Some Thoughts on a 75/80m Fan Dipole

Joe, WB9SBD, asked on the ***Ham-Antennas*** email reflector an interesting question concerning a 75/80m 2-wire fan-dipole:

> What would happen if the lower wire connected 1/2 way along the top wire, instead of connecting at the center feed point?

I didn't know and thought it was an interesting question to investigate via modeling. (I used EZNEC+ 6.0)

Larry Banks, W1DYJ

First licensed: 1962 (KN1VFX)

W1DYJ since 1966 – Amateur Extra

33 Blueberry Hill Road Woburn MA

Note: if you build an antenna with these dimensions, your results ***will be different***. This is an "ideal" model and does not take into consideration your specific environmental situation.

Some Thoughts on a 75/80m Fan Dipole

Discussion

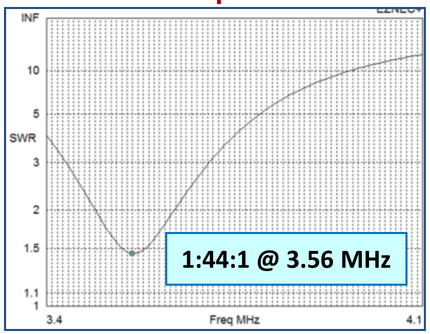
The Question: **What would happen if the lower wire connected 1/2 way along the top wire, instead of connecting at the center feed point?**

Basic 80m Dipole ~ at various heights

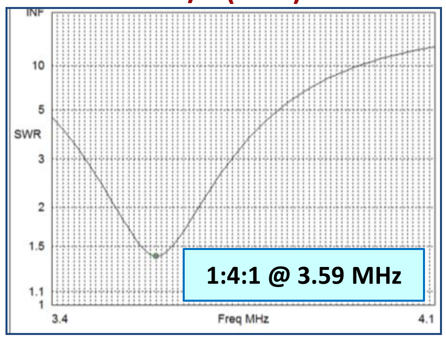
One #12 wire, 11 segments, 134.5' long [67.25']

Height

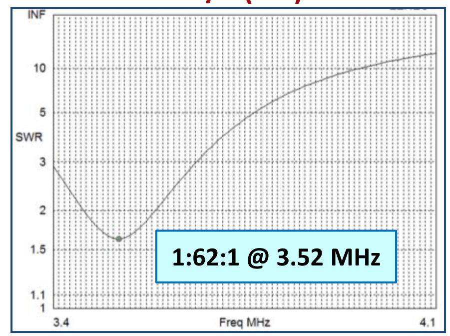
Free Space



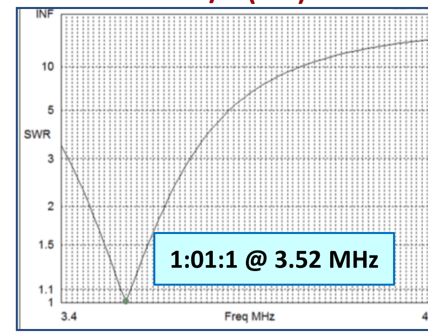
~λ/2 (132')

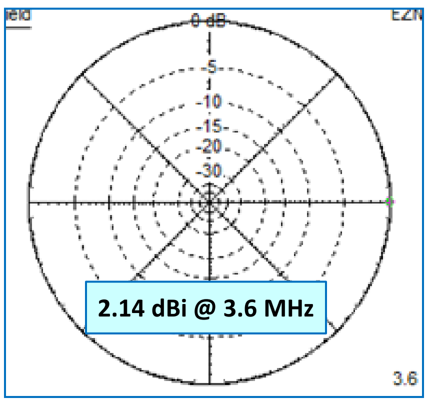


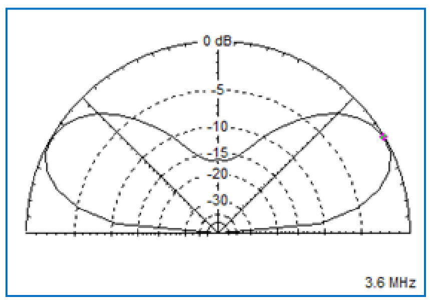
~λ/4 (66')



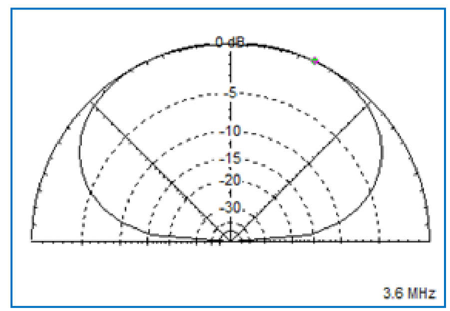
~λ/8 (32')



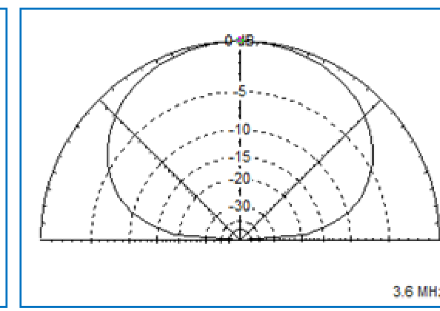




7.69 dBi / 30° @ 3.6 MHz



6.3dBi / 65° @ 3.6 MHz



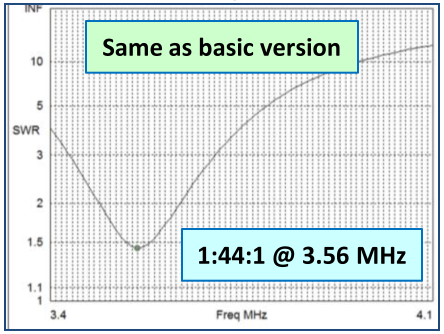
5.86dBi / 90° @ 3.6 MHz

Basic 80m Dipole ~ multi-wire version: to prepare for fan design

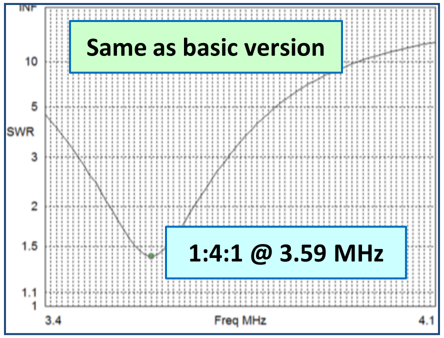
Five #12 wires, ½' segments, 134.5' long [33.75'] [67.25']

W5 – 33½'	W3 – 33'	[0.75'] W1 – Source	W2 – 33'	W4 – 33½'
67 segments	66 segments	1 ½' 3 segments	66 segments	67 segments

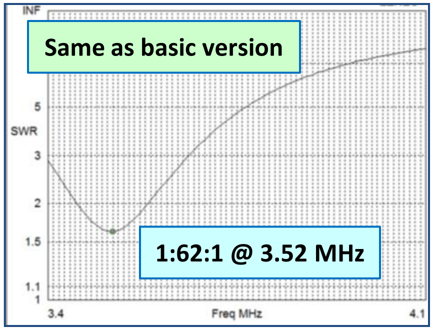
Free Space



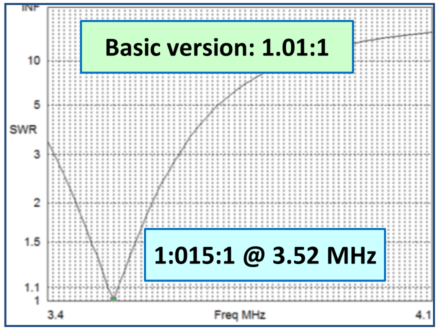
~λ/2 (132')

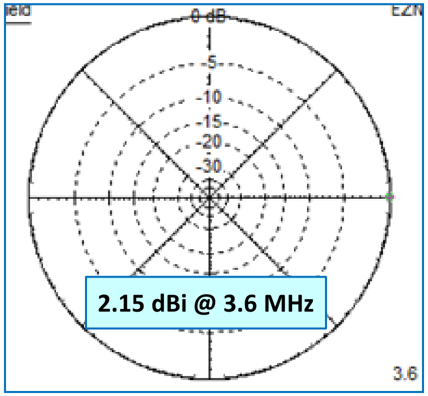


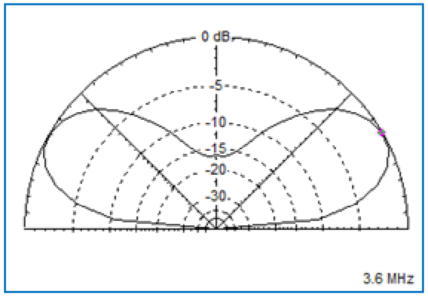
~λ/4 (66')



~λ/8 (32')

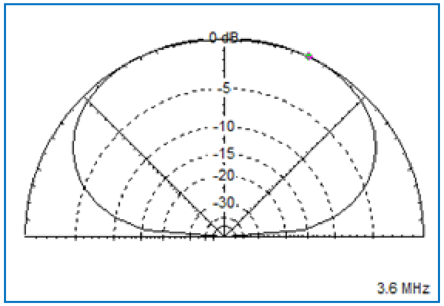






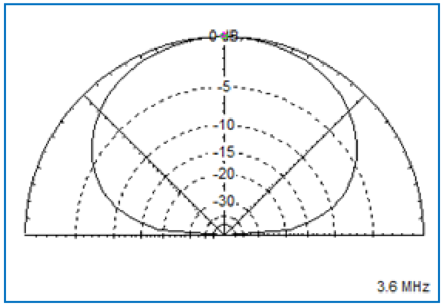
7.7 dBi / 30° @ 3.6 MHz

Basic version was 7.69 dBi



6.31dBi / 65° @ 3.6 MHz

Basic version was 6.3 dBi

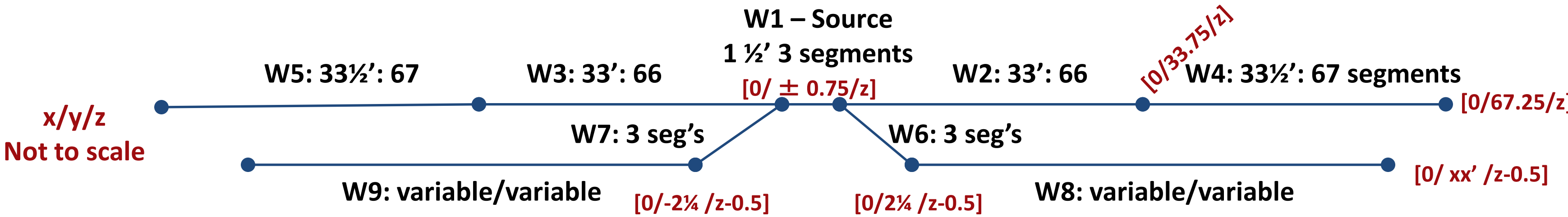


5.87dBi / 90° @ 3.6 MHz

Basic version was 5.86 dBi

The fact that the differences are in the 3rd digit suggests that this model is equivalent to the basic – 1 wire 11 segment – version.

75/80m Fan Dipole ~ free space SWR with variable 75m dipole lengths



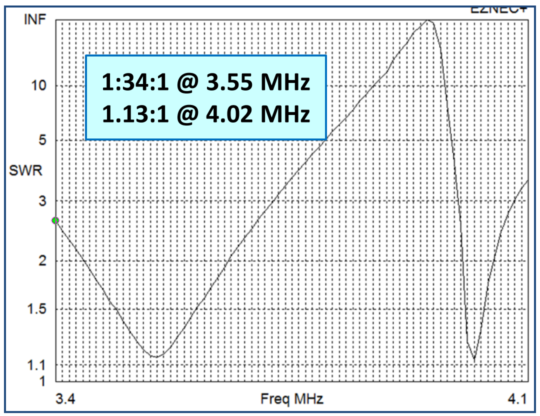
FILE: 75-80m-dipole_9-wires_v1.ez

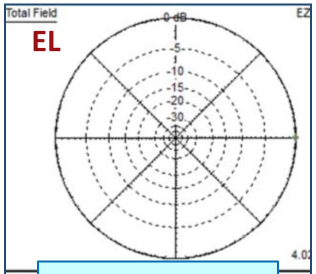
W8/W9 = 59’/118 segments
[ends = 0 / ±61 ¼’ / z - 0.5]

Free Space

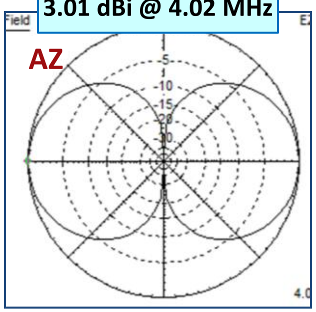
FILE: 75-80m-dipole_9-wires_v2.ez

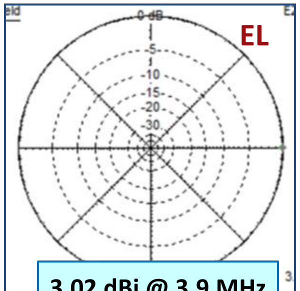
W8/W9 = 61’/122 segments
[ends = 0 / ±63 ¼’ / z - 0.5]



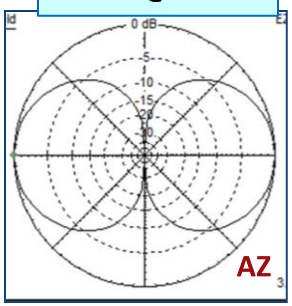


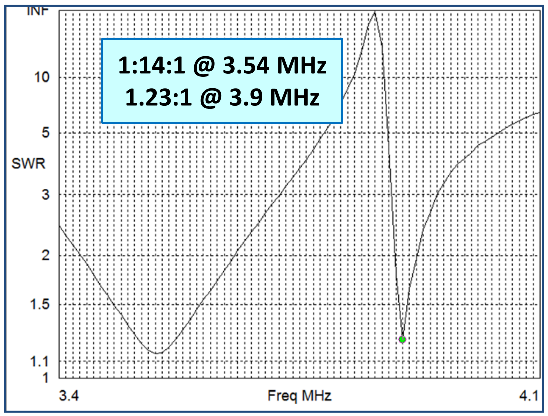
3.01 dBi @ 4.02 MHz

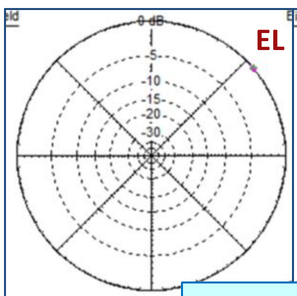


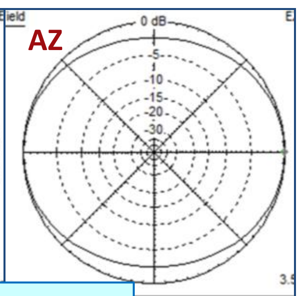


3.02 dBi @ 3.9 MHz



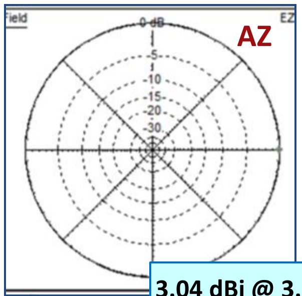


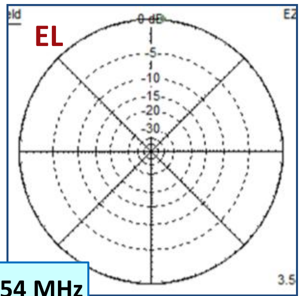




3.04 dBi @ 3.55 MHz

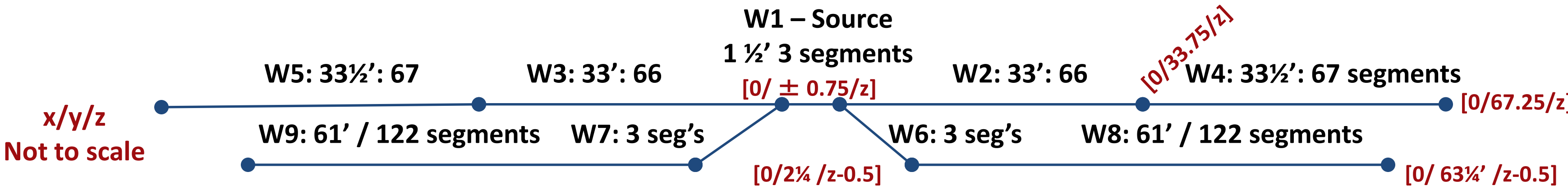
Note that the close spacing of these two frequencies create an interesting phase issue in between the two frequencies, indicated by the very high SWR.

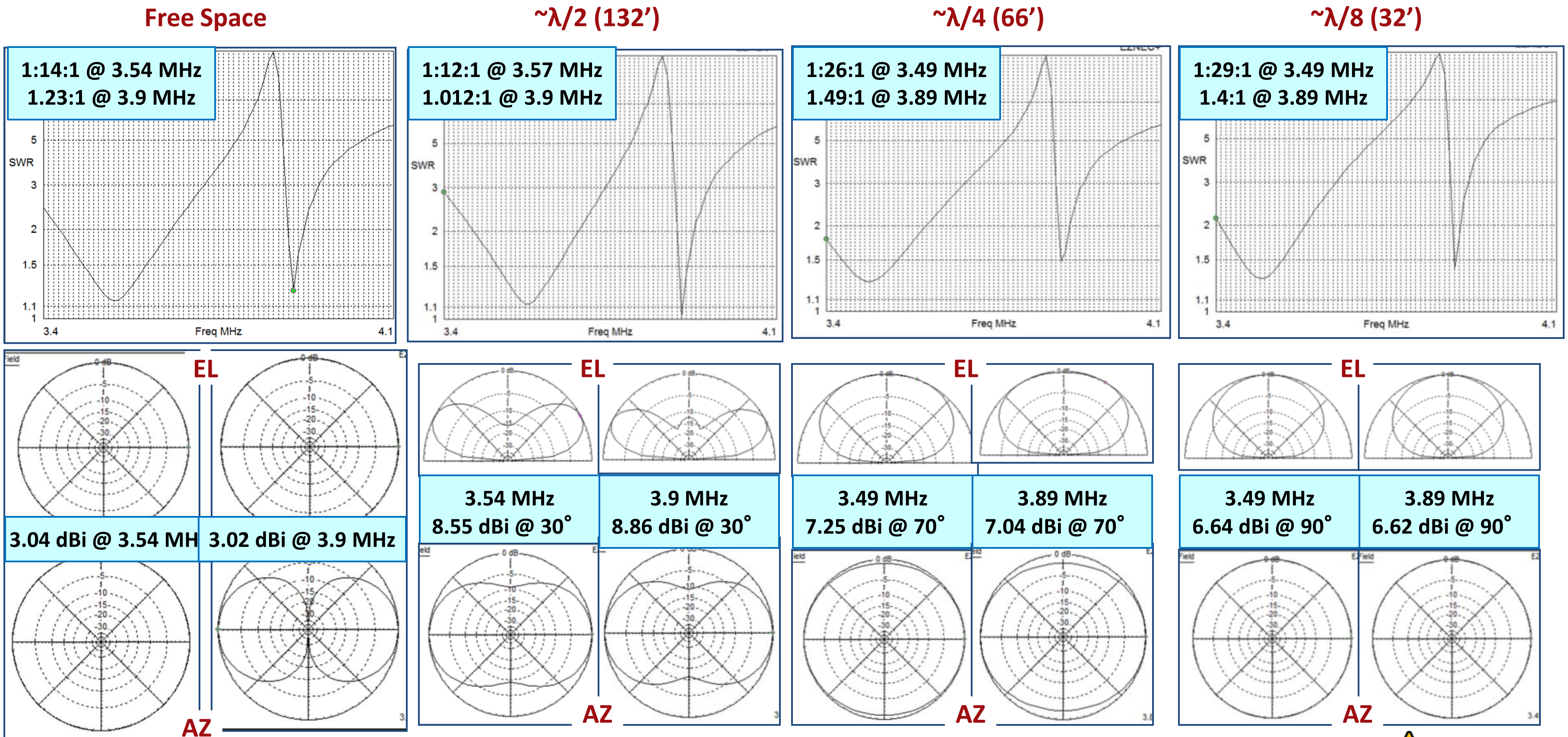




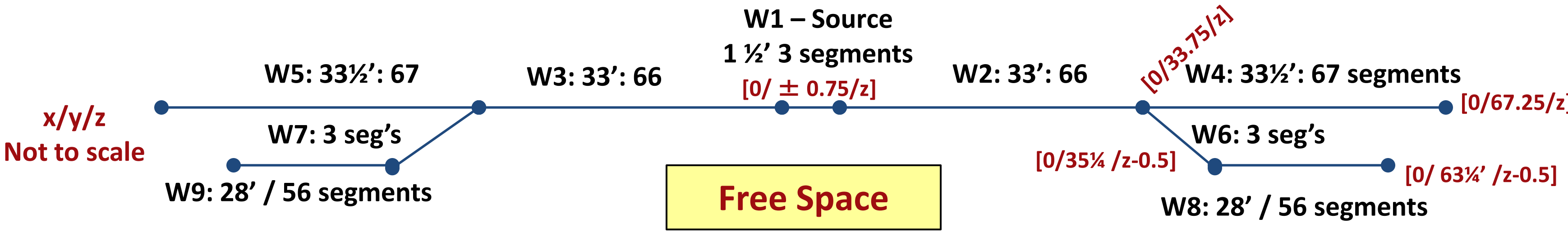
3.04 dBi @ 3.54 MHz

75/80m Fan Dipole ~ using version II at various heights

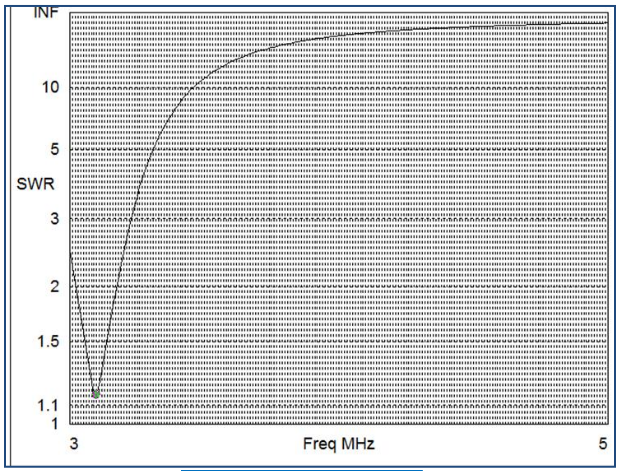




75/80m Fan Dipole ~ Moving 2nd wire half way out

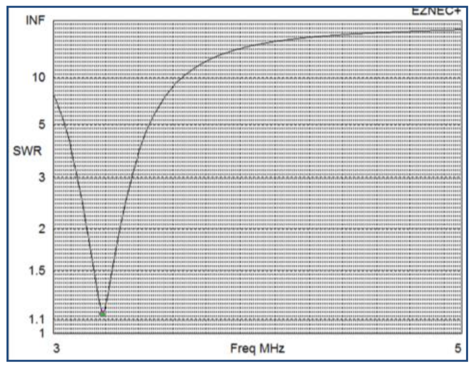


FILE: 75-80m-dipole_9-wires_half-way.ez



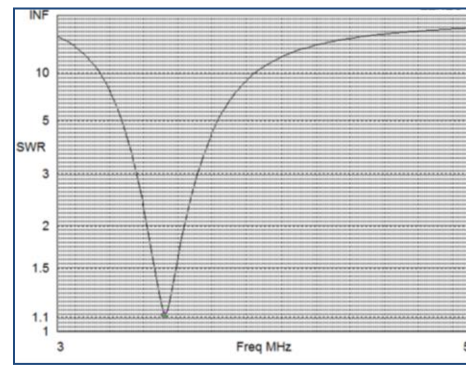
1:15:1 @ 3.1 MHz

With W2/W3 = 30'/62 segments, and other wires the same length. Overall lengths of the two wires are 64 ¼ ' and 60 ¼'.



1:13:1 @ 3.24 MHz

With W2/W3 = 25'/50 segments, and other wires the same length. Overall lengths of the two wires are 59 ¼ ' and 55 ¼'.



1:11:1 @ 3.52 MHz

Moving the connection point out half way essentially eliminates the effect of the "fan". I am assuming it just makes the outer portion appear thicker, and therefore shorter.

International DX Association
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