Stuart Craigen's Antenna Workshop
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Top Band in a Small Garden?

Why not try it? Stuart Craigen G4GTX describes a shunt-fed loaded wire 1.8MHz vertical antenna for small gardens.

This project began with the age-old problem of how to develop a 'Top Band' (1.8MHz) antenna, capable of radiating a good ground wave signal while being effective at over 300km from a postage stamp garden!

The book *Vertical Antennas* by **William Orr W6SAI** provided a lot of helpful information on the shunt feeding of vertical aerials. Many of the designs, however, were based on the use of copper pipe as the radiating element.

For Top Band the height of such a design would have been totally impractical for a very small garden, so I decided to see if a shunt-fed Top Band vertical could be developed using wire! It could. But the length of the antenna would be increased because of the difference in radius between the copper pipe and antenna wire.

The resulting antenna (**Fig. 1**), which looks like a capital 'G' from the side, can put down an impressive ground wave signal and has enabled me to receive 5&9 reports from Oban, Aberdeen, the South Coast, Switzerland and even a 5&9 report from a short wave listener in Italy!

Drainpipe & Antenna Wire

The antenna is constructed from grey 50.8mm (2in) plastic drainpipe and antenna wire. For a vertical antenna to work effectively, good earthing is essential. At ground level two 1.21m (4ft) ground rods coupled to a quarter wave counterpoise and some radials buried under the lawn provide the earthing for the vertical. Adding extra radials would in all probability increase the efficiency of the vertical antenna. Attached to the rods is the shunt coil L2.

The shunt-feed coil consists of seven turns of antenna wire wound on a 50.8mm (2in) former. The coaxial cable from the transmitter is connected across the shunt coil - inner to the top and braid to the earthy side. This coil provides a convenient and efficient 50Ω match to the coaxial cable. The length of the wire from the shunt coil to the loading coil is 9.144m (30ft).

The loading coil L1 consists of 30 turns of antenna wire wound on a 50.8mm (2in) former. Beyond the loading coil, the wire passes through an insulator attached to the 6.1m (20ft) support pole at about 1.525m (5ft) and then through another insulator at the

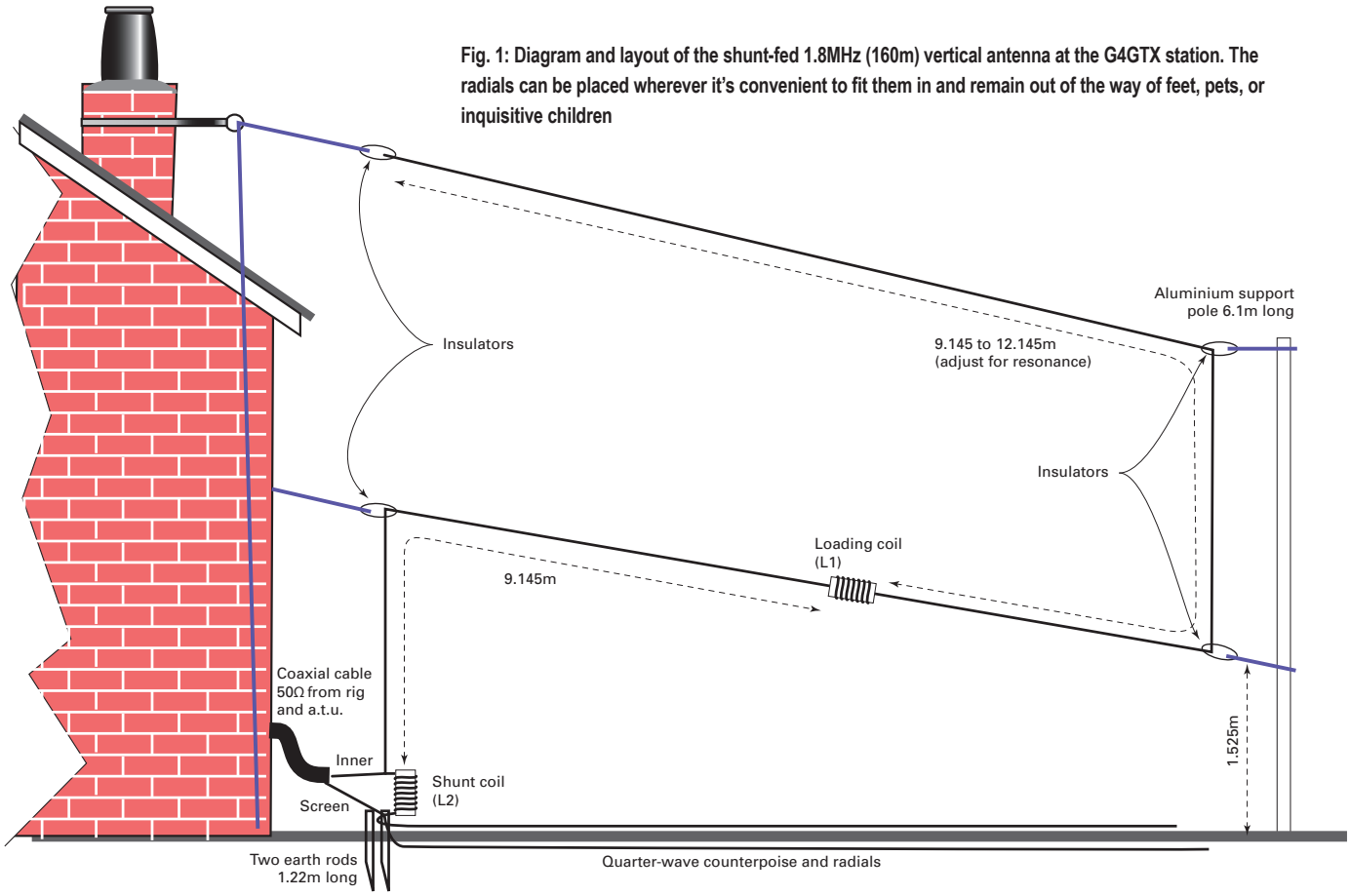

Fig. 1: Diagram and layout of the shunt-fed 1.8MHz (160m) vertical antenna at the G4GTX station. The radials can be placed wherever it's convenient to fit them in and remain out of the way of feet, pets, or inquisitive children

Fig. 3: Close-up view of the shunt coil.The coaxial cable from the transmitter is connected across the shunt coil - inner to the end out to the loading coil and top. The braid connects to the earthy side, going to the ground spikes and radials.

Fig. 2: View of the shunt coil, coaxial cable feed and earthing rods. The coil consists of seven turns of antenna wire wound on a 50.8mm (2in) former. Some form of weather protection will probably be needed.

top of the support pole, ending at an insulator attached to the chimney stack. In the interests of safety, this was fitted by a professional rigger. He also fitted a halyard with pulley and length of cord to enable the antenna to be easily lowered for tuning purposes.

Tuning The Antenna

To tune the vertical to resonance, I used an antenna noise bridge – a useful tool in any shack! Alternatively, an antenna analyser could be used to check the resonant frequency. If neither of these is available, the length of the antenna can be adjusted to resonance with the aid of an inline s.w.r. meter. To do this, the length of the wire beyond the loading coil is adjusted.

I found that a length of 10.67m (35ft) brought a 1:1 s.w.r. on 1.950MHz with no a.t.u. but this will depend to a greater extent on the individual installation and layout of the antenna. An a.t.u. can be used to flatten the s.w.r. at the band edges. With no a.t.u. in circuit, I can obtain a useable s.w.r. between 1.900 and 1.960MHz.

One advantage with this antenna system is that all the r.f. currents are out in the garden and not in the shack, as sometimes happens when using end-fed wires. The total outlay was very modest – some grey plastic drainpipe available from DIY stores, some lightweight antenna wire and two earth rods!

Does It work?

The antenna has shown itself capable over the years of putting down a strong local groundwave signal while enabling regular night-time contacts from the North of England to Exeter in the past. Contacts have been made to Norfolk and to Aberdeen mid-morning during the winter months! No electromagnetic compatibility (EMC) difficulties have been encountered over that period either.

When compared to the 25.6m (84ft) end-fed wire or W3EDP antenna, which I also use on 'Top Band', certain outcomes were evident. I found that with distances of under 300km the 25.6m (84ft) wire provided the better signal on both transmit and receive but at distances of over 300km the shunt-fed vertical was clearly in the lead.

Although the length of my garden is only some 7m to the boundary fence, this shunt-fed loaded vertical antenna has, over the years, enabled many long distance contacts from a very small suburban garden.

If you want to work Top Band from a small garden, then this might just do the trick for you, too! ●

Fig. 4: The loading coil, L1 consists of 30 turns of antenna wire wound on a 50.8mm (2in) former and is placed 9.145m from the 'top' of the shunt coil. The outer end of the antenna has its length trimmed to give resonance of the whole system. As it might vary between about 9 and 12m a little experimentation will be needed. Some form of weather protection will probably be needed.