

Portable HF Antenna Options

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29 July 2017

It is probably obvious from my many other web articles about the operations at VK4ADC that I like to have various antenna and radio gear options available when away from the home QTH. I have developed ideas over time as how to implement to gain flexibility to provide the best outcome as determined by local conditions: available space, setup/pulldown time and even operating locality. For instance, it is usually useless planning on putting up a 40 or 80 metre dipole in a crowded caravan park or campground but a vertical such as a squid pole is easy to erect, takes minimal setup time and small physical area.

I will diverge briefly about antenna efficiency versus size. A large resonant antenna (eg full size dipole) will always be more efficient than a reduced-size antenna (eg a trap dipole), which will always be better than an untuned whip (eg a squidpole with vertical wire radiator) and it, in turn, is more efficient than a helical whip (even though it too is resonant). Size is important!

I set about comparing three antenna types during a recent trip with the caravan out to a bush campsite, plenty of space and low noise levels. The reference antenna was the trap dipole, the frequency around 7110KHz on the 40 metre band, the signal source was a VK3. The coaxial feeders from the antennas were terminated in BNC plugs which made it possible to change through the three antennas all within a minute thus virtually eliminating QSB effects.

The outcome was: trap dipole = S9, 7 metre vertical squidpole with 4:1 UN-UN = S7 (& occasionally to S8), Mobile One M40 helical whip = S5. The relative signals test was repeated the following day at a different campsite, similar dipole direction, and that provided exactly the same results (S9, S7, S5). I have noted previously there has been a one-to-two S-point difference between a full size dipole versus the trap dipole with the full-size dipole providing the stronger signals.

The summary effect is that if you have enough space available then erect full size dipoles, if not then try to fit the trapped versions, even just for short-term portable operations. I have worked into Europe with my squidpole-based vertical wire antenna on 20M so it does work, just not as efficiently as other simple antenna types. The helical whip is fine while driving (/travelling) but is a poor selection for actual portable operations.

Ok, back to the original topic: portable antenna options. You may actually be “stationary mobile”, and even be using antennas mounted on the vehicle, but term the operation as “portable”. Alternatively, you might be using larger-than-normal antennas mounted on or near the vehicle but be operating from a radio mounted in the vehicle. Either way, what options can you use to mount HF antennas on the vehicle? What about on the caravan? Maybe a nearby tree? I guess actually operating from the caravan (or at least outside the car) is ‘really portable’ but who is quibbling about the correctness of the term?

I made the most of this most recent trip to photograph at least some of the HF antenna options I typically have available to me, or usually at least some of, while away from home. The photos each have a textual description to provide an insight into the how or why of each example....

Mouse-over the images to see in greater detail...



Straightforward HF helical whip mounted on the top of a removeable L-tube structure. The antenna base is bolted to the 40mm square tube riser via a S/S right angle bracket and S/S bolts. There is a 3mm 'handycord' loop that goes under the hard top on the tub to give extra stability while driving.



The tubular L-bracket slides into a slightly larger tube 'socket' and is retained by a T-bolt and wingnut. The RG58CU coax from inside the vehicle is terminated in a BNC female to allow use in many ways. The flylead from the antenna base is terminated in a BNC male, with the extra coax length (ie cable slack) wrapped around the vertical tube. When not in use, the BNC socket has a dust cover fitted to keep out water and grime. The tubular socket is welded via a spacer tube onto a flat plate and thence fitted onto the vehicle by the retaining bolts for the back bumper/step.



The chosen whip simply screws on to the antenna base, with a choice of whips available covering 80, 40, 30, 20, 15, 10, 6 and 2M. My homebrew loading coil can be fitted under the 40M whip to tune to 160M if necessary.



The L-tube can also have a squid pole mounted on it via a round tube arrangement that bolts on through 6mm holes through the square tube. wingnuts used to tighten into place. The top of the round tube has a PVC adapter section for quick and easy fitting of the squid pole itself.



This view shows the wingnuts a little more clearly, noting a fair spacing in between to provide extra stability. The HF whip base is left in place as there is sufficient clearance - on purpose!



The Squid pole simply 'plugs' over the top of the PVC fitting although there are holes and a retaining pin to ensure it stays fitted.



A slightly clearer view of the tubing arrangement. Note the coil of black wire disappears into the hole in the PVC, and that is the actual antenna wire that is used. As the squid pole is extended, the wire is drawn into the tube. Quick and easy.

(Note: this squid pole gets to travel a lot so the paint finish is always damaged!)



It isn't easy to see the squid pole from this distance and against the trees but that arrangement works out pretty well - the squid pole goes up in 2 minutes or less, the 4:1 UN-UN at the base just clips on and the BNC connector on it is a simple push and twist. The squid pole mounting pipe section can be left in place on the L-bar even when travelling.



This image shows the 4:1 UN-UN fitted at the base of the squid pole antenna. The UN-UN is inside a jiffy box, screws through for the antenna and earth connection plus a BNC female on the side. The earth/ground connection has a permanent lead with a crocodile clip to ensure easy connection to a grounding point.



The UN-UN is a toroidal based arrangement to provide approximately 200 ohms to 50 ohms transformation, unbalanced antenna to unbalanced coax feed.



By inserting only the bottom bolt through the round and square tubes, the squid pole mount can be tilted backwards making it easier to fit the extended fibreglass section. Once moved to vertical, the second bolt is fitted.



This is the mounting point on the front drawbar of the caravan. The 38mm thick-wall steel tube is welded to a piece of 6mm bar, with that bar attached to the drawbar with a large rectangular u-bolt. (The u-bolt also holds the front 100mm PVC tube in place via an extra pipe bracket.) This image shows a stubby 32mm pipe with a CB antenna base bracket added top allow the fitting of a HF helical here instead of on the vehicle. The coax wrapped around the PVC tube is 'spare' to allow flexibility in the use of the BNC-terminated cable.



View of the mount from the opposite side. Note the use of a T-bar plus nut to tighten the 32mm tube in place. Note the use of BNC connectors - quick and easy and good to over 100W up past UHF!



The HF whip mounted on the front draw bar bracket. The only problem with using this mount is that you cannot easily open the front boot on the van, at least not without releasing the T and lifting the antenna assembly out of the socket.



The solution to the front mount obstruction is to add one onto the rear bumper of the van too. This was done by using another short length of thick-wall 38mm pipe plus a galvanised fence post T-socket. The vertical pipe was welded to one side of the T-socket only to ensure mechanical stability and ease of assembly. Where the straight path of the T-assembly goes over the bumper tube, a piece of grey vinyl was wrapped around the bumper to minimise damage to the paint finish. That 'insulator effect' was resolved by running a thick braided earth wire (RG213 outer braid) in underneath the van and directly onto the chassis. Again, a T-bar retainer is threaded through the side wall of the vertical tube.



The opposite side of the rear bracket shows the earth braid and coax disappearing underneath the van.

The stubby HF helical mount was fitted into the pipe for this view and the BNC connectors make for quick and easy fitting.



More detail in this view of the rear mounting, with the HF helical base in place.



More detail in this view of the rear mounting. This shows the T-bar retainer clearly.



More detail in this view of the rear mounting. This shows the T-bar retainer clearly.



More detail in this view of the rear mounting for those who may want to copy it in some way.



The coax is terminated in a BNC socket when not in use, simply to keep moisture, dirt and grime out of the connector.



The end of the cable is popped into the top of the tube and the cable tied off the the T-bar retainer for safe travelling.



The back van mount also works well for the squid pole, but using a different 32mm mounting pipe arrangement that simply fits into the 38mm base pipe. That adapter is shown in a separate image.



The UN-UN simply attaches to the coax from inside the caravan, the earth lead goes to the braid connection point on the rear and the black antenna wire clips onto the antenna connection on the jiffy box. Quick and simple.



The squid pole mounted on the rear bar of the van. Needless to say a number of other caravanners came up to ask about it !



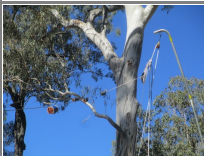
Being prepared for tree-less setup of a HF dipole/V calls for a lightweight 'mast tube' made from some pre-loved slender tent poles, all of which fit together to make a short-to-transport but long-erected mounting pole. This style of mount has no real strength so it must be guyed, in this example with three nylon rope guys in places on the caravan and vehicle but tent pegs are in the kit to allow ground fixing.



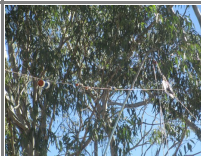
The top of the 'mast' has a 90 degree section that allows the halyard to be spaced out from the metal tubing. It is important to use a halyard as the tubing simply does not have the mechanical strength to be moved to the vertical state with the weight of the dipole wires and balun attached.



The slender mounting pipe fits into the front drawbar pipe via an adapter section to expand the diameter to 32mm. The dipole/V ends have lengths of nylon rope in place to allow tying off to any suitable position, with extra tent pegs available if needed.



The 90 degree hook piece at the top is clearly visible in this photo. Note the use of a pulley to make the pulling up of the dipole, balun and coax easier.



Yes, there are coaxial trap baluns in there somewhere. The main advantage of the trapped antenna is that it is physically shorter while providing multi-band operation.



This shows how messy it can get: 3 rope guys plus the 2 rope sections of the halyard plus coax plus 3 dipole sides. Messy or not, it illustrates that it is possible to put up a dipole (or more correctly a V) when trees are not available.



The traps are there too, getting caught up in the ropes when erecting the V. This image shows how much bending is apparent in the mast pipe any why guys are absolutely necessary.



Easier to see against the sky, this shows the balun mounting 'plate' with the dipole legs out each side.



This image is out of focus because I was holding (and supporting) the squid pole in my left hand while trying to capture the image with the camera in my right. Its purpose is to illustrate that the 'socket adapter' for the squid pole simply slides into the mounting tube on the van drawbar.



Squid pole in the drawbar socket, UN-UN in place with the earth lead connected to the caravan chassis. Again, quick and easy.

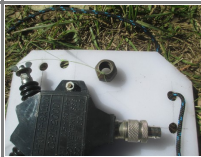


This is the real secret of using a variety of antennas on the radio: an LDG Z100 ATU. This one hides on the floor under the front passenger seat in the D-Max and connects to the body of the IC-706Mk2G under the drivers seat. Again, BNC connectors are used to make good Rf connections that are quick to move.

I also have a different LDG ATU permanently in use with the IC-7000 that I use in the caravan proper, or when participating in Field Days etc.



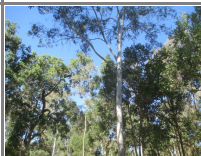
My not-so-secret way of getting halyard ropes over tree branches: a slingshot from a camping shop. (Back in my boyhood, they were called shanghai). Add the fishing line and parts from an old spinning reel plus a shaft to hold it on an angle above the dirt, then all you need is a weight plus good aim (or have plenty of practice). Warning: only use line with a breaking strain of about 6-10Kg so that you can snap the line off if it becomes tangled in foliage.



This image shows two things: the car wheel nut that I use as a weight on the fishing line, and which is shot over the tree branch. Sometimes with rough bark on the branches there is a need for more weight for the nut to make it back to the ground: simply add another nut or two. The second part is the piece of kitchen chopping board that has the balun screwed to it. The holes along the upper side are duplicated along the bottom edge and are used to take the strain of the dipole wires off the balun termination points.



The trap dipole wires have been connected to the balun with the wires fed through extra holes in the white backplane, RG58 coax feeder plus orange rope halyard all ready to erect the dipole/V.



The trap dipole centre, with balun centre, hauled almost up to the tree branch with the rope halyard. At this stage, the wire dipole legs are just hanging down loosely.



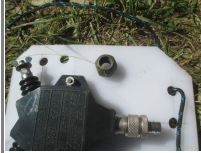
It is worthwhile not trying to get it fully up to the branch so that there is less possible interaction between the antenna itself and the 'conductive makeup' of the tree trunk. Others have had their antennas directly against tree branches and trunks and found that they have been detuned - move it away a bit and all is well.



Looking along one leg of the dipole reveals the bodies of the traps hanging down. That's ok as the trap structure provides enough strength to cope with the entire wire, trap and end tension loads.



This view shows what you shouldn't do : pass the antenna through foliage. The tree that this leg was tied off to was just in the wrong position and the next one with a clear path was too far away.



This is a repeat of an earlier photo but this time, look for the two extra holes near the balun termination post. The wire is fed through the holes before it attaches at the termination and the wingnut makes it quick and easy. Remember to take a few extra wingnuts along as long grass makes them hard to find (and you are likely to fumble them...)



This is a side view of the balun backplate showing the wire entering from the side and through the front hole, then it turns back through the second hole before reaching the termination post.



The 32mm OD "short plug base" section attached to the bottom of the squid pole make it easy to put into either the front or back "sockets" on the caravan. The black hookup wire is simply pulled out as the squid pole sections are compacted - the reverse of when it is erected and the wire disappears into the hole in the mounting base as each piece is extended.



Nearly forgot this one: how to tie off your halyard to the tree trunk... Green rope has loop at one end & passes around the tree trunk then back through its loop. Once the balun is up at the correct height, tie a quick loop in the halyard (orange rope). Tie the loose end of the green rope through the newly-made orange loop with a quick slipknot. All done & easy to remove or adjust.

Maybe I should add that the "modified tent pole mast" was used to support my triband (6/2/70) turnstile array back in November 2016 for the Spring Field Day (link (/~vk4adc/web/field-day-activities/81-2016fds/176-2016spfd)) from the socket at the front of the caravan so it doesn't just have HF antenna mounting applications.

What isn't shown here:

My OCF dipole with 4:1 balun - good but quite long and needs to be relatively high above ground for effective operation;

My 'longwire' roll plus a number of egg insulators. Note that I dislike using longwires because they **must** be operated against an **effective** ground - and those are often hard to come by when portable;

My VHF / UHF antenna options - including an aluminium pipe that can fit in either front or back "sockets" so that these antennas can be mounted clear of the caravan roof;

My "heavy duty" tubing mast - made from a number of straight sections of tubing recovered from a trampoline safety net. These simply fit together using the original compressed flared socket arrangement and can be used in multiples to provide up to 7 metres of vertical height;

My cellular yagi (900/1800MHz) to connect to the wireless hotspot via a 3.5 metre N->BNC flylead and used when in poor mobile coverage areas - where the yagi can be mounted atop the earlier-mentioned aluminium pipe and mounted in either the front or rear caravan "socket";

The permanently fitted coax feeders from front and rear sockets that terminate inside the caravan up on top of the cupboard area, but with enough slack to connect to the transceiver in a few positions. One can be used for VHF & the other for HF, as desired, or both HF.. whatever;

The single 50A anderson series power socket inside the van and directly off the battery (& fused) for internal caravan transceiver use when truly 'portable';

Two 50A anderson series power sockets under the van, one just forward of the dual axle wheel arch, one just behind the entry door, fed via heavy gauge figure-8 wire, for use of a transceiver external to the van (eg under the awning or in the annex (when erected));

Two independent optional 80W solar panels to complement the 120W one permanently mounted on the caravan roof to ensure plenty of DC power;

The bag of accessories that travels along too.... it has other AC and DC leads, coaxes in a few lengths (BNC-BNC), coax adapters, 4:1 UN-UN, headset, transceiver interface, morse key, foot pedal PTT switch, 2 position coax switch, spiral notebook, pencils & pens, 3.5mm audio leads, spare fuses, LED lighting, 2 x anderson 50A extension leads (made from 100A car jumper leads), etc... That lot means that I have covered virtually all operational setup options, eg just in case I want to use a longwire or other antenna, operate CW, contest or FD operate..... ;

The "tower" of radio gear that is basically an LDG auto ATU on top, IC7000 under it and a SMPS at the bottom, all fixed together with double-side Velcro™ straps - and it travels ready to use in a similar heavy duty travel bag. Pop it out of the bag, connect AC power or DC via the anderson lead and coax to the antenna (BNC) and it is ready to go.

This stuff all travels in the vehicle & not the van.