

The 'IH-Vert-tenna'

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Build the 'IH-Vert-tenna': an easily constructed, adaptable antenna for lightweight portable SSB or FM VHF/UHF use. Parts are easy to find and total cost is less than \$30 with all new parts.

An imminent overseas trip saw the need for a versatile antenna system for HF and VHF/UHF. A quick look back through Amateur Radio saw the construction of a QRP L Match tuner for HF and a 'Versatenna', a design by Peter Parker VK3YE (AR Feb 2003). This antenna was a two element beam on 2 m and a $\frac{3}{4}$ wave dipole on 70 cm constructed from 'rabbit ears' antennas that plug into the rear of television sets. This antenna was tested on backpacking type camping trips and proved to be quite a good system. However, further thought regarding the operating requirements on the overseas trip that would see use in a motor-home, and borrowed houses as well as commercial apartments, led to the design of the 'IH-Vert-tenna'.

This design is stable on a small flat surface such as a table, veranda rail, or metal motor-home roof. It can utilise commercial multi-band antennas (such as the one supplied with the Yaesu FT-817, or most handhelds) or higher gain antennas such as telescopic 5/8th wave antennas. Part of this article details some homebrew whips that will easily outperform antennas supplied with most radios. The IH-Vert-tenna can quickly be switched from vertical polarisation, for use with FM repeaters and the like, to horizontal polarisation (common with SSB operation) in an instant.

Construction is easy, using only the simplest of tools and cheap materials, and the finished product is an excellent performer.

Parts

You will need:

- a TV antenna, the type with the two telescopic whips each over 60 cm long on a large plastic base with feet, and a 75 Ω lead. Dick Smith Electronics (DSE) L4015 or similar (I have found some low cost examples in supermarkets.)
- a BNC panel socket (the round style is easier to work with than the square base style) DSE P2220
- a vertical antenna for the band in use such as the three band antenna supplied with the FT-817 or any hand held antenna. (I will also show you how to make a low cost one yourself).
- a DPDT (double pole – double throw) switch that can handle the application)



Figure 1: The set up in the field for FM or SSB use on 2 m. This antenna has been used in three states and 15 countries (as G3ZDR/p) with great results.

power output of the transmitter. A DSE P7670 should be fine up to 20 W or so.

Construction

Figure 3 shows the simple construction technique.

Unscrew the base of the TV antenna and remove the balun if there is one (it is the little thing with wire wrapped around it). You should also remove the 75 Ω coax now if you want to replace it with 50 Ω RG-58.

Drill two holes in the top of the plastic base, one sized for the BNC socket in the middle of the plastic top of the antenna and the other for the DPDT switch in a convenient location nearby.

Mount the switch and BNC socket and then connect with short pieces of stiff wire (enamelled wire with the enamel scraped off the ends is ideal) as per the picture of the IH-Vert-tenna in Figure 2, and the internal wiring in Figure 3. At this time you should also connect the coaxial cable and the BNC or PL259 plug to your radio.

This completes the basic construction!

Operation

You should now have the IH-Vert-tenna sitting on the table beside you and a whip of your choice mounted on the BNC socket you fitted in the lid of the plastic base. Extend the telescopic whips out to be a ¼ wave on the 2 m band each side (i.e. around 49 cm). Flip the DPDT switch to the position that connects only the horizontal TV rabbit ears to the coax. You can now transmit a low power carrier and adjust the length for minimum SWR.

You are now on the air with horizontally polarised SSB! Simply adjust the length for 70 cm band use (ie around 16 cm each side) or fully extend the whips and add a little extra length with insulated wire on a crocodile clip to resonate on the 6 m band (total length each side of around 132 cm) if the whips on your IH-Vert-tenna aren't long enough. The insulated wire can dangle down - it won't affect your signal noticeably.

To change to FM vertically polarised transmission, simply flip the switch and the two rabbit ears now become the 'ground plane' for the vertical whip attached to the BNC socket, then adjust the whips to around ¼ wave each and

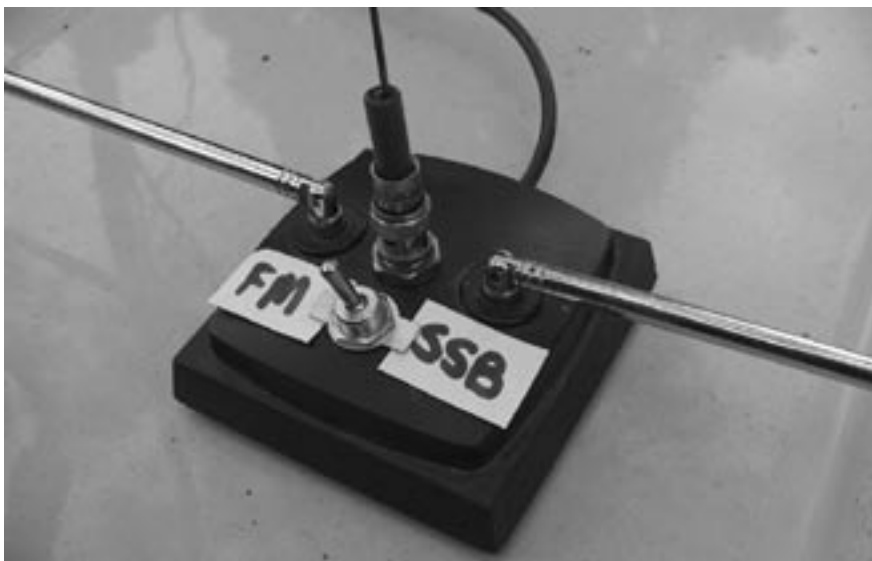


Figure 2: The IH-Vert-tenna showing the switch for converting from a dipole for SSB use to a vertical 'ground plane' antenna for FM use.

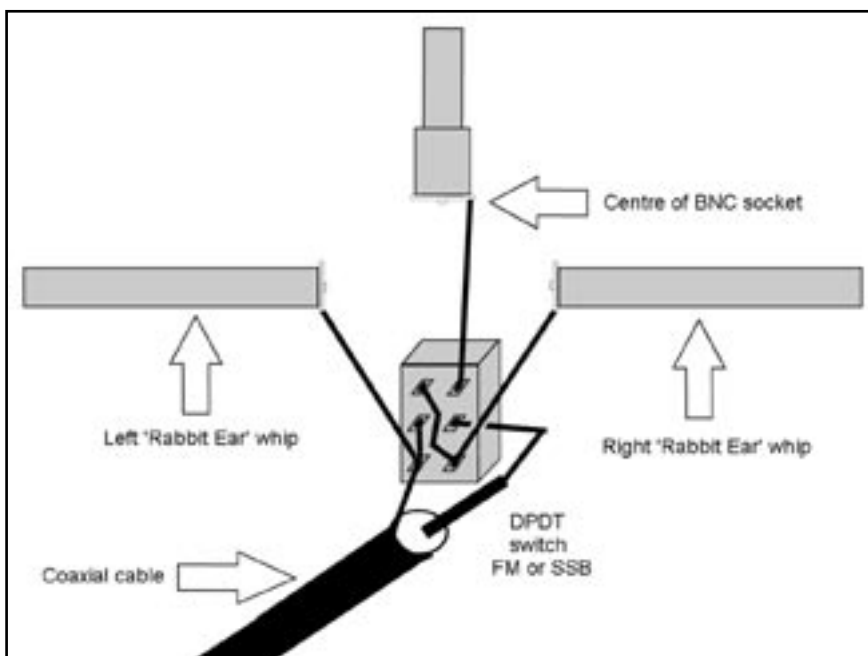


Figure 3 - Construction technique and internal wiring to the DPDT switch.

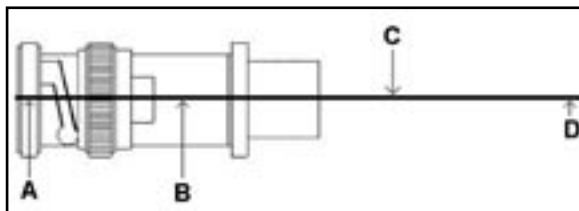
Figure 4 - Quarter wave whip construction.

A – The brazing rod comes right through the assembly taking the place of the pin that is usually in this position. Round the end with a file (rubbing the end on a concrete path does the same job!).

B – Insulate the rod through the body of the BNC and pack it out so that it doesn't move and lose contact with the antenna socket. A bit of round ball-point pen works well.

C – ¼ wave long on 6 m is approximately 1321 mm. ¼ wave long on 2 m is approximately 489 mm. And ¼ wave long on 70 cm is approximately 164 mm.

D – Loop the end over for safety or create a tip with a small piece of heat shrink tubing.



you are on air! In practice the whips can be generally left fully extended on each band. The tri-band whip supplied with the FT-817 works well.

You now own a versatile SSB/FM antenna that can be placed on any metallic or non metallic surface in a more advantageous location away from your operating position. Take your IH-Vert-tenna with you on your next BBQ in the park!

Enhancing your IH-Vert-tenna

Figure 4 shows how to build simple quarter wave antennas that will be far superior to the electrically short antennas supplied with most rigs. I use the cast off BNC 50 Ω terminations from old Ethernet computer systems, but a new BNC plug will work just as well.



Figure 5: A close up of the quarter wave whip.



Figure 6: The author using the IH-Vert-tenna with an FT-897. (*EMR considerations would suggest that the antenna be placed at a greater distance from the operator and any other persons, especially if used with other than low power. Ed.*)

Brass ‘brazing/welding’ rods are sold in many tool shops - they are stiff, conductive and cheap! A 6 m whip will require you to solder some together if the rods you find are too short. Any *ARRL Antenna Handbook* from the 1980s onwards has a 2 m 5/8 wave antenna described that you can make which will work well on 2 m FM. (Editor’s note: The 2 m 5/8 wave whip will also work as a loaded 1/4 wave whip on 6 m – just be sure to check VSWR first.)

Forgotten your vertical? Simply mark the rabbit ear connected to the centre of the coax and swing it up vertically, the other whip will give you a reasonable ‘ground plane’ with the switch in the SSB position.

The model depicted has travelled to many locations and countries including portable operation in VK2/3/4/7,G, GM, EI, GW, F, HV, I, LX, DA, ON, OE, T7, EA, PA, VE, and 3A. I hope you, too, get some enjoyment, and a little more ‘on air’ time with this project.

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