Ham 160 - Antenna angle layers

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The transmitter sends an electrical signal to the antenna, whose capacitance C and inductance L converts it to electric E and magnetic H fields, respectively. The E-H are perpendicular. Depending on reflection and refraction from soil and ionosphere, the E-H fields may be in phase (resistive, radiating) or time phase shifted 90-degrees (reactive). A subsequent phase shift can make the wave radiating again. Height above dirt is primary influencer of reactive. Fortunately, the Triad design allows the counterpoise to compensate the impedance for height.

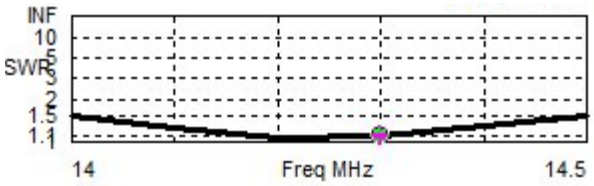
From an antenna, the wave may be three-types. Surface travel along the terrain with low frequency <4 MHz. Range is very short. Space waves travel through 'free-space' of troposphere, which is mostly line of sight with a Fresnel lens area along the linear section. Sky waves travel through atmosphere to be bounced back from ionosphere with frequency <20 MHz. For that to occur locally the take-off angle would be within The assumption of 'free-space' makes it a purely resistive circuit and the math is much easier. Reactive waves come from distorted paths and proximity to earth.

Models show the radiation path, pattern, and impedance Z. Most takeoff angles make HF shoot over top of neighbors. Elevating the feedpoint moves closer to free-apace and resistive radiation. Typical recommendations are elevation of λ/10 to λ/4, because of the free-space attempt.

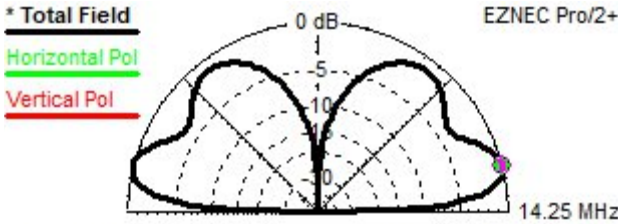
Consider the triad pattern. There are two major take-off angles. One angle is about 12-degrees while the other is near 60-degrees. Now use those on the angle verses distance chart by JNR Stanley.

D layer is only usable in Daytime, E lay is sporadic, F-layer is dependable but changes with Time of day.

Life is good. Enjoy!

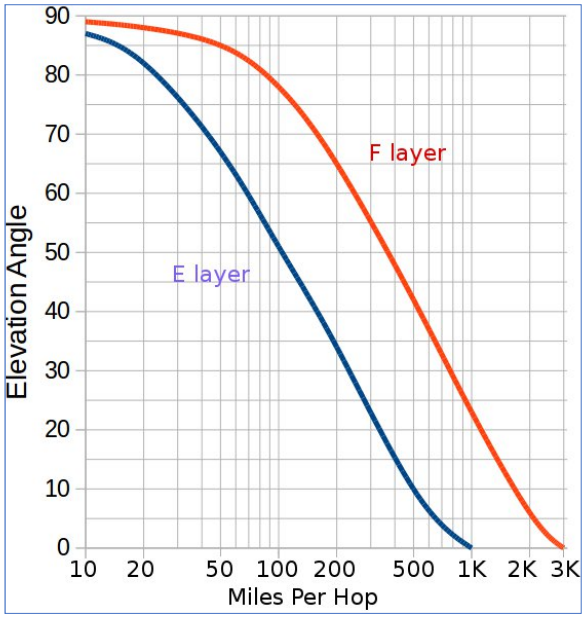


Freq	14.3 MHz	Source #	1
SWR	**1.098**	Z0	50 ohms
Z	51.03 at 5.21 deg.		
	= 50.82 + j 4.631 ohms		
Refl Coeff	0.0466 at 77.36 deg.		
	= 0.0102 + j 0.04547		
Ret Loss	26.6 dB		



Elevation Plot		Cursor Elev	14.0 deg.
Azimuth Angle	0.0 deg.	Gain	0.73 dBi
Outer Ring	0.73 dBi		0.0 dBmax

Slice Max Gain	0.73 dBi @ Elev Angle = 14.0 deg.
Beamwidth	22.3 deg.; -3dB @ 5.7, 28.0 deg.
Sidelobe Gain	0.73 dBi @ Elev Angle = 166.0 deg.
Front/Sidelobe	0.0 dB



f = Q * bandwidth