CATCHING THOSE ELUSIVE SIGNALS

An antenna is the start of your receiver's signal chain. Don't let it be the weak link.

Arthur Cushen

NOW THAT THE new listener is aware of the frequency range of the receiver and how to find the incoming signal on the radio dial, it is time to look outside in order to improve the strength of the signal, and here is where an efficient antenna is necessary.

The two main considerations in constructing or selecting an antenna are the space available to you and the frequencies you are interested in. Generally, the lower the frequency (and the longer the wavelength) the greater the space you will require. If space is the main limiting factor, the ground plane, inverted V and loop antennae are the ones to look at. Those with plenty of outdoor area can play around with the long wire antenna and its variations, the beveridge and inverted L antennae.

Long wire antenna

A long wire antenna is, as its name suggests, a long wire strung from your 'rig' to a conveniently located post or something similar. The length of the long wire should be one wavelength or more of the lowest frequency of interest. The appropriate formula is:

$$\text{metres (length)} = \frac{71.5}{\text{f(MHz)}}$$

A typical long wire installation is illustrated in Figure 1. The actual height and length depend entirely on your circumstances. A piece of 50 mm by 100 mm oregon is painted (the new external wood paints such as 'Timber colour' etc are very good) and bolted to a fence post or other support, as far from your receiver installation as you can reasonably manage it. A pulley, obtainable at almost any hardware store, is fixed to the top and a loop of good quality hemp rope threaded through it, before erection.

An egg or strain insulator is attached to one end of the antenna which is also tied. The other end of the antenna is erected near the receiver installation. An insulator is also attached at this end and the lead-in taken down from it to the receiver installation. The antenna is then supported from this end by tying it off to a chimney, as illustrated, or to a screw-eye in the facia-board of the house. Having one end of the antenna higher than the other is of little consequence. It'll still work!

The lead-in should be taken in such that it clears the house guttering and may be fed through a ventilator opening or over a window sill — whatever is convenient. Avoid running it for any distance clamped to a wall or parallel to metal guttering, pipes or wiring. The more direct, the better.

Once your long wire is up you're ready to go! The end of the lead-in can simply be attached directly to the antenna terminal of your receiver or it can be connected to your receiver via an antenna tuner! Antenna tuning is merely a way of varying the reactance of the tuner to optimise for the particular frequency you want to receive.

Inverted L antenna

The inverted L antenna (see Figure 2) is a form of long wire that is bent at 90 degrees about half way along its length. The formula for calculating the total length of wire you need is:

$$\text{metres} = \frac{71.5 \quad \text{x (1.1 to 1.3)}}{\text{f(MHz)}}$$

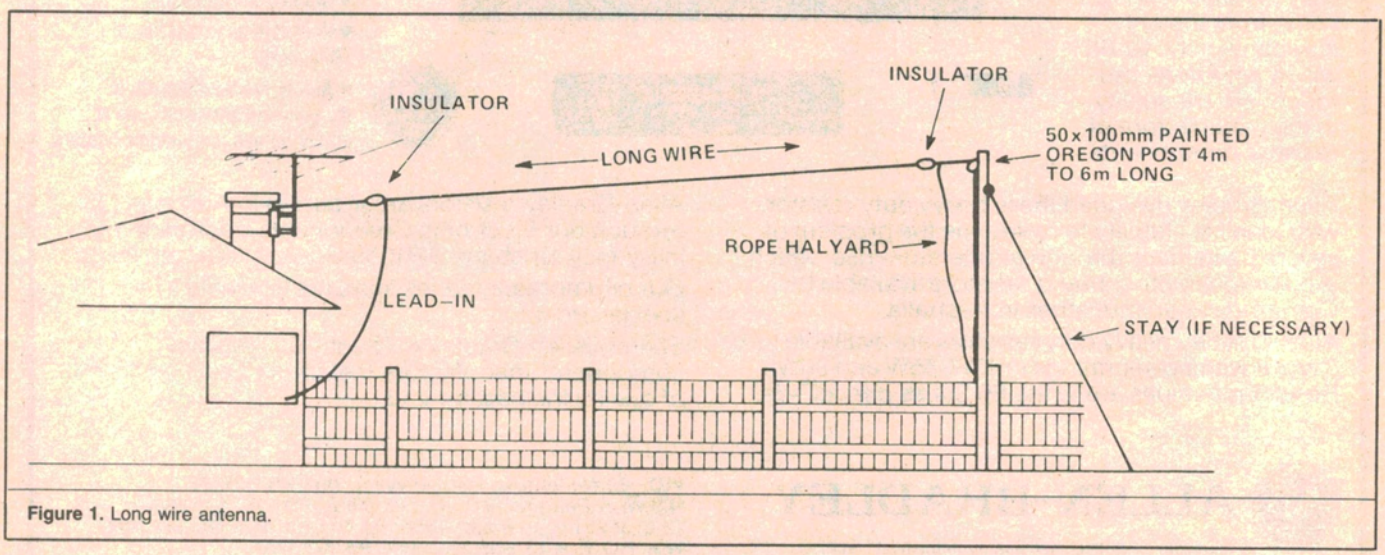

Figure 1. Long wire antenna.

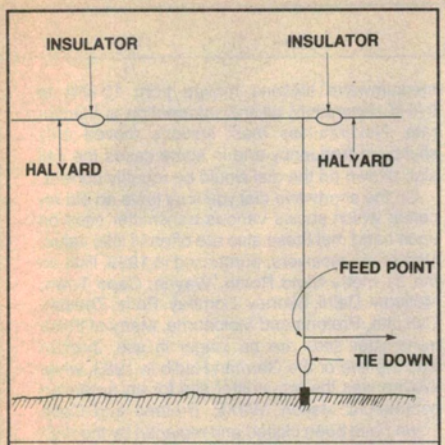

Figure 2. Inverted L antenna.

The advantage of the inverted L antenna over the long wire is that it is simpler to tune requiring only a single variable capacitor.

Beveridge antenna

For those fortunate enough to live in areas with little space limitation, another form of long wire antenna, the beveridge, has proved to be efficient especially on mediumwave.

Like the long wire this antenna is stretched horizontally, but is earthed at its end. Length is not critical, but direction is. The greater the length of antenna, the more defined is the area of reception. Thus its erection should be based on compass bearings; the antenna should be pointed towards the part of the world from which the signal of interest is received. For example, a long antenna running north-east would give best reception of signals from North America.

The beveridge antenna need not be high above the ground but it should be held in place by several short poles up to 5 metres high. Earthing the antenna at the far end relies very much on experimentation to improve reception.

Many groups in Australia and New Zealand favour this antenna for 'outdoor' listening. There have been many cases of listening in car radios at the beach with an antenna attached to broom handles and strung from the car across the beach.

Inverted V antenna

A wideband inverted V style of antenna is illustrated in Figure 3. This works extremely well across the range from about 5 MHz up to 30 MHz and uses ordinary TV ribbon for a feedline. However, an antenna tuner is necessary.

Good signals will be picked up by this antenna right down to 2 MHz, but at these low frequencies, there's no substitute for size and different antennae, designed to operate in these regions, usually provide better performance.

Beggars can't be choosers though, in many circumstances!

Construction is quite simple. Again a 4 or 6 m length of 50 x 100 mm oregon, is erected against a suitable support — shown here as the side of a house. A fence or garage is just as good.

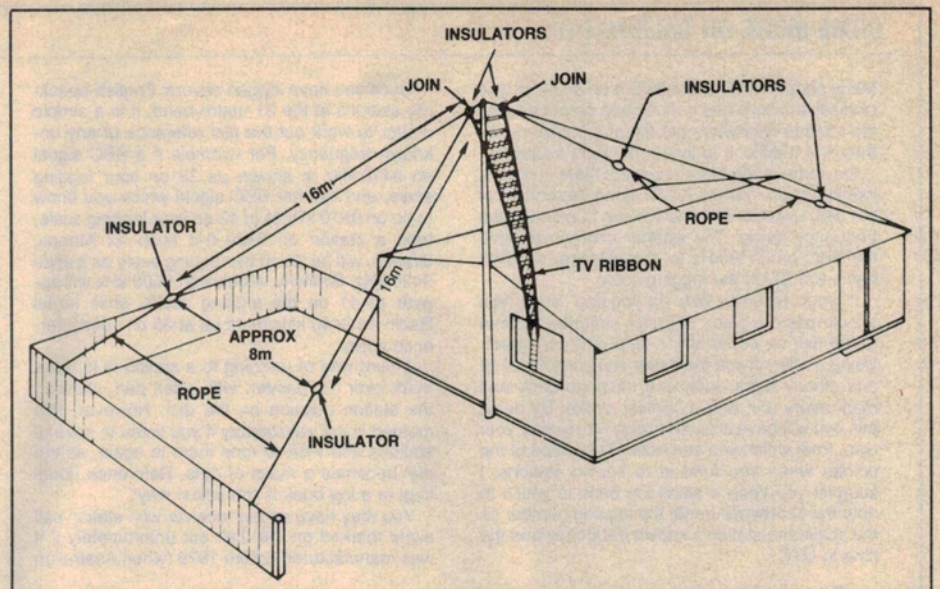

Figure 3. Inverted V antenna.

If you can attach a length of aluminium pipe to a chimney mount or to your house gable — well and good. Just get the centre up as high as you reasonably can.

Each leg of the inverted V should be 6 metres long. The legs can be shorter — whatever you can fit, but the performance at low frequencies suffers.

The TV ribbon is connected where the opposite legs of the antenna join at the apex. Support the ribbon with standard screw-in TV ribbon insulator standoffs.

Each leg should be individually tensioned with the rope strainers as indicated. Large screw-eyes, obtainable from most hardware stores, screwed into the supports as illustrated serve as excellent anchor points and allow the rope to be tightened using an appropriate slip knot (a round turn and two half-hitches is excellent).

Ground plane antenna

The ground plane antenna was originally designed as a high frequency transmitting antenna, but makes a fine receiving antenna and covers a wide frequency range. Response from 13 to 49 metres has been found better than with a long wire. Below 49 metres performance falls off but the antenna compensates by almost eliminating TV interference on 60 metres.

It is also a useful shortwave aerial for the listener who has little room available, because it can be placed on the roof of a house without extensive guy wires running everywhere. The vertical portion used is ¾ or 1-inch square aluminium tubing; 5 metres long is light and strong. The length is determined as being equivalent to quarter of the wavelength of 19 metres (5 metres approximates ¼ wavelength = 15.2 MHz).

Ground radials are copper wire 5 metres long, at right angles to each other at the base of the antenna. They do not have to be horizontal, in fact it seems preferable that they be up to 45 degrees down from horizontal, that is 135 degrees from the vertical.

TV ribbon provides a matched lead-in for the antenna, one side linking the vertical to the antenna jack on the receiver, the other side linking the four radials to the earth of the receiver. By having the receiver earthed, performance is improved and noise level reduced. However some sets may work better without the connection to earth. Breaking strain nylon line is used to support the vertical, rather than affect the balance and performance of the antenna.

This antenna has produced some good catches already. Signals have been heard on 13 and 16 metre bands which were inaudible with a 35 metre long wire.

Tuned loop antenna

This antenna typically consists of a number of turns of insulated wire on a former about 0.75 metres in diameter. It can be tuned with a single parallel capacitor. Its particular advantages are easy construction and its portability. This aerial is highly directional so it should be mounted vertically with the edge of the loop pointed towards the station of interest.

Generally

Long wire antennae including inverted Ls and beveridges are generally more suitable for mediumwave reception. Those best suited to shortwave are the ground plane, tuned loop and dipole (which we haven't mentioned here).

In constructing an aerial, rules of thumb are to have it as high as possible and clear of any obstructions such as power lines. The wire between the two insulators can be copper or insulated; lead in should be covered wire. Most importantly, make sure the aerial touches no metal objects. One further precaution is to fit a lightning arrestor which short circuits any unwelcome current. ●