A Nest of Dipoles for HF

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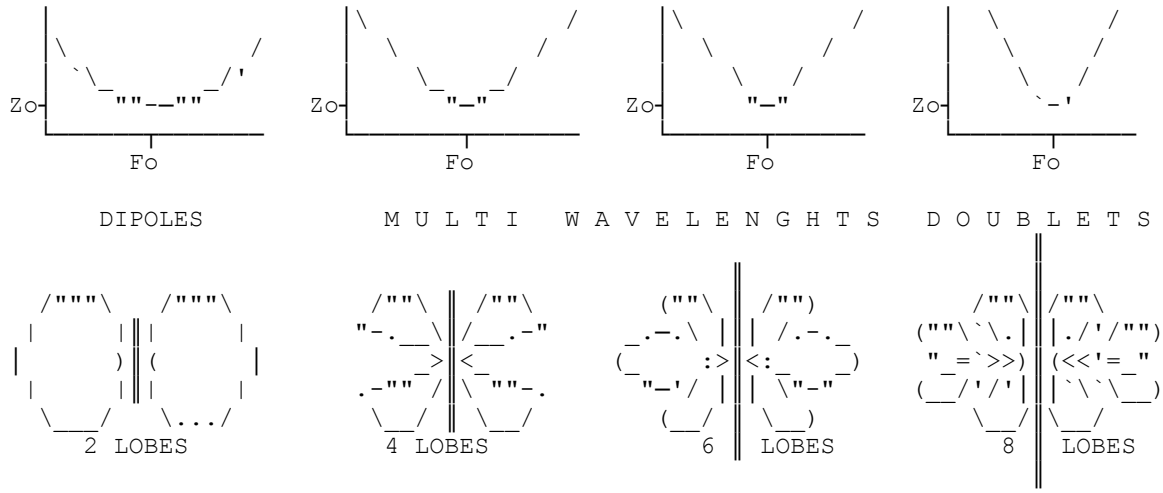
To : TECH@WW

By G8MNY (Updated Jun 05)

Just starting out on HF & with a large garden, I'd thought I would try the nest of Dipoles approach (Spider web), rather than the simpler multiband doublet (eg G5RV). The doublets if they have a good Q will in theory have a more complex & narrow band Zs & different polar diagrams per band than the dipole & therefore my be a less useful aerial. The ganged up dipoles in a nest should give much the same performance as a single dipole for each band, as the non-resonant dipoles will only present a few % loss as each of their Zs should be much higher.



HALYARDS

I had 2 halyard points one @ 12M on a chimney mounted pole on the house & the other 50M away 16M up a tree. Each one has a simple pulley that had the bearing well greased up. (on the really simple open pulleys, I found that a piece of suitably cut tin plate could be added to each side of the pulley block wheel to stop the rope fouling & jamming the pulley by falling off the side of the wheel).

The halyards are threaded up to be continuous loops so that if the aerial breaks then it can still be lowered. Also for the tree end there is a put up rope that was placed over a high branch to hall the halyard pulley up.

Polypropylene rope (e.g. 6mm draw rope) is OK, but does have a short lifetime of only a few years in the sun before it disintegrates! Never trust it for dangerous work where people could get hurt!

```
Tree.....Pulley   Spring
    :     O.......eee.ý----
    :     :     /     Insulator
    :     :    / Loose
    :     :   / Pull Down
    :     :  / Loop
    :     : /
    :     Tension
Tie Off   Weight
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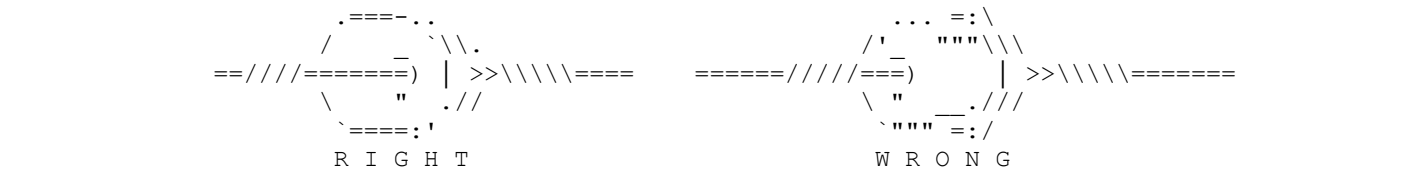
INSULATORS
These need to withstand the tension, be as light a possible, be UV stable & still insulate when wet. In practice with a metre or so of modern synthetic rope at the ends & pure rain water (not sea spray) end insulators are not strictly required.

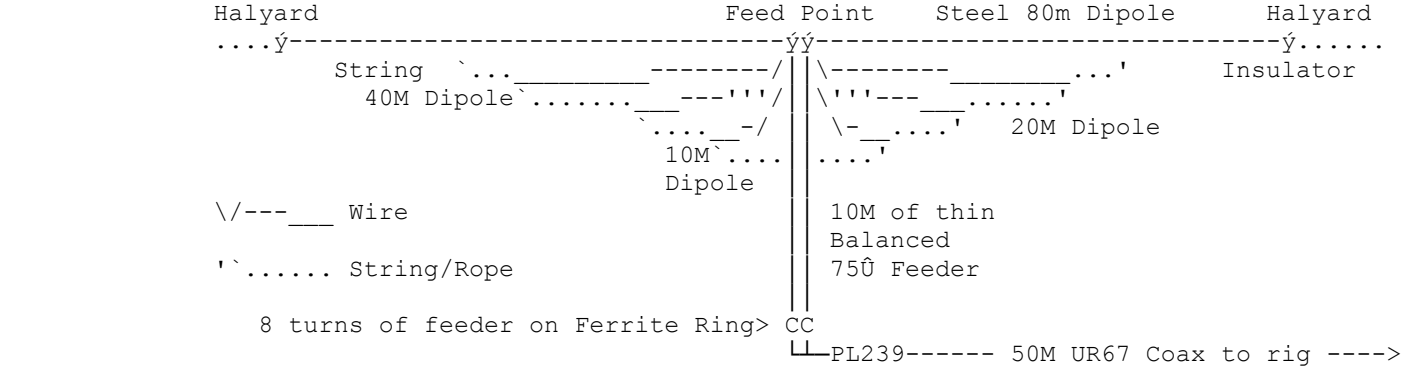
The plastic & ceramic egg type insulator are designed to be in compression with the tie & wire looped over each other separated by the egg, NOT the tie & wire looped through each end hole keeping it in tension.



Black plastic egg insulators are ideal for the middle of the 80m dipole of this design where low weight is important & due to the low the Z the insulation requirements are minimal. Ceramic ones are best used at the ends were their weight is less important.

TENSIONING
To maintain & control tension I used a 10Kg heavy weight (old transformer). But I found this was not too effective, because the mass & the pulley friction would be slow at keeping the tension, resulting in the middle of the aerial bobbing up & down with the wind. And with this type of aerial that was a real knotting problem, so I tried adding some long coil springs out of a chest exerciser (was not mine). I painted these to reduce further rusting & one mounted each end just before the insulators. This has stopped the bobbing around as about 0.5M stretch is available with no slow mass to allow for the wind & tree sway. A bunjee may have similar performance but a short lifetime!

THE AERIAL



DIPOLE LENGTHS
The lengths I used were:-

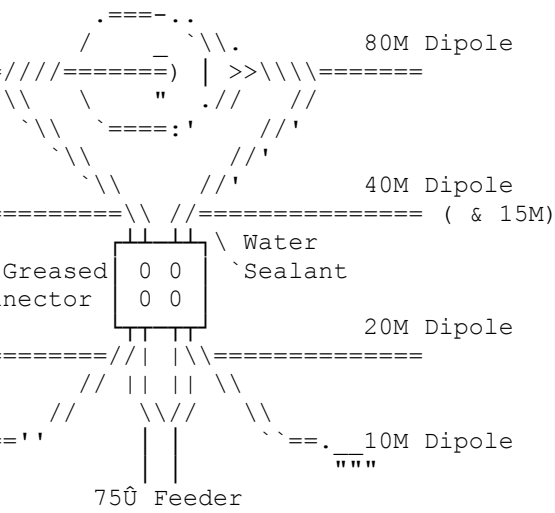
Dipole Length Ft	M	Freq MHz	Band M	Material
125'3"	38.22	3.7	80	Plastic coated Tinned Steel 2 mm dia.
68'0"	20.750	7.1 & 21	40 & 15	Plastic covered Copper wire 2.5mm(mains)
32'11"	10.028	14.22	20	Plastic covered Copper wire 1.5mm
16'3"	4.968	28.7	10	Plastic covered Copper wire 1.5mm

In the 80M dipole I put 2 twisted loops about 3M before the start of the 40m dipoles for the string to attach to. Each smaller dipole is suspended below with 2 pieces of string with slip knots so that the hang can be adjusted.

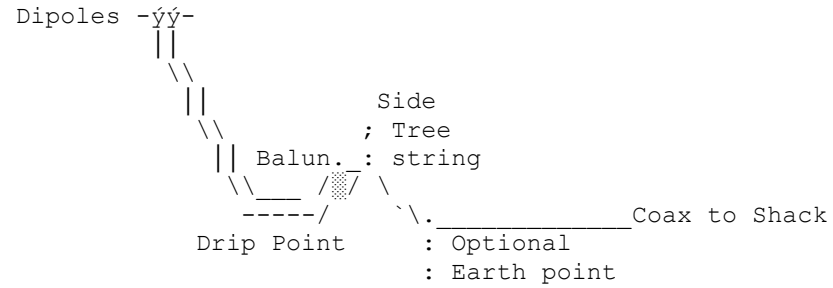
The dipole ends have to be well spaced from the above dipole, so the 10M one ends up more like an inverted V.

SWR tuning for each band is to cut the length of that dipole for the wanted frequency. With some extensive trial & error, it is possible to get usable match on all bands. The interaction of the aerials is minimised if the spacing (string lengths) are even!

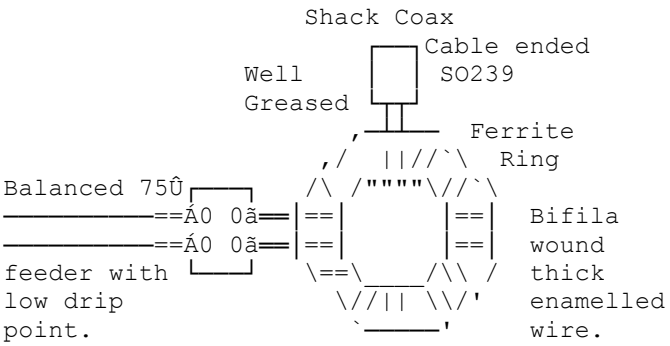
THE FEEDPOINT
As there is a lot of force on at the central insulator it needs to be designed to handle it. I used a black plastic egg insulator on the top 80m dipole & hang a large 60A connector block (screws & wires well greased up, & with water sealant on the top!) 5cm below it to make all the connections with all the wired going under both screws.



FEEDER
I used 10M of 75Û thin balanced feeder to a ferrite choke balun & then 50M of UR67 along a fence to the shack. The weight of the coax is as it goes up to the balun & feeder is supported by another string from a side tree, this reduces to a minimum the dipole central load.



As the balanced feeder is just long enough to reach the ground, that is convenient place to put a plug & socket just after a normal ferrite ring choke balun.



This SO239 connection point enables testing & use from the garden.

IN USE
I find it works without an ATU fairly well. There is no need to tune anything across a band or between bands, as the SWR typically less that 2:1 (often 1:1) on the useful parts of the bands. But an ATU would help with the higher SWR at the ends of some of the wider bands. The loss due to 2:1 SWR assuming your rig is OK with it (most are), may be much less than the loss due to the addition of an typical ATU (0.3-1dB)!

Why Don't U send an interesting bul?

73 de John G8MNY @ GB7CIP