A LEVEL 1 LOGICAL RENDITION CALCULATING RADIATION RESISTANCE

Overview rendition of logic sequence written in 1968 K9AXN

Two things must be known to calculate Radiation resistance: The surge impedance of the media and Q based on the number of radians the traveling wave must move to termination.

The surge impedance of the media:

The calculations carried out by Telegraphers a century ago used a .06” diameter wire for their antenna calculations. That size has since become known as the ideal antenna which is a common law statement.

The closest to .06” diameter wire would be .0571” and will be used here to calculate the Z0 or surge impedance of the wire.

(78.74 ÷ .0571 = 1378) (LOG 1378 = 3.13924922) (3.13924922 • 138 = 433r) The Zo, surge impedance of the media.

The radiation Q of the antenna:

The radiation Q is determined by calculating the LOSS in voltage and current per radian traveled from source to termination. The traveling wave that is launched into an electrical 1/4λ Monopole will travel 1/2λ before it reaches the termination which is the **source**. The effective length of a 1/4λ monopole antenna is calculated (6.28319 ÷ (λ ÷ .5) = 12.56638). 12.56638 is the radiation Q of a 1/4λ monopole.

 The radiation resistance of the electrically resonant 1/4λ monopole:

 The zo of the wire ÷ the radiation Q. (434 ÷ 12.56638 = 34.5365969r) the radiation resistance.

The radiation resistance of a 1/2λ electrically resonant dipole:

The 1/2λ dipole is a collinear array composed two independent monopoles each with 34.5365960 Rr. 2 • 34.5365960r = 69.07319371Rr.

This a level 1 logical explanation used to calculate the radiation resistance of an electrically resonant monopole or Dipole. The Rr of the **physical** 1/2 λ antennas will follow, and using the same wire will be somewhat greater.

Next, the simple math used to calculate the 100 watts applied to a 1/2λ center fed and end fed wire. The equation used for the actual end fed wire is included along with logic sequence.

I hope you find this useful, following will be a deeper logical explanation of Rr.

If an error in math is found please bring it to my attention. I have not proofed this material.

Regards Jim K9AXN