

The Radio Hotel - The Antenna – Part 2 – The Recipe by W5RH

The best place to start learning about antennas is with the dipole and knowing that the smallest antenna that is resonant is $\frac{1}{2}$ wavelength long – electrically¹. The dipole is the basic building block of most “standing wave”² antenna systems. Some systems use only half of the dipole (i.e. ground mounted vertical), others use extended length dipoles or multiple, independent dipoles to achieve what is desired. Orientation, feed point location and height all play into the system performance.

Compare designing, building and using an antenna to making a cake. When you bake a cake you need raw ingredients (flour, sugar, eggs, etc.). When building an antenna you also need “The Raw Material”, aka Basic Characteristics -- wires/elements of a resonant length and a feedpoint Z/Radiation Resistance that matches your chosen feedline’s Characteristic Z

“The Recipe” then defines how you are going to put the ingredients together. Are you making a cake, or a pie, or scones? Depends on how you put them together and in what quantity. On the antenna we can use these Controlling Characteristics to vary the current distribution, the polarization/orientation and the height above ground. Are you making a repeater antenna, or a NVIS, or an antenna for DX (low main lobe launch angle)?

How you physically configure the wire/element along its’ length, where you feed it and how you orient it will determine the last group -- Performance Characteristics. “The Raw Material” and “The Recipe”, all factor together to correlate into making “The Cake” -- the desired radiation pattern, gain and angle of radiation of our desired antenna system. In brief:

- Basic Characteristics – The Raw Material
 - Resonant length
 - Feed Z (Impedance) /Radiation Resistance
- Controlling Characteristics – The Recipe
 - Standing Wave Current Distribution
 - Polarization
 - Height Above Ground
- Performance Characteristics – The Cake
 - Gain and gain pattern
 - Angle of (primary) radiation lobe

Knowing what you want to do with an antenna is the main factor when starting to design an antenna system. Knowing what the antenna system is going to give you, performance wise, and what it will present to you feedpoint wise, etc. comes from your personal knowledge base built up by studying and working with antennas over time. Antennas are fun to learn about, build and use. There are as many different antennas and systems as there are stars in the sky (a slight hyperbole). To get a gist of the many antenna types, read the article on the www.bvarc.org **Tech Articles** web page – “Antenna Adjectives – Words Aplenty”. Enjoy the journey down the path of antenna system enlightenment.

Next month: **The Antenna - Part 3 – “Resonance, Feed Z and Standing Waves – Oh, My! “**

*Notes: 1-- The key term is “electrically” -- there are short dipoles – physically, but all are at least $\frac{1}{2}$ wl long “RF-wise”
2-- Standing Wave antennas versus Traveling Wave antennas (Rhombics, Beverages, etc.) – Google the difference*

*The purpose of **The Radio Hotel** is to give you a practical kickstart into exploring the workings of antenna systems. It is a series, so go back and read the previous columns to get the whole picture, as one month relies on the previous month’s information . Google the buzz words and find out what they mean. Read up on antenna system theory to see how it all works together. You will be glad you did.*



Have you volunteered to help with the Greater Houston Hamfest? We need as much help of any level of ability as possible. Contact this year’s Chairperson, Nathan Vessey, N5NYV, at gghamfest@att.net or (c) 832-603-1535.