Yagi Antenna Fundementals For DFing (Foxhunting)

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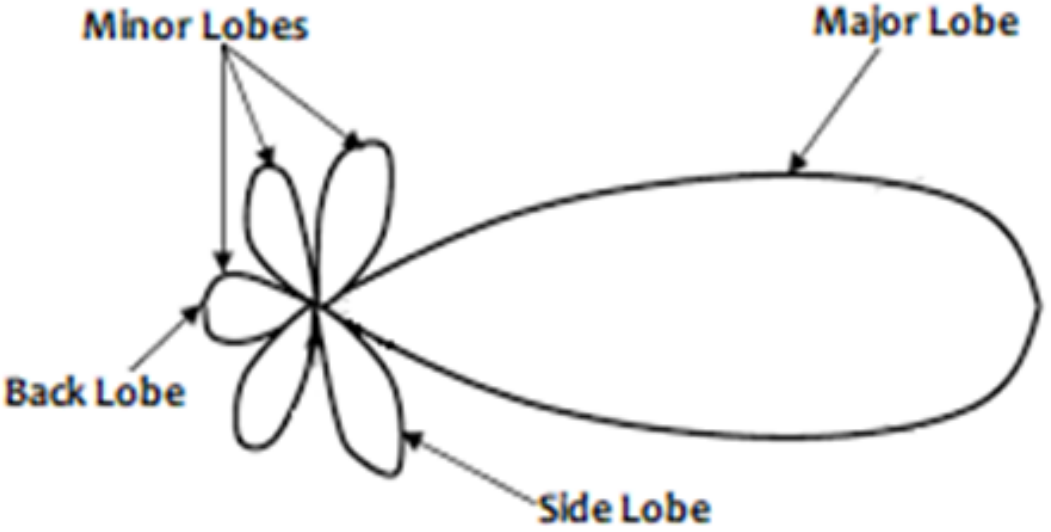
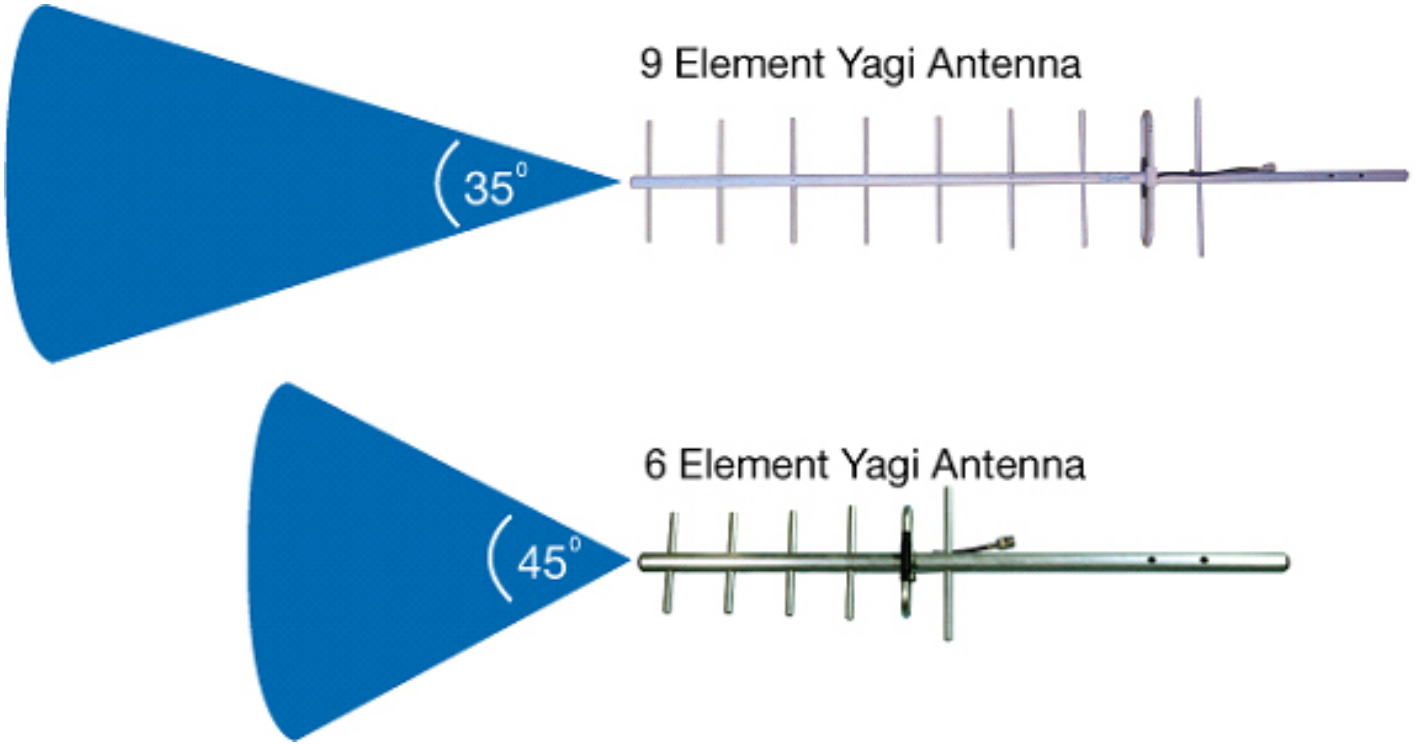
Yagi Terminology

- Forward Gain - The gain of an antenna (in any given direction) is defined as the ratio of the power gain in a given direction to the power gain of a ***reference*** antenna in the same direction



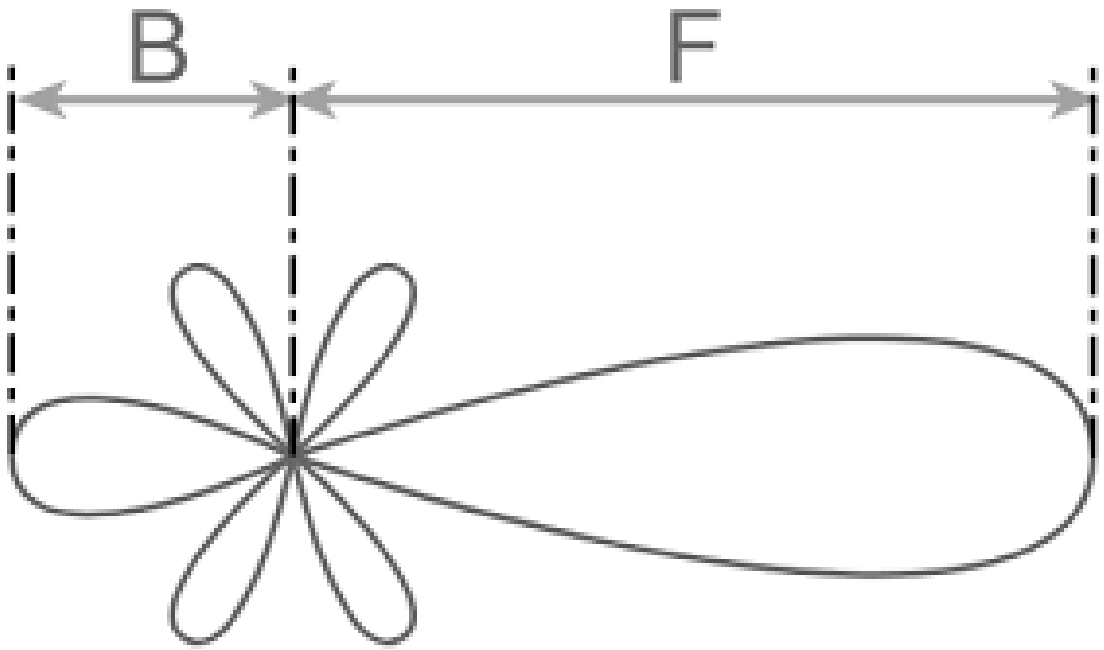
Yagi Terminology

- Beam Width - Indirectly related to Forward Gain. As Forward Gain increases, beam width decrases.



Yagi Terminology

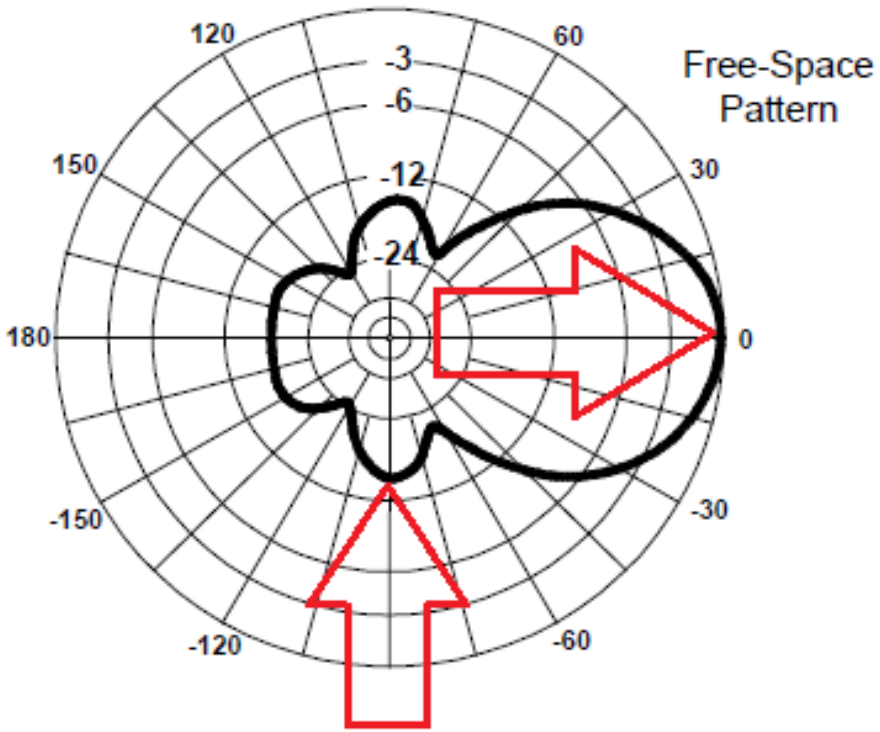
- Front to Back Ratio - A measure of the antenna gain at the front and the back of a directional antenna expressed as a ratio



Yagi Terminology

- Front to Side Ratio - A measure of the antenna gain at the front and the side of a directional antenna expressed as a ratio

Figure E9-1



The H Plane

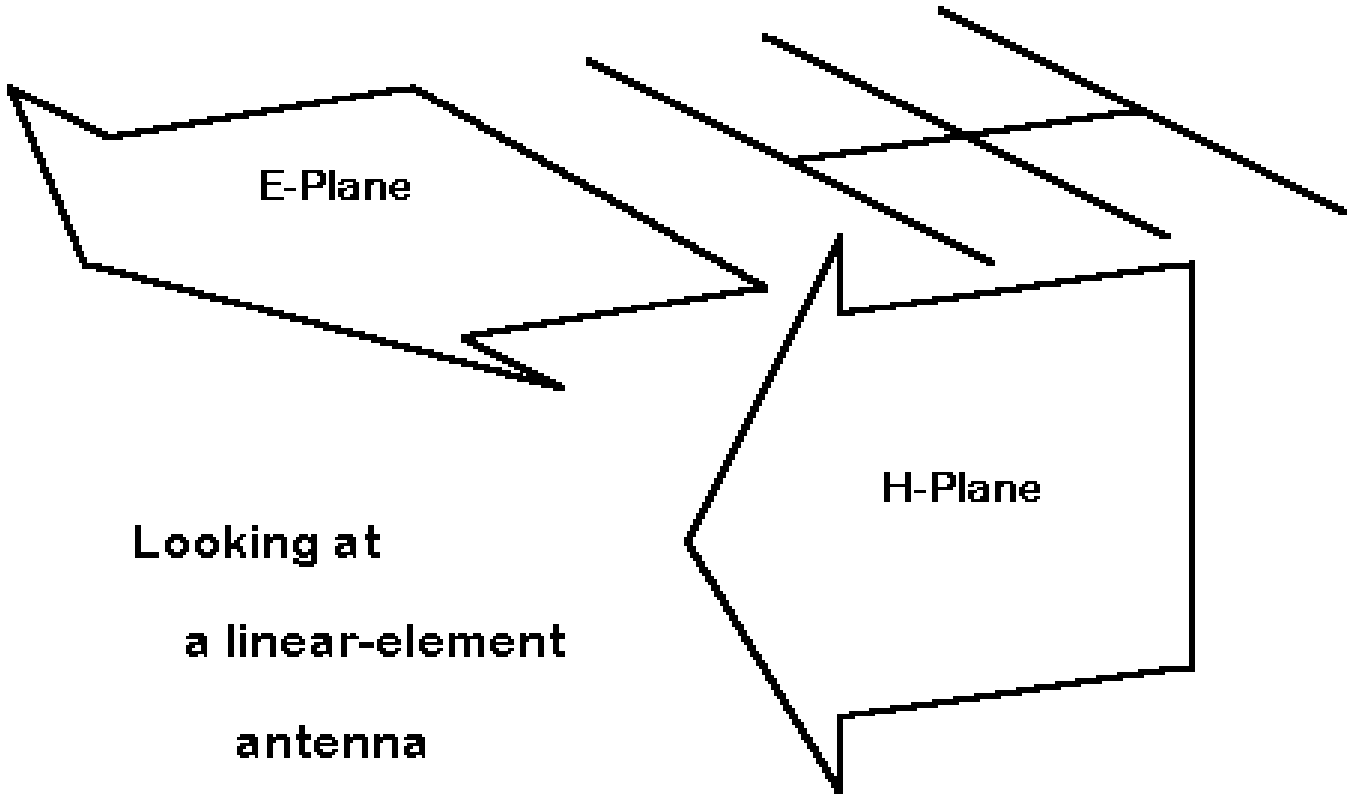
- In a linearly polarized antenna, this is the plane containing the ***magnetic field*** vector (sometimes called the H aperture) and the direction of maximum radiation. The magnetizing field or "H" plane lies at a right angle to the "E" plane.
- Think of a “side view” of an beam laying flat on a table so you are seeing the open ends of the tube elements Image to follow...

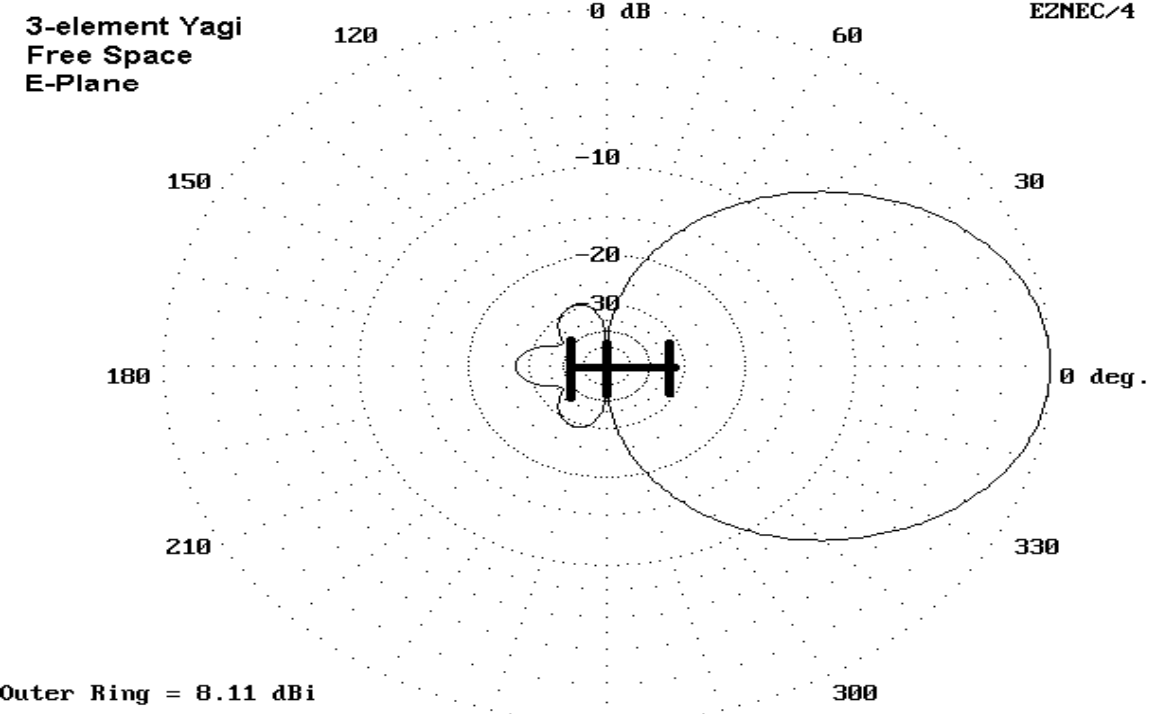
The E Plane

- In a linearly polarized antenna, this is the plane containing the ***electric field*** vector (sometimes called the E aperture) and the direction of maximum radiation. The electric field or "E" plane lies at a right angle to the "H" plane.
- Think of the view looking from above a beam laying flat on a table. Image to follow...

The E and H together

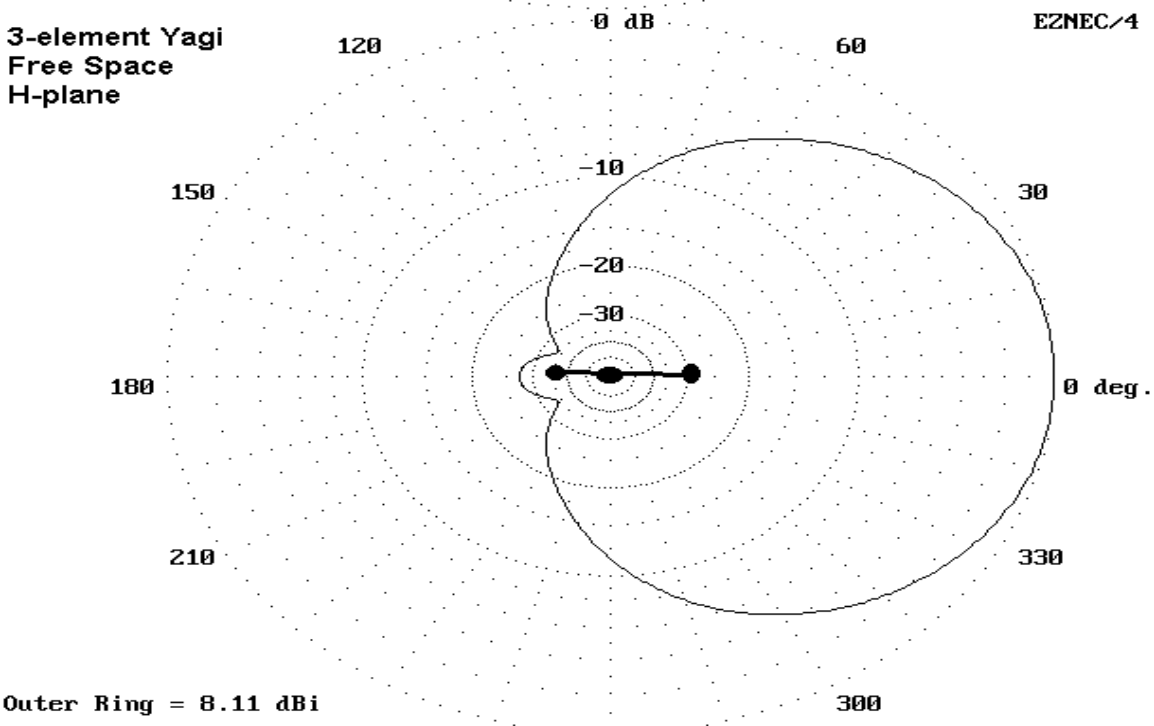
- Aligned with the antenna elements is the E plane





E-Plane

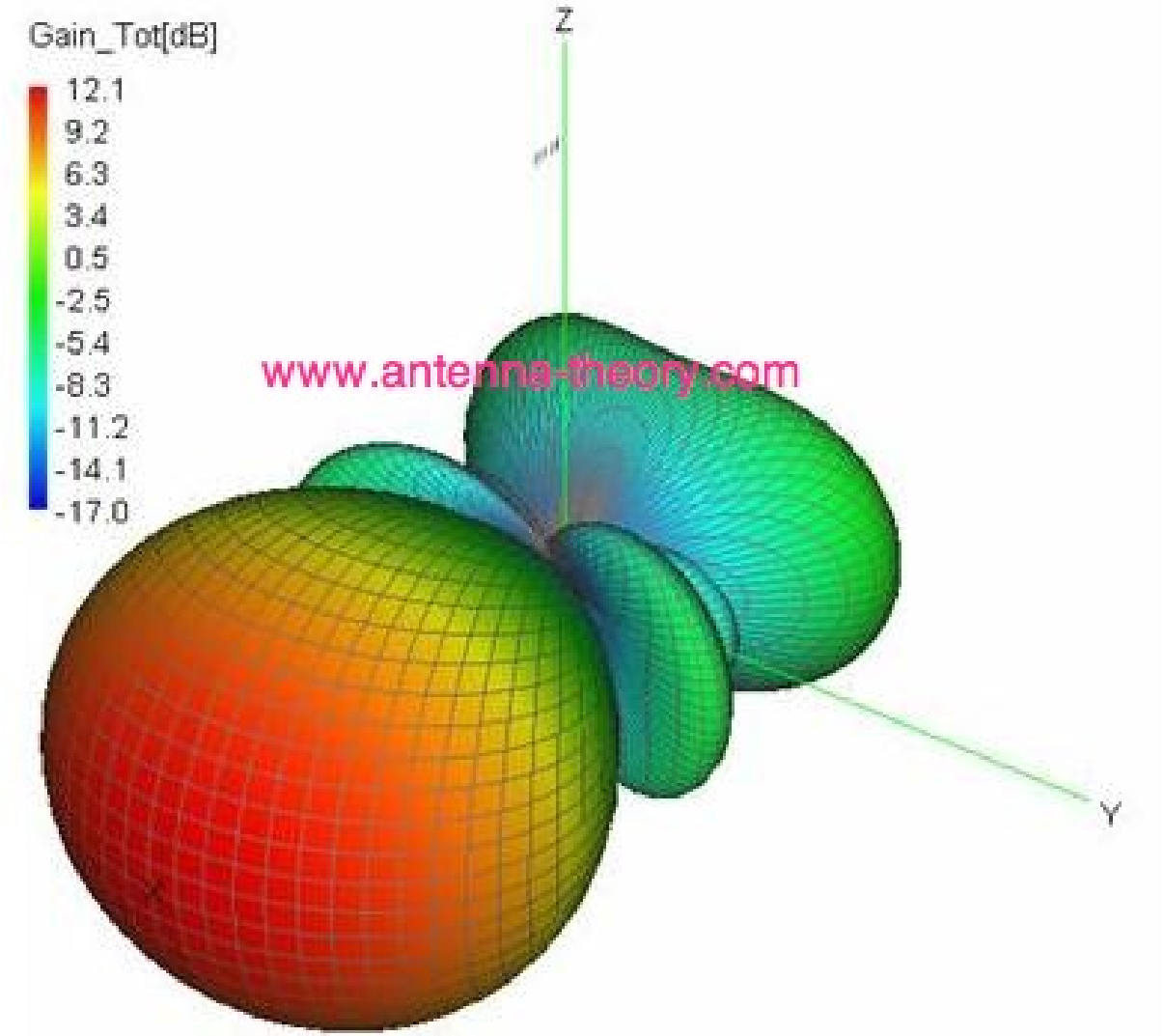
Easily altered by element spacing and number of elements



H-Plane

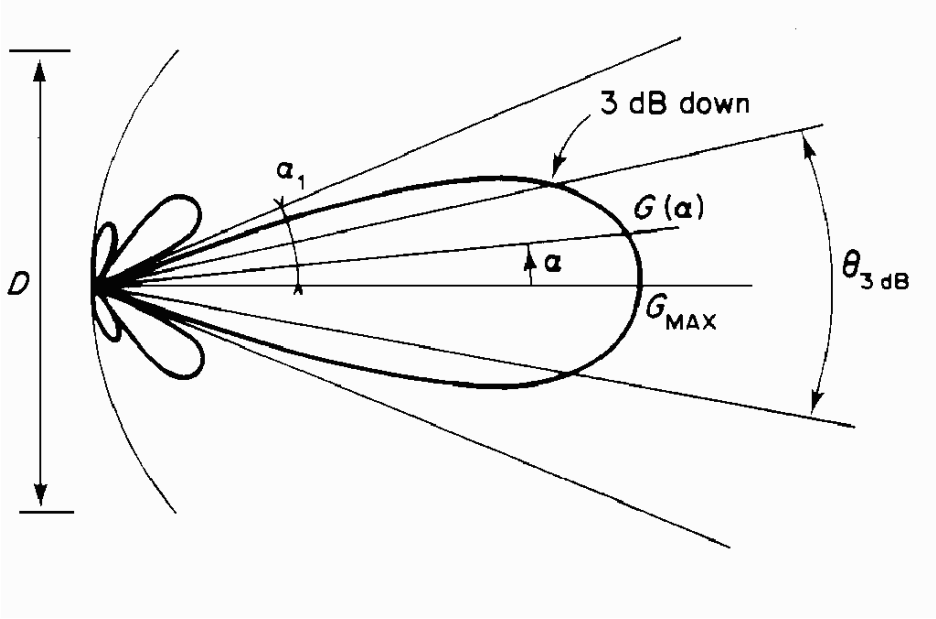
Easily altered by height above ground (Take off Angle)

Now plotted in 3D COLOR!

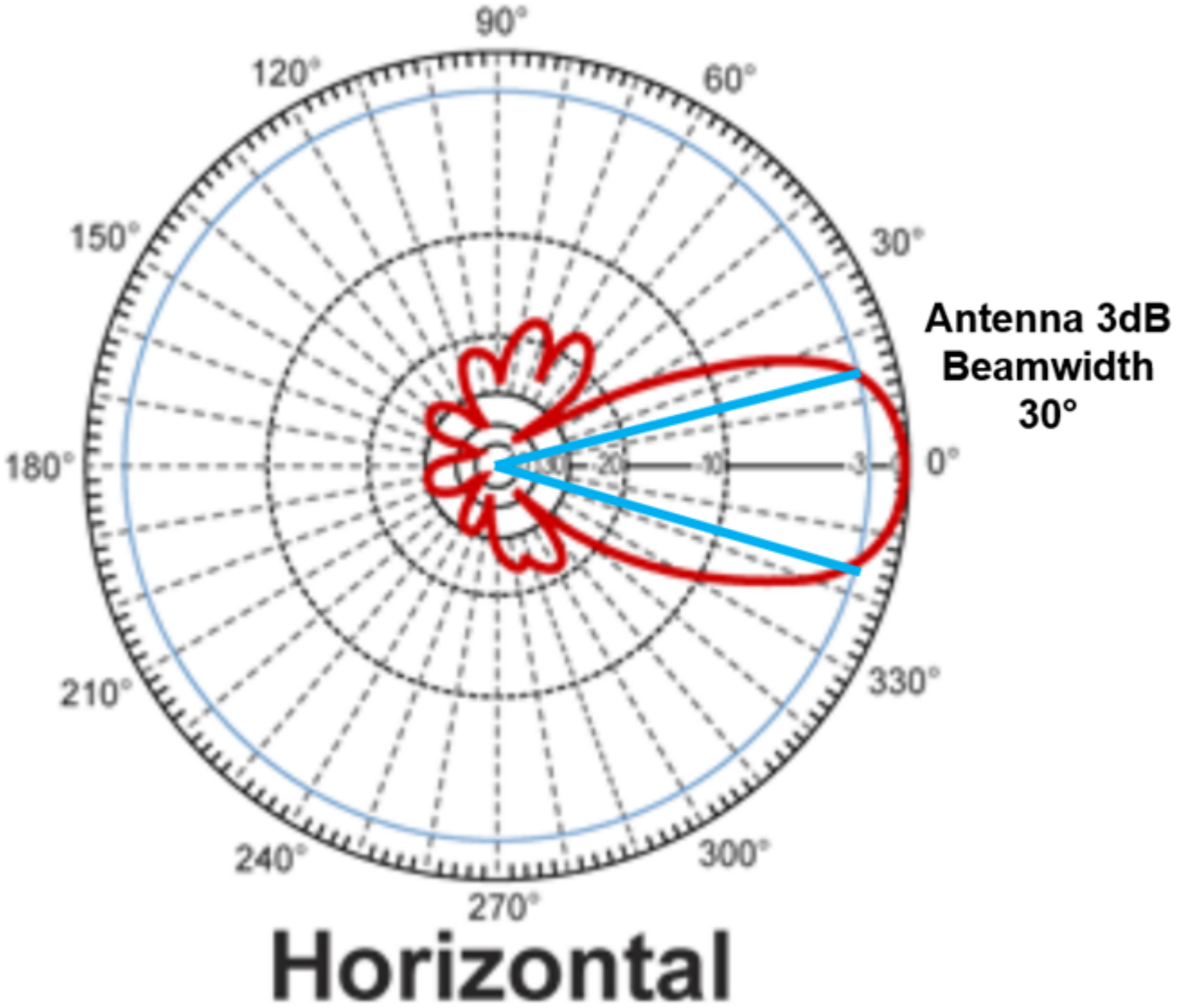


Half Power Beam Width

- Angular distance on ether side of the peak field, or main lobe, of the antenna that represents half of the peak field intinsity. Half the power is equivalent to **-3dB**, so the half-power beamwidth is also sometimes referred to as the **3dB beamwidth.**



Half Power Beam Width, continued



What Makes a Good Foxhunt Antenna?

- **Portability**
  - elements that bend, but return to proper shape while using antenna and while stowing for transport to the next location

- **Light Weight**
  - One has to aim antenna ***and*** read signal strength on the RXR's S-meter. We only have two hands!

What Makes a Good Foxhunt Antenna?

- **Portability**
  - elements that bend, but return to proper shape while using antenna and while stowing for transport
  - Repurposed measuring tape is perfect!
- **Light Weight**
  - One has to aim antenna and read signal strength on the RXR's A-meter
  - PVC tubing for the boom is light and easy to machine/work with basic hand tools

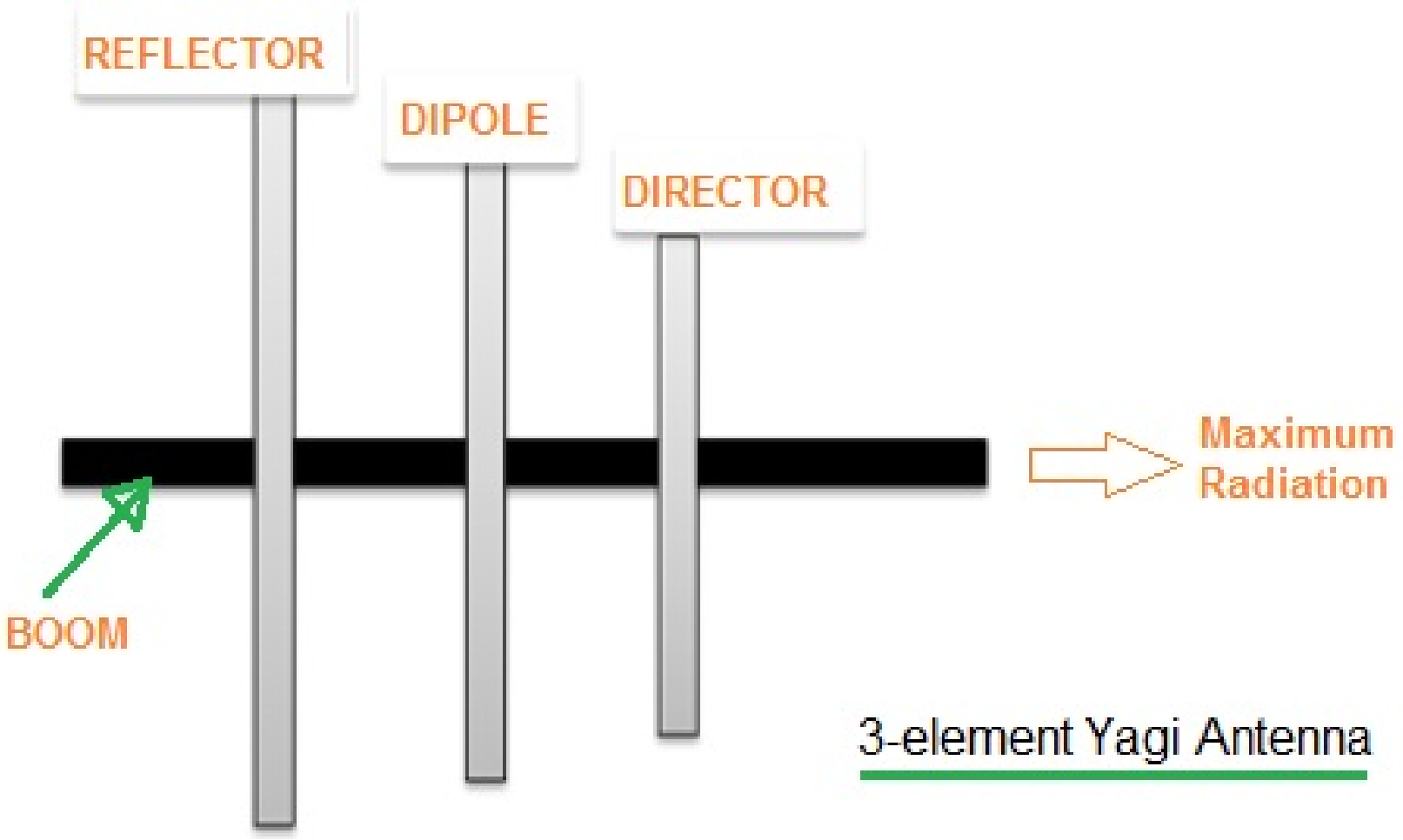
What Makes a Good Foxhunt Antenna? Continued...

- **Good (large) Front to Back ratio**
  - Initially use the forward gain lobe from three different locations to narrow down the search
  - As you get closer to the TXR, you use the ***backside*** of beam (the sharp null) to get an accurate azimuth
  - This is accomplished by element spacing, primarily the ***reflector*** and **driven** element

Generic Three Element Beam Dimensions

- Reflector is 5% ***LONGER*** than the driven element
- Driven element is typically a dipole cut for the desired frequency
- Director is 5% ***SHORTER*** than the driven element
- Element spacing is anyhere from 0.1 λ to 0.25 λ

Generic Three Element Beam



The Foxhunt Antenna