Antenna Workshop

A T-Lambda Antenna For 430MHz

John Heys G3BDQ, shows you how to make a simple vertically polarised wide-band antenna for the 430MHz band.

One of the antenna designs that appeared in Volume three of the ARRL *Antenna Compendium* is the T-Lambda antenna. This antennas design was developed by **Robert Wilson AK7KK** a professional antenna planner for Broadcast Stations.

During 1995 I constructed an antenna using his design data for the 144MHz band, that proved to be very successful. And the model I constructed then, still hangs from a beam in my loft. The T-Lambda (Tλ) is a vertically polarised 'skeleton' version of the well known Discone antenna. Like the Discone, this antenna's very broadband and can be made for the v.h.f. and the h.f. bands easily. The T-Lambda type of antenna is smaller than equivalent ground plane antennas, as well as only needing just two sloping radials.

At the Tλ's feed point the impedance is a convenient 50Ω, and when the antenna is designed for the centre frequency of a particular bend it displays an almost level s.w.r. figure right across that band and usually has an s.w.r. of around 1.3:1 or better. So, there is no need to use an a.t.u. or extra matching network.

About a year ago I acquired a new transceiver, which will operate on all the h.f. bands and additionally covers the 50, 144 and 430MHz bands. Having no wish to chase DX on 430MHz, I just needed a small but efficient antenna for local and repeater f.m. work.

Because of my complete satisfaction with a loft located Tλ for 144MHz that I'd constructed earlier, I decided that I'd make a version for the 430MHz band. Again I used AL7KK's design figures and very soon had my tiny version of the T-Lambda antenna up and running.

The photograph shows the completed antenna clamped to a small diameter fibre-glass pole and it is actually positioned inside my upstairs shack. The picture may look a little 'artificial', as I have painted the thicker vertical and horizontal elements with a matt finish coat of the mat-black paint that's supposed to be for refurbishing (or making) blackboard. I did this to make them show up more clearly in the photograph only, there's no need to copy this.

The T-Lambda fixed atop a two and an half metre pole. Its small size is obvious from the QSL cards in its vicinity.

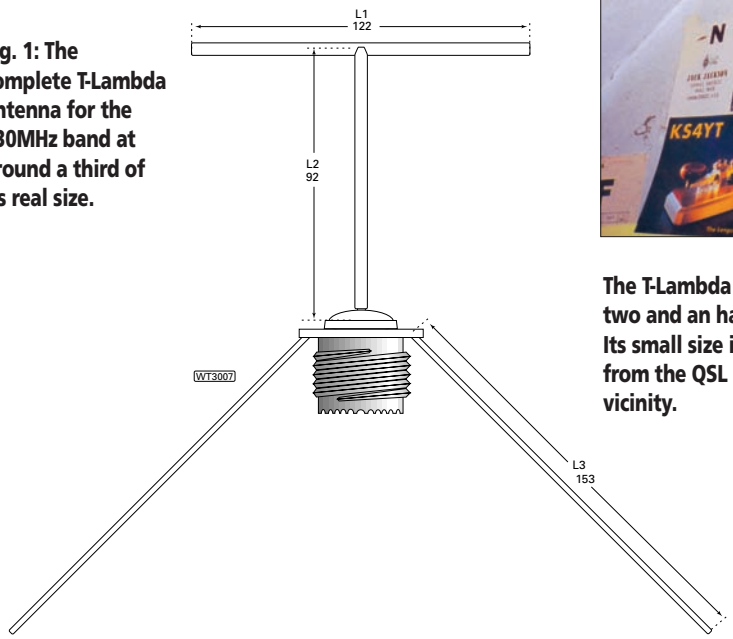

Fig. 1: The complete T-Lambda antenna for the 430MHz band at around a third of its real size.

Antenna Heart

The heart of the antenna is an SO-239 coaxial socket that is shown in **Fig. 1**. I decided to build a make myself a sturdy version of the antenna so, used thin 4.5mm (3/16in) diameter copper tube for the T that's marked as L1 and L2 (see Fig. 1). The sloping radials are made from stiff 2mm (14/16s.w.g.) copper wire, which may be either enamelled or bare.

By using copper tube for the vertical L2, the

bandwidth of the antenna will be wider than when a vertical wire is used. The tube also simplifies the soldered connection to the central spigot of the SO-239. The horizontal to bar L1 performs like the top of a centre fed Marconi 'T' antenna and is there to give top loading but not to radiate. the antenna currents on either side of the centre point will cancel out which almost eliminates the reception and transmission of horizontally polarised signals.

A high wattage soldering iron or a gas iron will be needed to solder the copper tube, an operation. This is perhaps the only tricky part of the construction work.

Just two sloping (at 45°) radials, (labelled L3) are required and their upper ends are soldered to opposing corner holes in the square base of the SO-239 coaxial socket. It is best to give the area around these holes a good 'going over' with a file, both top and bottom before attempting any soldering.

The 50Ω coaxial feeder should run down vertically and be equidistant from the radials until it is well below them. By doing this there will be no need for a current balun (clamp-on or coil) to prevent r.f. running down the outer surface of the coaxial copper braid.

A thin nylon or similar insulated chord may be attached to the centre of the horizontal top of the antenna if it is to hang from a beam or something similar. My version instead uses nylon cable ties to clamp the SO-239 socket to the top of my non-metal pole.

Setting Up & Testing

Using low power, say, five watts, the antenna can be tested in the shack and checks made of the s.w.r. ratios over the whole band. A small change in the 90° angle between the sloping 'radial' wires can be made to achieve the best s.w.r.

The reading can be brought down to be close to unity, although the difference in signal reports between unity s.w.r. and a slightly worse figure of 1:1.3 is negligible. Should the antenna be positioned out of doors it must be thoroughly moisture proofed. A liberal covering of the coaxial socket with a silicon-rubber sealant with the sealant applied over the position where the coaxial cable enters the PL259 plug would prevent moisture ingress to the feeder.

It is said that 'height is everything' when discussing antennas, and this is no doubt true when considering antennas for v.h.f. My 430MHz Tλ was not located in the loft for there were already enough wires antennas up there. Also, at my age clambering up and into the roof space is not something undertaken lightly or too often!

With the antenna positioned in my shack the construction of the house means that where the T-Lambda is positioned it can fire right through some QSL cards and the external roofing slates. With just a few watts I can receive a huge signal from the repeater at Charing, Kent, some 26 miles from my QTH and have no difficulty in working through it. My local repeater is about 4km (1.5 miles) away and despite an intervening hill is a tremendous signal at all times.

Other Bands

The reader may be inclined to make a T-Lambda for the 50 or 144MHz bands, and if this is the case copper wire can be used for L1 and L2 (Fig. 1). This will reduce the antenna's weight with little effect upon its performance. Here are the dimensions:-

50.1MHz L1 = 1.061m L2 = 0.794m L3 = 1.329m
145MHz L1 = 0.366m L2 = 0.274m L3 = 0.459m

My earlier article concerning the T-Lambda antenna was published in *Practical Wireless* in 1996 and was part of the Antenna Workshop (*Antennas To Go*) and described the construction and use of T-Lambda antennas on the h.f. bands.

The T-Lambda designs for h.f. antennas are easy to make, effective, and require just a couple of end support masts to hold up the horizontal wires. **PW**

Churchill's Radio?

Churchill's Radio - an April Fool spoof or was it a case of PW being hoaxed? Oliver Tilllett G3TPJ perpetrator of the 2006 traditional April spoof reveals all! And in introducing our loker - the PW Editorial staff confirm Oliver's joke brought a large response (see letters pages) - and a number of readers thought the magazine had been well and truly hoaxed!

The not-so-old 'Wartime' radio built by G3TPJ. Despite Oliver's admission of the April Fool spoof - he confirms that case is made from a wartime Australian cheese box!

Oliver Tillett G3TPJ writes: Hopefully you were intrigued by my 'spoof' letter in the April issue. And I can confirm everything was true except references to the receiver itself! The case was indeed made from a Second World War crate marked 'Australian Cheddar Cheese', the set however, is much more recent and smaller than first appears!

Always looking for something to build I embarked on this miniature 'valved radio'. It stands just eight inches high and as some of you guessed the valves are made from shortened test tubes, filled with kitchen foil for a metallic effect. These, with the various coils and screening cans are simply glued to the chassis. Even the loudspeaker transformer is just for show, although the Editor tells me a