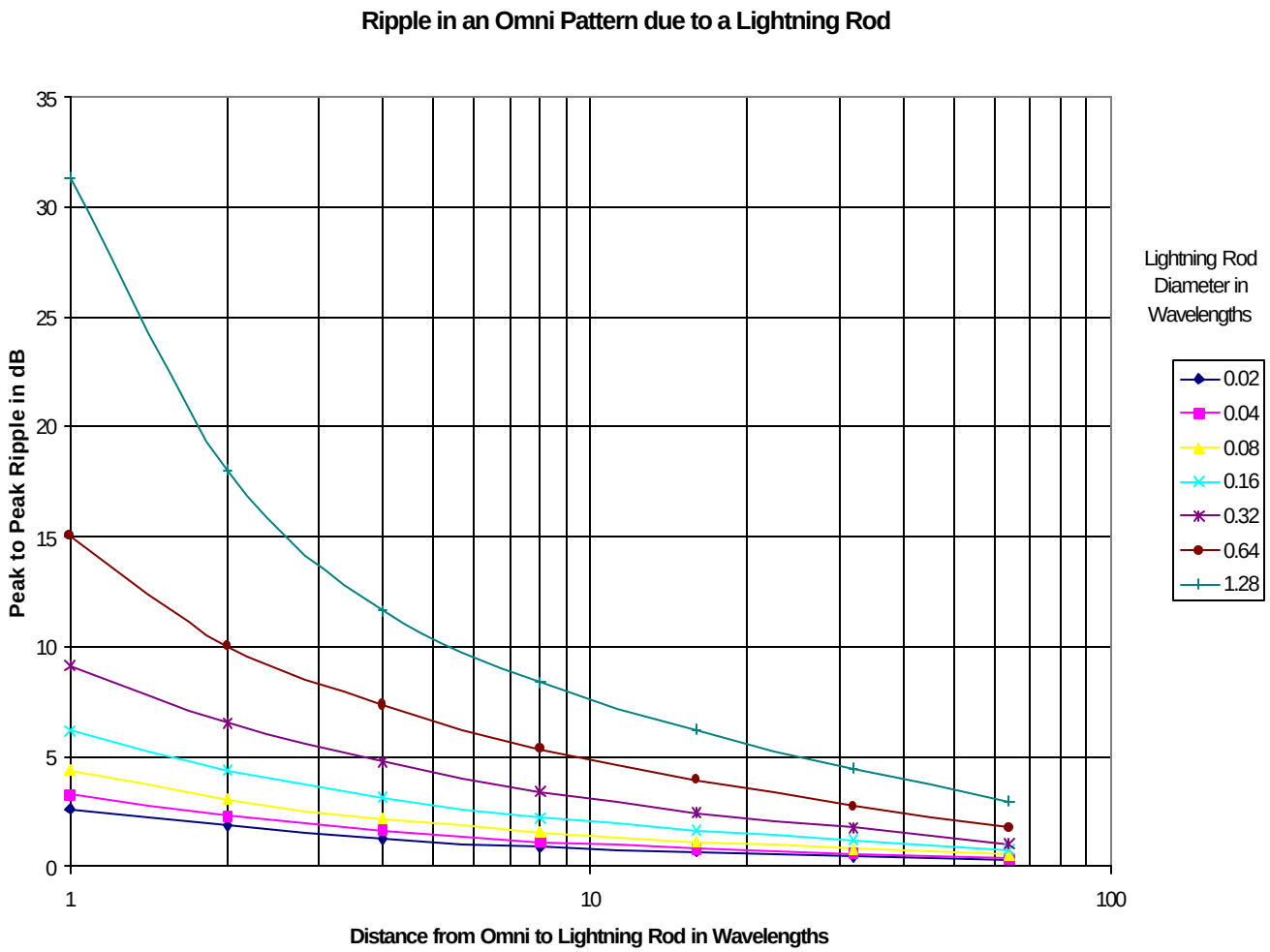
TIL-TEK

APPLICATION NOTE No. 3

OMNI PATTERN RIPPLE DUE TO A LIGHTNING ROD

The typical omnidirectional antenna is situated at the top of a tower beside a lightning rod. The lightning rod will scatter the electromagnetic field of the antenna, causing a ripple in the far-field azimuth pattern. This note shows how much ripple will occur. The effect is different for vertical and horizontal polarization.

VERTICAL POLARIZATION



Wavelength, $8_m = 299.8 / f_{MHz}$

$8_{inches} = 11,803 / f_{MHz}$

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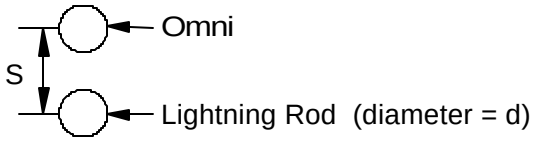
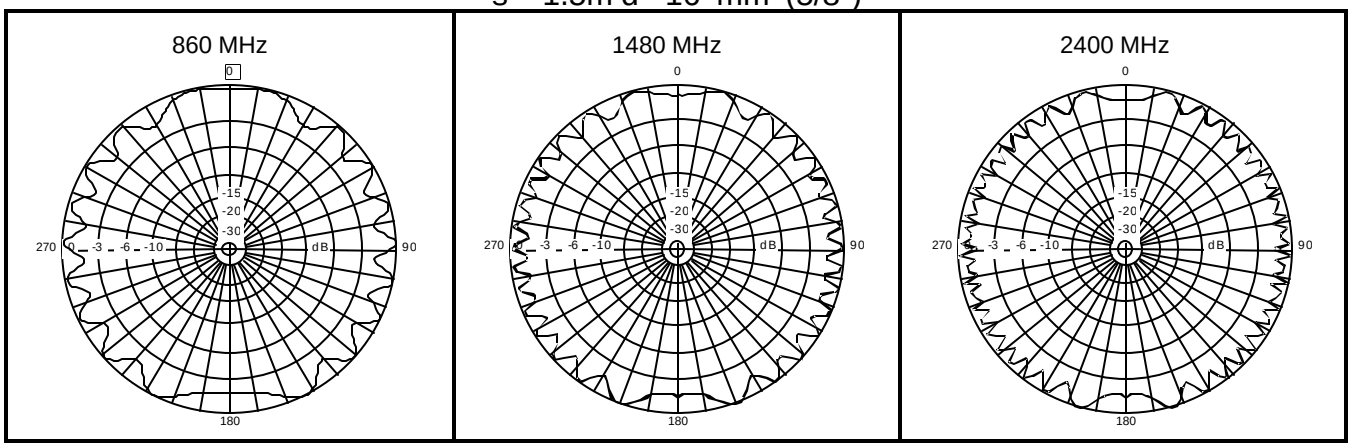
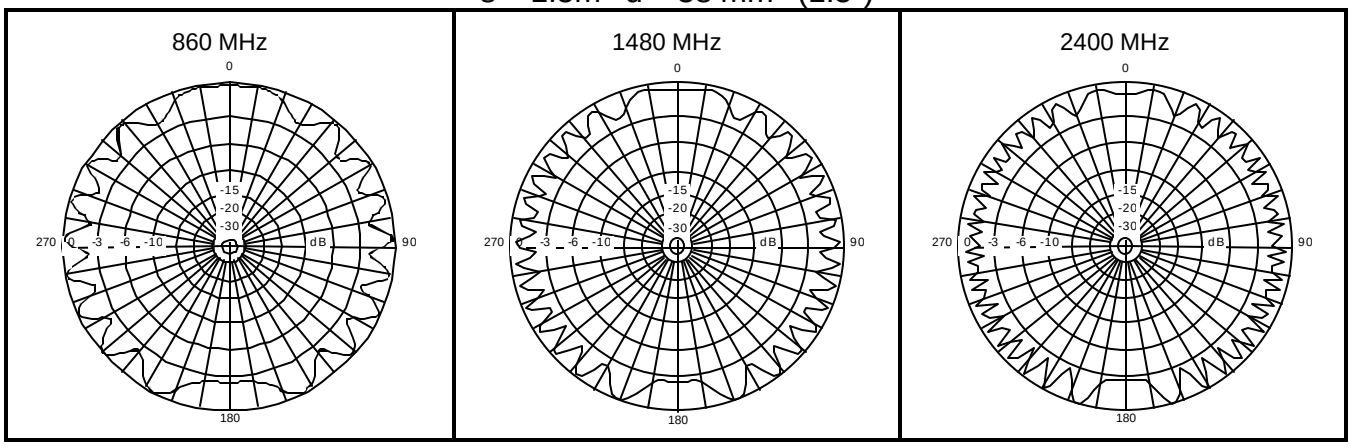
Vertical Examples:



s = 1.5m d =16 mm (5/8")



s = 1.5m d = 38 mm (1.5")



Relative positions of the lightning rod are shown above. The nominal gain of the antenna (data sheet specification) would be represented by a line on the average of the ripple, i.e. the net effect of electromagnetic scattering is to increase the gain in some directions and to decrease it in others.

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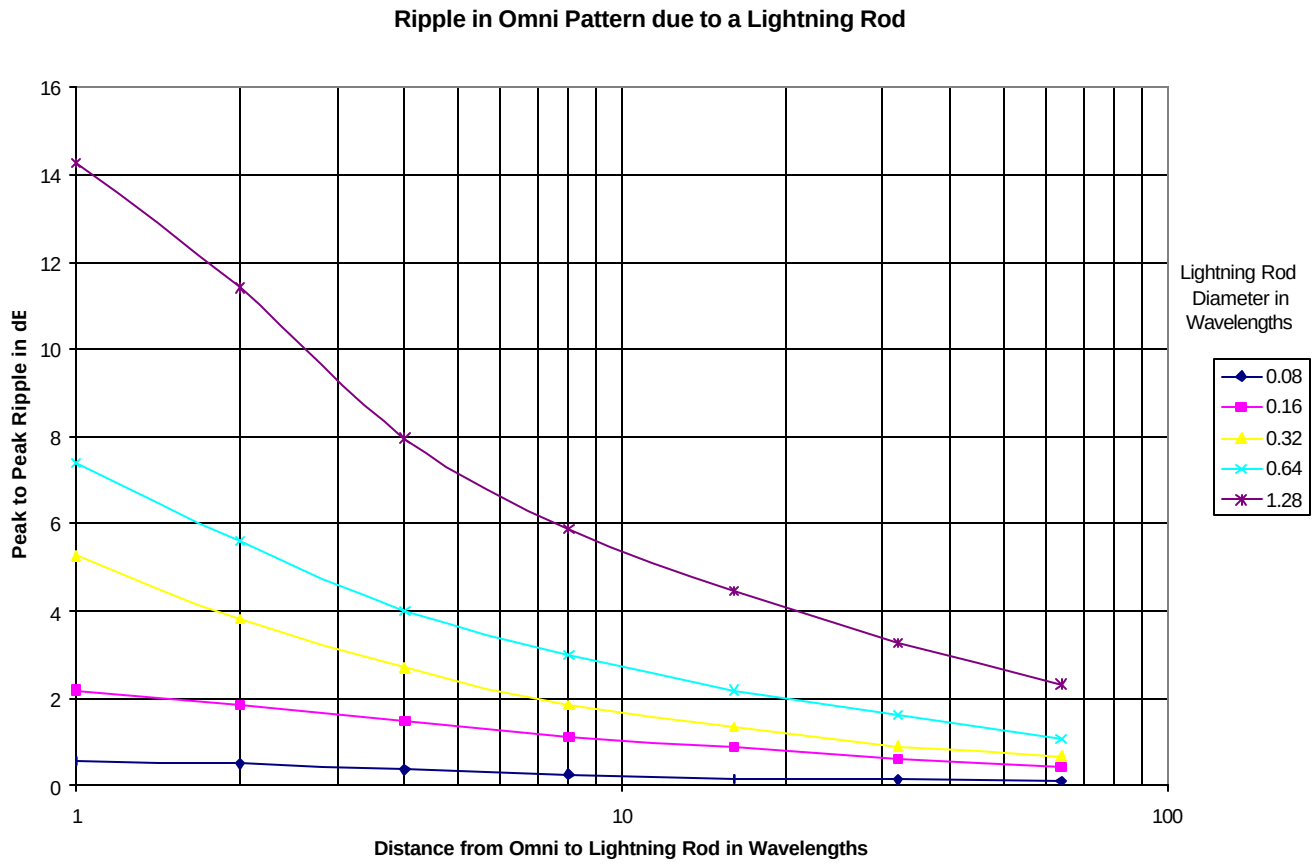
HORIZONTAL POLARIZATION



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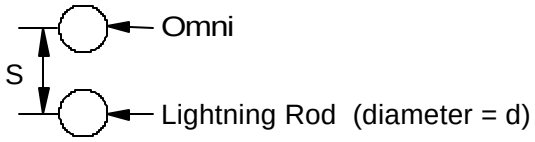
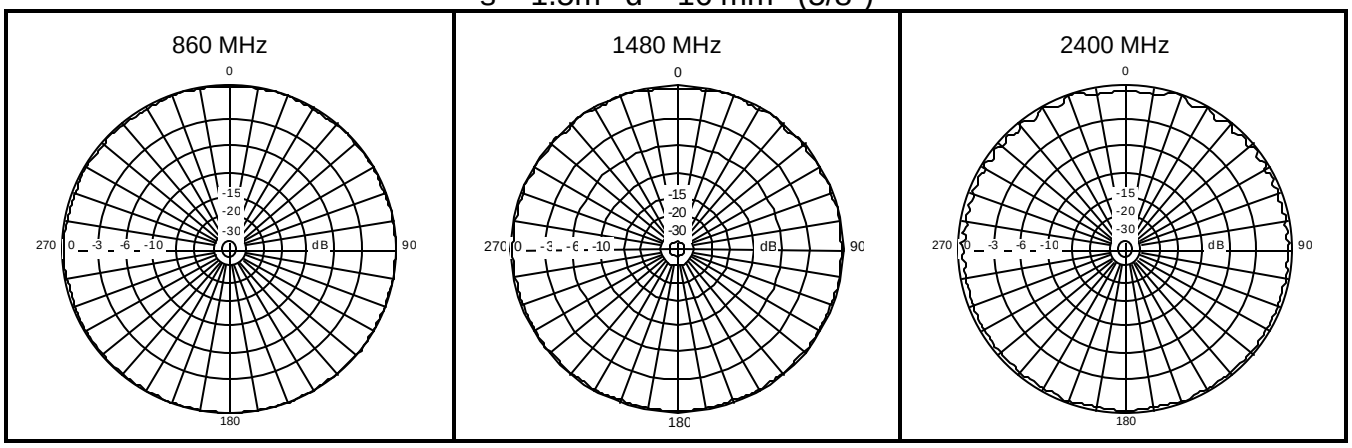
Horizontal Examples:



s = 1.5m d = 16 mm (5/8")



s = 1.5m d = 38 mm (1.5")