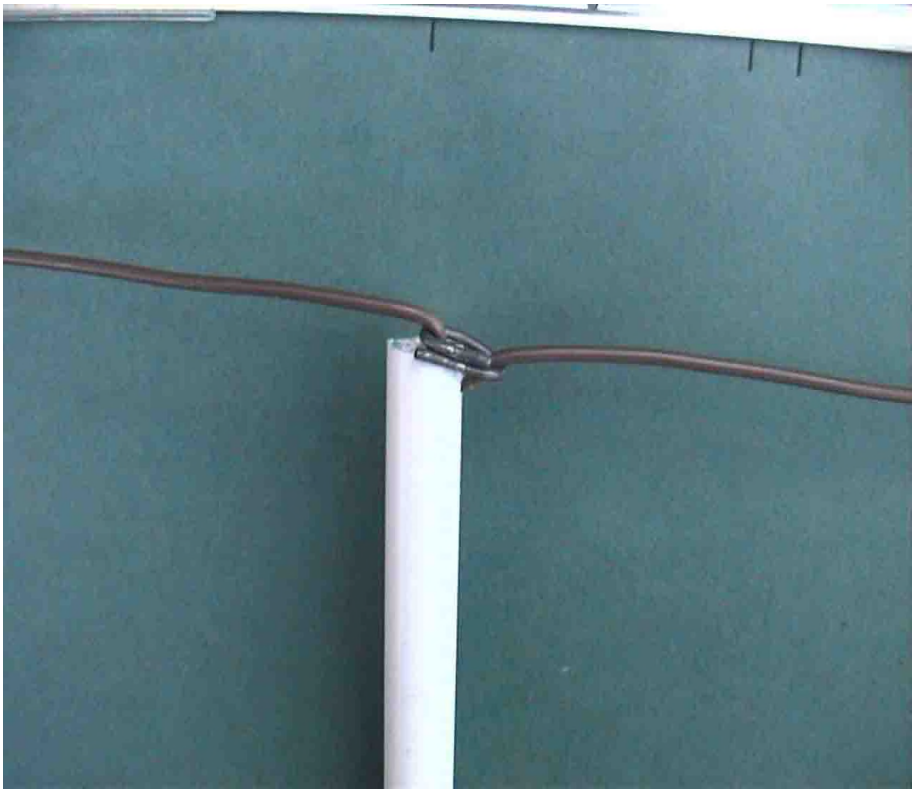
Oh,…….and one other point. I do use the T2FD through an antenna tuning unit. It's a good idea to do this in order to increase the broadband characteristics and usability of the antenna.

However……..(there's THAT word again!), being a broadband signal gatherer, I have found the T2FD to also be very good at picking up man-made electrical noise. My antenna is cut to "theoretically" operate from 4.8 mHz upwards. Yet, while it is great at increasing signal strength on signal metres, it also picks up a huge amount of suburban hash on that band. Perhaps set in a quieter, rural location the antenna would probably provide a much better signal-to-noise ratio. Interestingly, my 20 metre band inverted-Vee dipole is often a better antenna for the 60 metre band, because while the signals picked up are weaker, the noise is also much weaker. So, I end up getting a better signal-to-noise-ratio out of the dipole on that band.

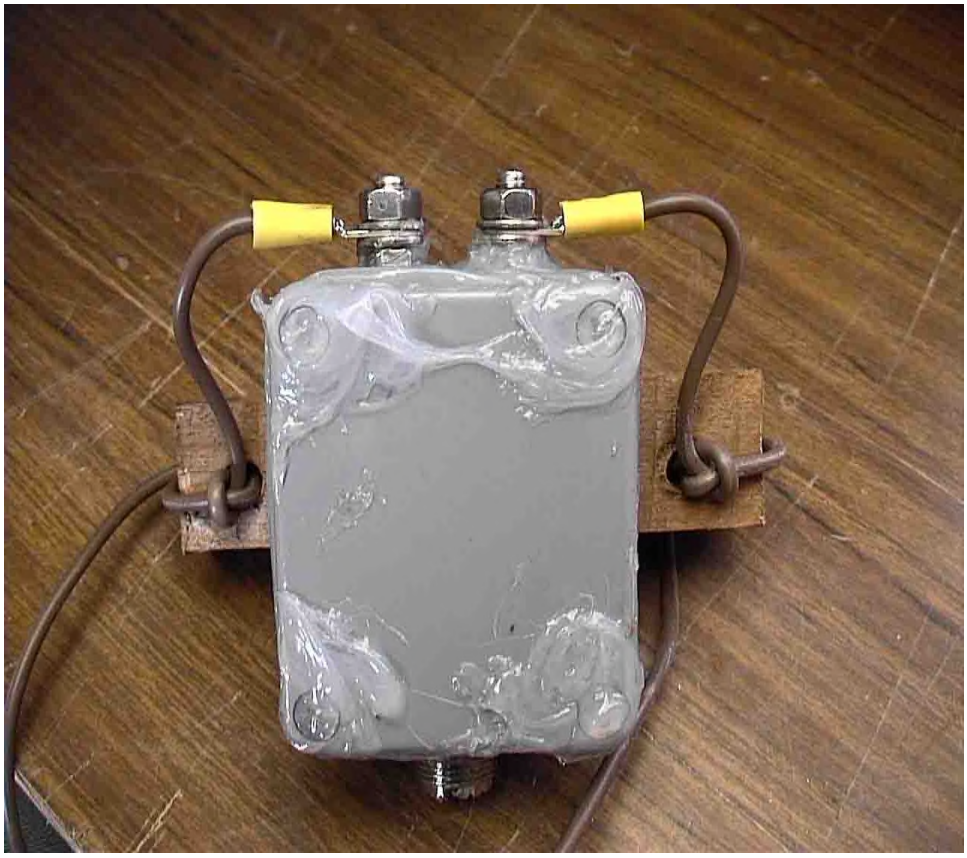
Also interesting is the fact that the T2FD is a great antenna on 49 metres at my location. It is most effective in boosting signals while keeping the noise under control on that band. I'm not sure why it is better at handling the noise on that band than 60 metres. Overall, the antenna appears to work well all the way up to 10 mHz.

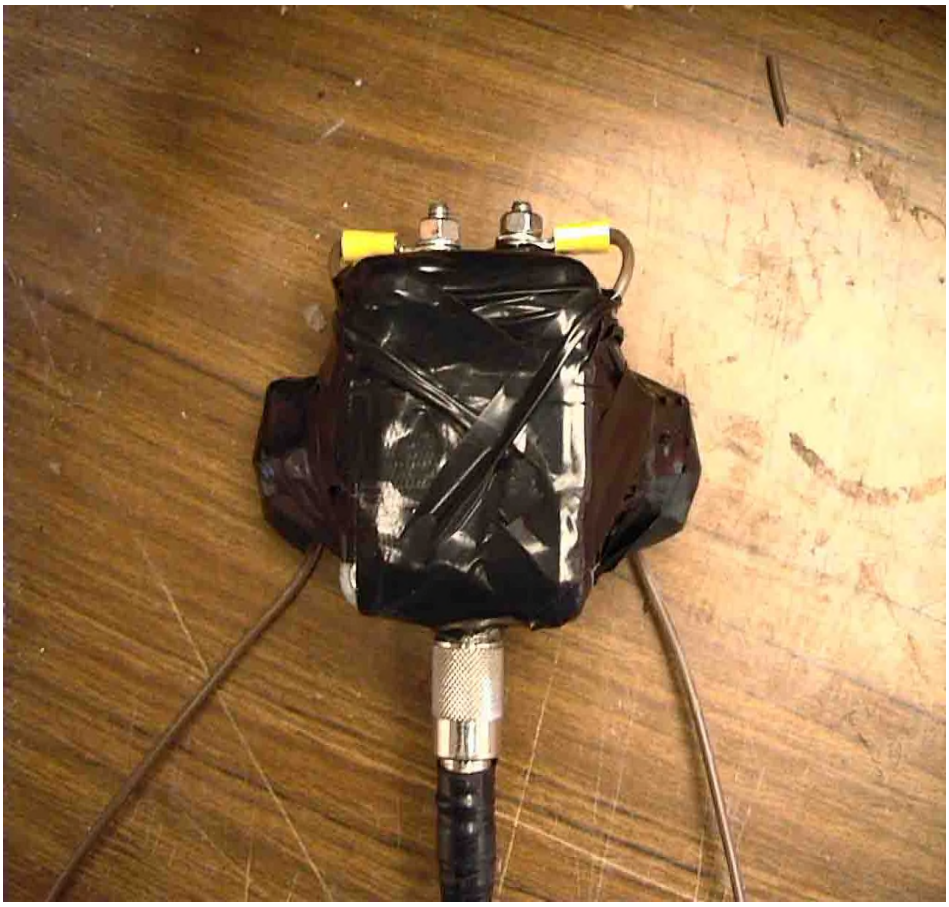
Some of the articles listed above mention spreaders of made of wood or bamboo. I have gone for small-diameter PVC pipe, and find this a light and effective alternative. Keeping the weight of the antenna down is important for large low-frequency versions of the T2FD.

I have also used homemade wire clips to keep each spreader in place. This, plus threading the wire through only one side of the spreader seems to keep it from moving along the wire.



The balun pictured here is a 4:1 type. The outside of the plastic box is heavily coated with silicone compound to prevent the entry of moisture. I then attached it to a wooden block that takes the considerable strain from the wires. I have then wrapped the whole shebang in electrical tape……probably "overkill"…but ohh well!





The terminating resistor is a little 1/2 watt 390 ohm inside an old 35mm film canister. Again, plenty of silicone is applied to keep out the moisture.

For my 60 mb T2FD, I felt that 3 spreaders on each side, plus the end spreaders were necessary to keep the wire separated and the antenna sturdy. In the photo below, the two legs of the antenna are laid out side by side.

I also decided to provide two ties for each end spreader to the supports. The articles generally show only one tie-off to the support, but I feel this causes the antenna to spin around too much in high winds. You may be able to see two small holes, one at each end of the spreader, where cable is threaded through and tied to the supporting post (or tree).

I haven't been able to erect the antenna at a 45 degree angle, it is somewhat less than that. However, the next holidays will see me trying to rectify that situation by raising one of the support posts by another 2 metres into the air. It does have a considerable dip in the centre of the antenna, as the whole construction is relatively heavy....but....it's STILL up there....so far! A combined length of 41 metres is quite an awesome site. My wife and daughters were most impressed when it was hoisted into the air (cough, cough).

Rob Wagner (VK3BVW)
Receivers: Kenwood TS-2000,Yaesu FRG100, Sangean 909
Antennas: 14 mHz dipole, 5 mHz T2FD