

A simple VHF vertical aerial for the home station.

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A simple aerial can be constructed from 10mm aluminium tubing fixed to a mobile aerial base. This makes it easy to change bands, just jump up on the roof & unscrew the radiator, change it over, screw on the new one! A genuine multi-band version is under development. To reduce corrosion, **seal** the top with non-acid silicon, and **grease** the thread in the tube.

Make sure that the coaxial cable is **absolutely** water tight at the mounting base; best way is to use an inverted die-cast box on the underside to keep driving rain out. The coax is protected against damage on the ridge cap edge by threading a short piece of garden hose over it, and it protects from the next hazard too. Another hazard to coax cables is shown [here](#), link thanks to <http://graemechapman.com.au>

Do not mount several aerials close together without checking by simulation with MMANA-GAL or similar, as the longer (lower frequency) ones can interfere with the others, giving a lumpy pattern, ie. poor results in some directions (try multiples of half wavelength spacing at highest frequency).

Mounting bases and ground-planes.

This type of base gives a very simple mounting to the ridge cap of a galvanized iron roof. It is a small piece of flat sheet galvanized iron, bent in the home vice. In the centre, mount a standard vehicle mobile type base. There are two thread standards in Australia for this, the 5/16" 26tpi brass thread (BSB), and the 8mm metric. They look much the same size, but don't swap them over. The metric thread has a much coarser pitch. Peter VK3ZAV has both taps.

If you have a tiled or other non-metal roof, then four radials will be required, each one quarter wavelength long at your lowest intended frequency. One of the textbooks suggests 0.28 to 0.3 wavelengths long. The actual aerial length is not very critical, but is affected by the sum of, the mounting base capacity, the roof shape (slope), and your mobile mounting base shape.

Mounting arrangements



Roof mount of Shane VK3FSRG, held in place by six 3mm pop rivets.



An alternate mounting method which includes ground plane radials.



A close up shows the mounting arrangement of the two ground radials bolted to a piece of 75mm aluminium angle.

A Quarter wave vertical

The simplest of all verticals is a quarter-wave long at the operating frequency of interest. The aerial is made of 10mm diameter aluminium tube, with a thread cut to fit the base. The vertical radiator should be about 95% of a quarter wavelengths long, for the following bands:

10m	2586mm	You will need guy ropes
6m	1415mm	May get away with this for 2m also, for test anyway.
2m	489mm	will also work @ 70cm
70cm	173mm	Not much point, as the 2m one works just as well.

A higher gain 5/8 wavelength 2m aerial.

A very simple way to more than double your effective transmitter power, as well as the transmitter power of those you're listening to, and costing about \$10, is to use a longer aerial, and tune it (as many of the AM Broadcasting stations do). A 5/8 wavelength aerial will exhibit around 4dB (6dBi) of gain. A 5/8 wavelength at 147Mhz, the middle of the 2m FM band, calculates at 1275mm. With careful adjustment you will find that this aerial works quite well on 70cm too.

Note: This is not a J-Pole, which is an end fed half-wave dipole, having the same gain as a quarter-wave ground-plane, and has 4db less than this 5/8 wave radiator.

If you run the simulation program MMANA GAL (see the links list, Design Software), you will see that the 5/8 wavelength gives a nice 50 ohm resistance, requiring a series inductor to give a good match, with best pattern & gain). Although the simulation program MMANA-GAL suggests more, don't bank on greater than 4dbd gain (6dbi). Download the simulation file for this aerial from [here](#)

A clever way to add the tuning inductance, as suggested by one of the RSGB books of the 1960's, is the use of a coaxial stub, but the linear stub shown here seems to work just as well, and is easier to make. Although the clamp in the picture is made from a solid block of aluminium it is best made from either round or square aluminium tubing, as it positions the actual short circuit point more accurately than with the solid clamp shown.

To make a clamp like this, two 10mm holes must be drilled with high precision through a piece of about 20mm tube, either round or square, and a drill stand and drill vice are recommended to get the two tubes accurately parallel. After the 10mm holes are drilled, drill a bolt hole for about a 4mm stainless steel screw, then cut the clamp in half with a hack saw, so that tightening the screw makes good firm contact with the two vertical tubes. Trim the SWR by moving the clamp up and down a little. The simulation shows that adjusting the total height mostly adjusts the R component, and the stub length the X component.

As shown, height 1275mm, stub 375mm, spacing 25mm (centres), base 325 x 200mm.

As a club project, we would expect to find a club member that can make up several of these clamps.

Finished product at VK3FSRG



Close-up of stub arrangement