BALCONY ANTENNA EXTENSION

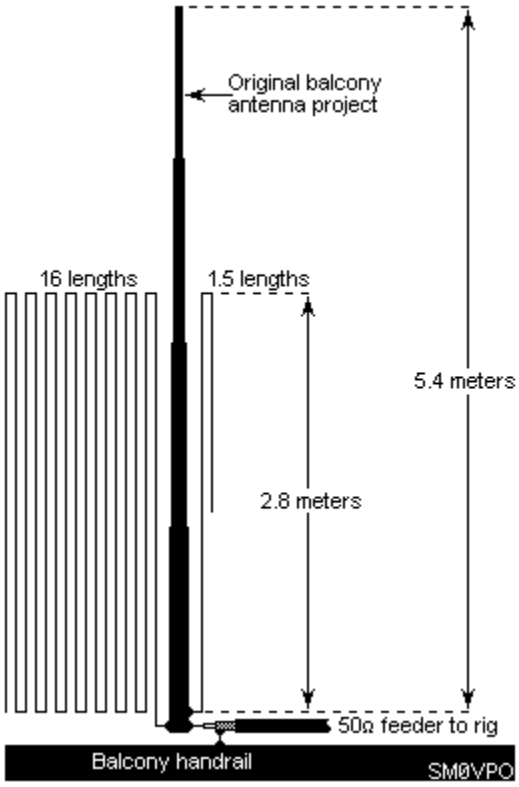
by Harry Lythall - SM0VPO

You may have already seen my HF Balcony Antenna which was designed solely for 14MHz, then a coil was added to cover all the lower HF bands (10, 7 and 3.5MHz). Following an article in RadCom I have now extended this antenna to cover all bands from 3.5MHz through to 30MHz without any switching or tuning. The antenna functions using both Fractal and Meander principles. The height of one turn of the loop gives coverage of the 10-meter band, the old balcony antenna covers 20-meters, an extra element covers 17-meters and the 40-meter long meander gives coverage on the 80-meter band. Here is the measured range of the complete prototype antenna:

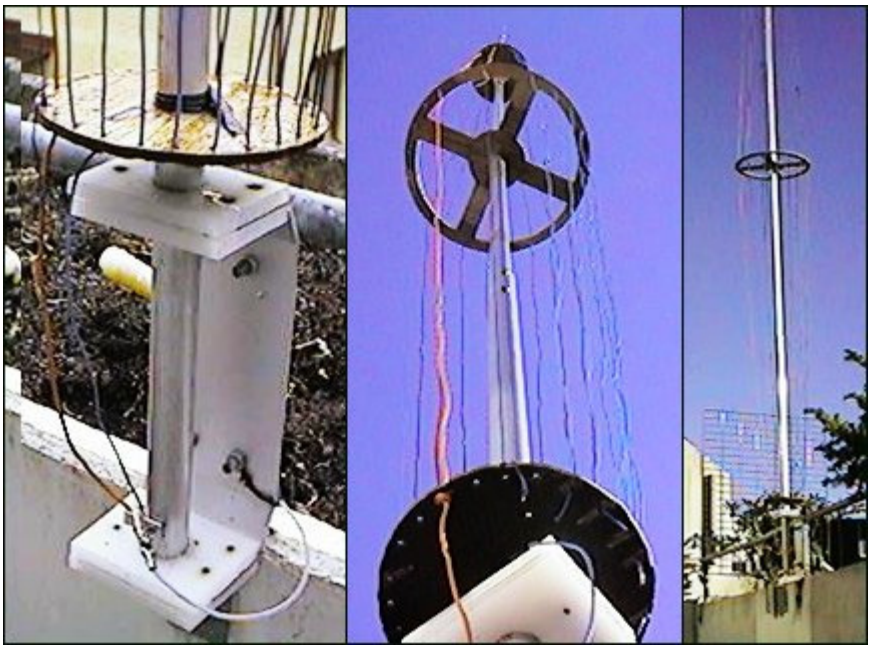
Band	Range (MHz)	Worst VSWR	Center VSWR
80 meters	3.55 - 3.70	3:1	1.1:1
40 meters	7.00 - 7.10	2.2:1	2.2:1
30 meters	10.10 - 10.15	2.3:1	2.3:1
20 meters	14.00 - 14.35	1.1:1	1:1
17 meters	18.07 - 18.17	1.2:1	1.2:1
15 meters	21.00 - 21.45	2.8:1	2.5:1
12 meters	24.89 - 24.99	2.1:1	2.1:1
10 meters	28.00 - 29.20	3:1	1.1:1

As you can see, the VSWR rises on some of these bands but the antenna is still 100% useable on all bands without an ASCTU (ASTU or ATU). I have not tested the coverage outside amateur bands, I stopped when the VSWR became 3:1 or when the band edge was encountered.

So what is the big secret? I have mentioned before in these pages that several 1/4-wave or 1/2-wave antennas can be placed in parallel and fed with a single feeder. The resonant element will have an effect; the others presenting a high impedance. I tried to add two 1/4-wave antennas to cover the original 14MHz plus 29MHz, 18MHz and 3.6MHz. When I tried it I was surprised that the antenna covered as much as 200KHz of the 3.5MHz band and other HF bands were ALL useable. Reports suggest that the effects on 14MHz have introduced a couple of dB's loss, but that is far less than one "S-point". Here is the drawing of the antenna showing the original 14MHz pole (center) and the other two 1/4-wave antennas I have added.



I have shown a graphic likeness of the routing of the additional 43-meters of wire, they are wound on three plywood disks. The top and bottom disks are 100mm diameter and the center spacer disk is 300mm diameter, each drilled with 18 holes. It would have been better to have used nylon food preparation boards (from Ikea) but I didn't really have all that much confidence this antenna experiment would work so I began with this make-shift arrangement. I must also point out that putting your hand near this antenna will cause changes to the readings, so you may need to make a few minor adjustments in your own individual case. Here are photographs of the finished and working prototype antenna.



The left insert shows the antenna mounted on the old balcony support bracket with the coil removed. The center insert shows a view from the bottom of the antenna. The orange wire is the 420cm 18MHz element. The right insert shows most of the complete antenna from a little distance. Notice how I have cut out material from the center spacer to reduce wind resistance and to help make it look a little less obtrusive for neighbours. The top spacer is identical to the bottom spacer. All three of the elements are connected in parallel at the feed point where I connected my 50-ohm feeder. The old coil is now obsolete and has been removed.

Please note that this antenna idea is also governed by "Harry's Law" of coils:

1. You cannot wind coils like me and I cannot wind coils like you.
2. Coil-winding data is a constant that varies from person-to-person.

This means that it may NEED some adjustment in your own environment, depending upon proximity of other artifacts, humidity, groundplane efficiency and even the colour of the flag you have fitted to the top of the original 14MHz pole.

Begin antenna assembly by making and fitting the top, middle and botom spacers. To trim the spacers, temporarily add a 3-meter length of wire, making a small tight loop at the top to remove the surplus. Check the VSWR at 29MHz and adjust the top-spacer position, re-coiling the surplus wire, until the antenna is resonant with VSWR better than 1.5:1. Fix the spacer positions using hose-

clamps or whatever other bright ideas you may have. Now remove the 3-meter wire and sew the 40-meters of wire through the holes. Check the VSWR at 3.6MHz, or whatever part of the 80-meter band you want. Remove wire to achieve resonance. Fit the 1.5-loop, 4.2-meter length of wire for the 18MHz element. This loop only comes 1/2-way down the cage, so add some nylon line and secure it to the bottom spacer. Do not tie anything to the center spacer. The wire I used was 7-ampere multi-strand household mains-wiring cable.

Have fun with this project. Regards from Harry - SM0VPO