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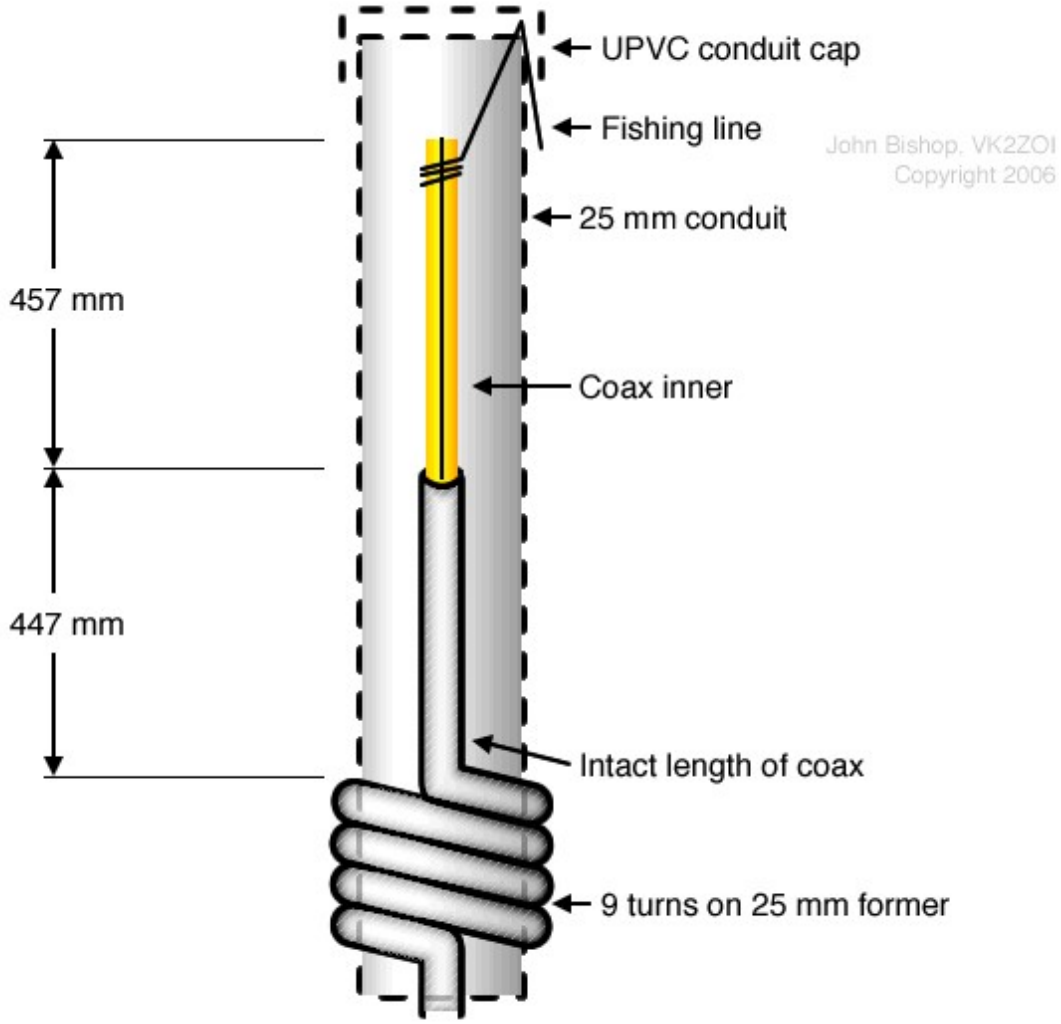
Half-Wave Flower Pot Antenna

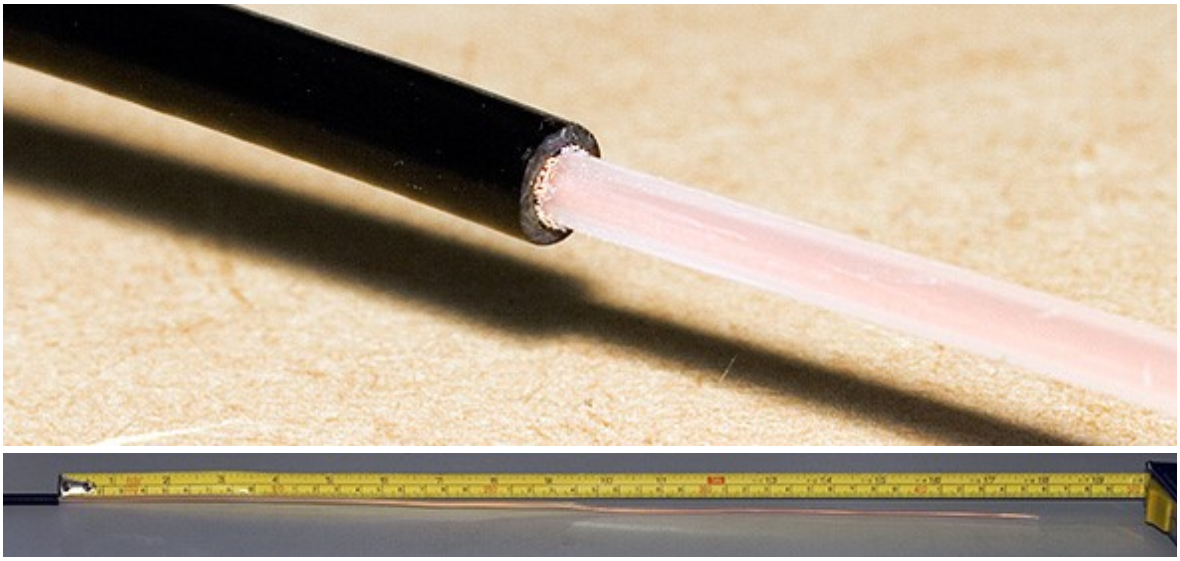
The diagram below shows the basic arrangement of the 2m Half-Wave version of the antenna. To construct the antenna, first select a suitable length of grey 25mm conduit (as a minimum 1m but if you make it longer, you will have more room below the coil to attach to your antenna support).



Basic arrangement of the 2m Half-Wave version

Drill two holes into the side of the conduit for the choke coil. The ‘top’ hole will be approx 925mm from the end (this distance is the length of the radiator plus a small clearance between its end and the end-cap). The spacing between the holes should be such that the coil turns will be firm and secure. Actual hole diameter and spacing will depend on the cable brand and/or where it was manufactured. It will be close to being two 6mm holes spaced 45mm apart but wind 9 turns temporarily on the conduit and take measurements.

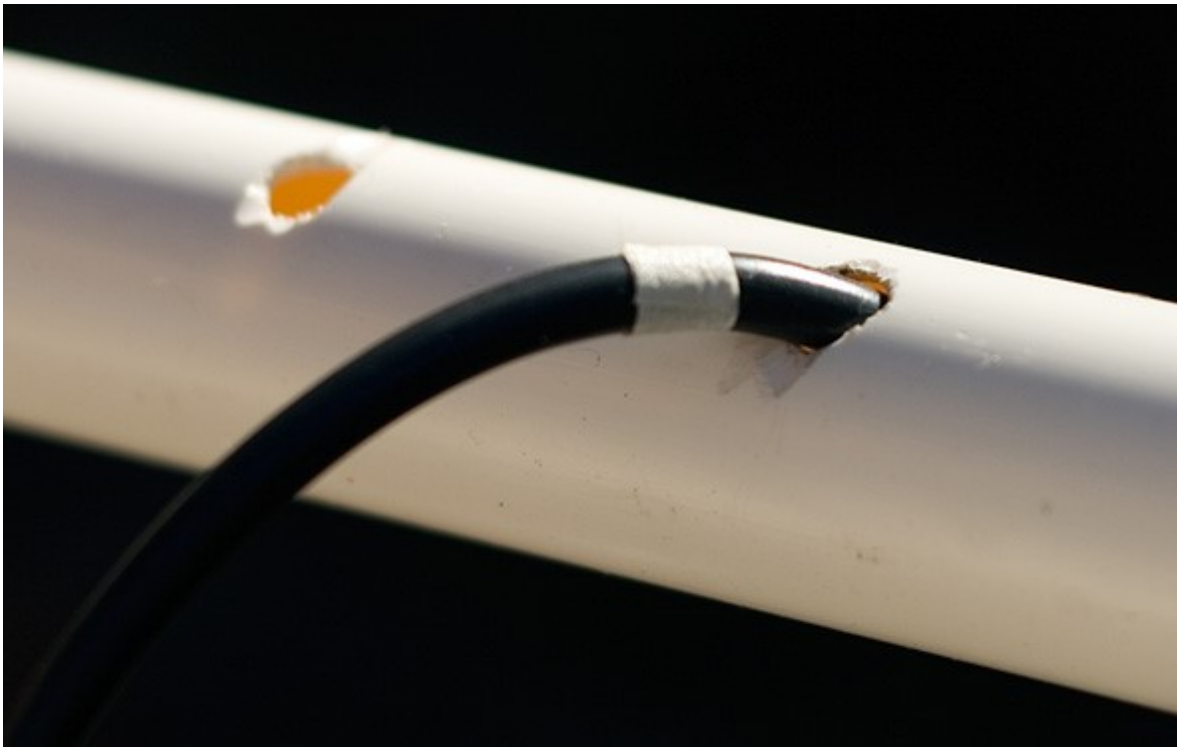
Then take a suitable length of co-ax (I make mine using the one piece of cable, about 5 to 6m long, to reach from the antenna to the transceiver – the length is your choice). From one end, strip off 457mm of the outer sheath and braid to form the top element. It's not a big problem if you end up with a length that's a bit short, because a another piece of wire or the discarded braid can be soldered to the top to make the correct length.



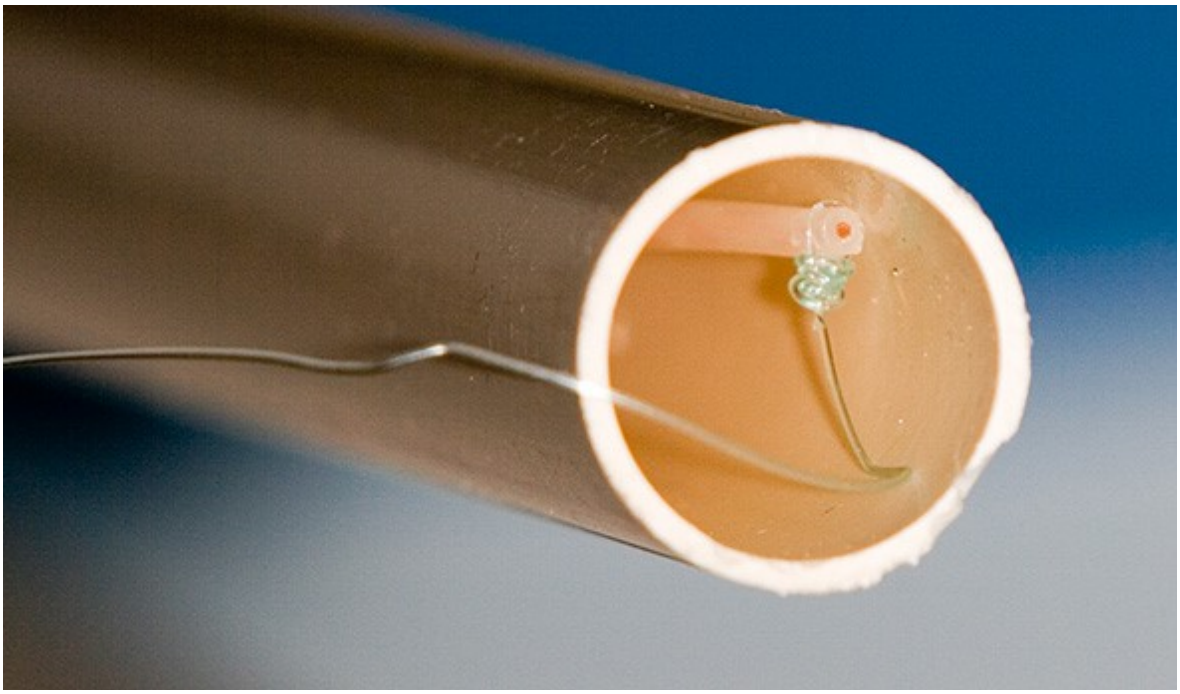
Using several “half-hitches”, tie a piece of fishing line (or similar, thin nylon line), say about half a metre long, to the top of the upper element. This line will be used to pull the radiator taut, it will clip over the top of the conduit and be clamped by the end cap.

Now measure 447mm down from the feedpoint (the point where the braid/outer sheath now starts); this is the distance to the start (or top) of the choke coil and mark this position on the coax with a piece of tape, string, paint spot, or whatever, so as to be a reference/stop point when inserting the cable into the conduit.

The antenna is assembled by inserting the radiating portion (together with the piece of nylon line) through the top coil hole and pushing it upwards until the aforementioned reference/stop point disappears into the hole.



Fish-out (pun intended) the nylon line and by pulling it taut, temporarily straighten the radiator to “set” the bend at the choke coil top.

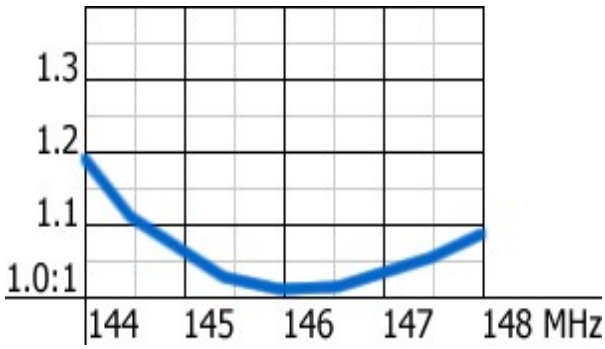


The coil is then wound on the outside of the conduit and the remainder of the cable inserted through the bottom coil hole and pushed down. Using firm but careful manipulation, the cable is pushed and tugged through the exit hole until the coil is tightly wound and secure. This must be done without altering the bottom radiator length (you should continue to just see your ‘mark’ through the top hole.

At the top, cut a small (thin, narrow) notch in the edge of the conduit, pull the nylon line taut and nip the nylon line into the notch. Later, when an end cap is fitted, the cap will clamp the nylon line solidly in place and hold the radiator straight.

Fit a connector, measure the VSWR, if necessary trim the top element.

However, you should find that very little trimming, if any, will be necessary. If you dual band the antenna, the 2m resonance will appear to shift upwards slightly. So, don't be too concerned if your antenna at this stage appears to have its VSWR curve dip a bit below 146 MHz. The VSWR plot of the 2m Half-Wave antenna should look like the following:



VSWR plot of the 2m Half-Wave antenna

When you are happy with the VSWR, finally, cap the top, securing the nylon line and the radiator in place.

Don't block or seal the bottom end of the conduit. This is to allow condensation etc to drain away.

Tips

File the coil holes to ease the bends.

Heatshrink the feedpoint to seal against water entry. Also heatshrink the coil's entry and exit points to minimise water entry.

Heatshrink the bottom end to provide a buffer for the exiting coax and neaten the base.

The type of Co-Ax is Important. Use braided co-ax only.

Do not use co-ax with a foil shield as the foil tends to break during assembly especially at the sharp bends at the choke entry/exit points. Obviously if this happens, your antenna will not work!

Cocky Proofing

To protect the choke coil from bird attacks especially from the White Cockatoos, the coil needs to be covered with a 'Cocky' shield. An empty Silicone Sealant cartridge (enlarge the hole at the top and cut the barrel to length) neatly fits over a 2m antenna coil. A PET soft-drink bottle can be used for larger coils which, when heated with a hot-air gun (but don't melt the conduit), will act like heat shrink tubing and become a very tough shield. Before fitting the shield, wrap PVC tape over the coil and the entry/exit holes to minimise water entry.

Using something other than grey electrical conduit

To the purist and his microwave oven, grey electrical conduit is considered lossy. It is, however, very UV resistant. The design compensates for the affect of the conduit by shortening the elements (by about a 2% factor) but otherwise the conduit appears to have little effect on the radiation efficiency.

If you use orange (HD) conduit, irrigation pipe, Telstra conduit, GRP, etc, the element lengths will be different. An unenclosed antenna will have longer elements (probably 2% or maybe 3% longer). Similarly, an antenna enclosed in something that is very much loaded with conductive filler will be much shorter (but, of course, don't ever use a material like this for an antenna).

Scaling to Other Frequencies

The above design will scale to other frequencies, the limitation being the mechanical properties of the conduit.

To make an antenna for other frequencies, a suitable choke coil can be determined from this table.

RG58 Co-ax Self Resonant Frequency (MHz)

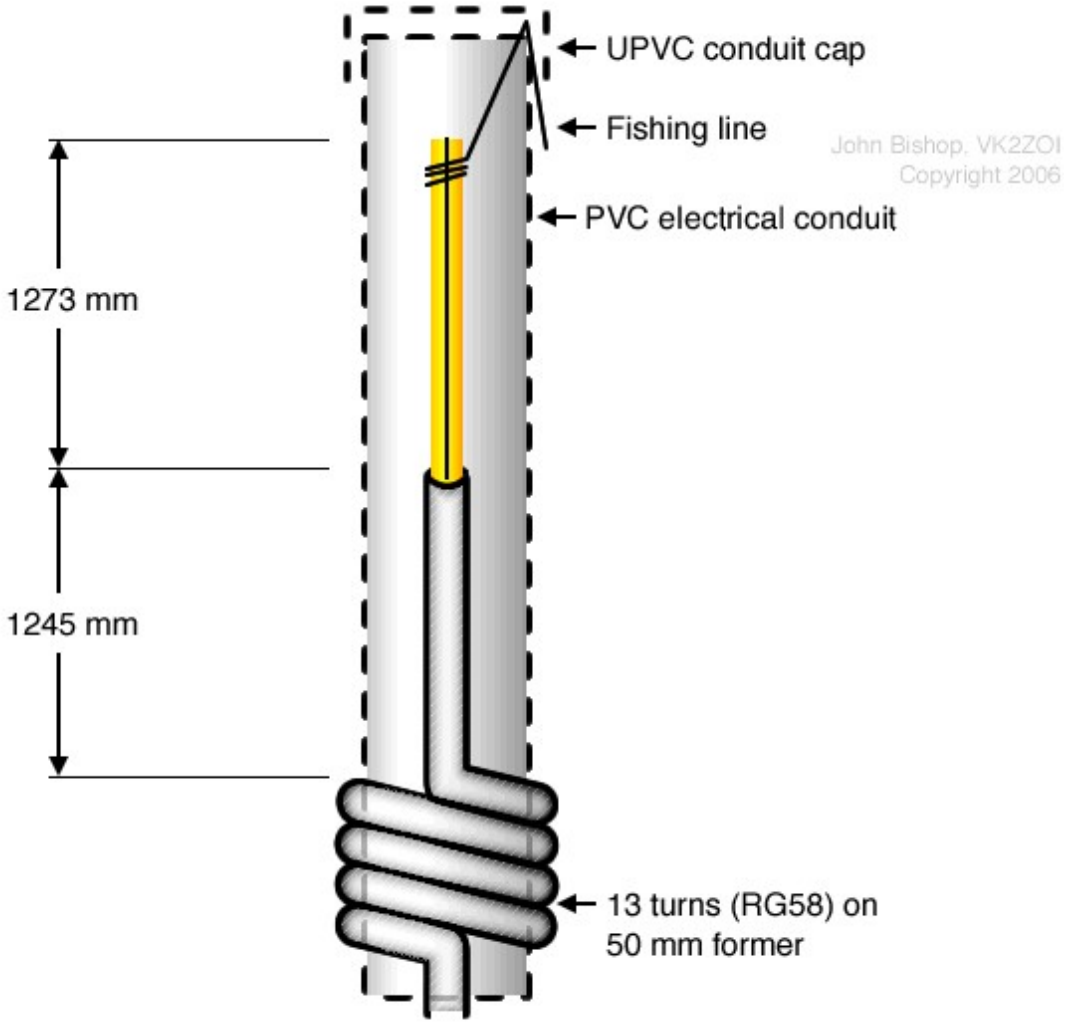
Coil Turns	PVC Conduit Former Diameter		
	25mm	32mm	50mm
4	-	160	-
5	150	136	85
8	142	106	65
9	135	100	60
10	129	95	57
12	117	84	52
15	105	75	47

As a suggestion, construct a series of graphs from the data to make it easier to interpolate. Ideally, the choke should consist of unit turns. Half turns are OK but do not wind a choke coil using other than full or half turns. If your design is for a single operating frequency (or very narrow band) then chose the lowest half turn (ie the choke frequency is closer to the operating frequency); if, however, a broader-band antenna is required, chose the nearest higher half turn.

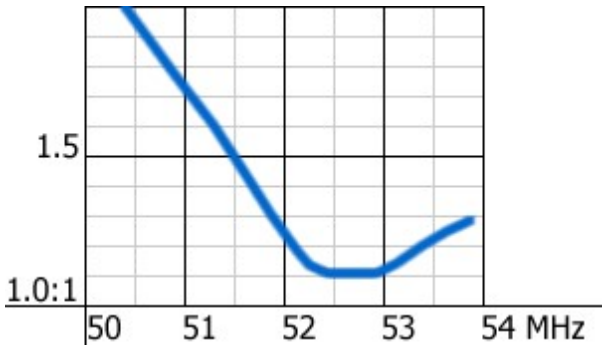
The choke needs to be resonant about 5 to 6% below the desired operating frequency. Closer spacing will sharpen (and deepen) the VSWR response; wider spacing flattens but raises the VSWR. curve.

6m Half Wave Flower Pot

To build a 6m version, use 50mm (OD) conduit. The dimensions are in the following diagram.



6m version



VSWR plot of the 6m Half-Wave antenna

Articles

- Half-Wave Flower Pot Antenna
- Dual Band Half-Wave Flower Pot Antenna
- Single 5/8 Flower Pot Antenna
- Double 5/8 Flower Pot Antenna
- Experimental Dual Band High Gain Flower Pot Antenna

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