

# The Radio Hotel – Understanding Antennas ...and the Antenna System

by Rick Hiller W5RH

An area of Ham Radio that is of interest to everybody is that of the Antenna System. The antenna (the load), the transmission line, the ATU (matching network) and the source (the transmitter/receiver) are the major components. In the end we are all most interested in the overall performance of this system when we are on the air. Antenna Systems, are they plug and play? Yes, they can be, but really shouldn't be. It is best and to your benefit to understand at least the basics of what is the antenna system: its' attributes, its' features and just what makes it tick.

As Hams, the main points of our antenna design and building process is to get the most out of gain, front to back ratio and efficiency by utilizing resonance, feed Z, SWR (return loss), pattern, angle of radiation. Some we calculate, some we adjust for and some we just accept.

The Antenna System for transmit consists of the source (radio) the transmission line (coax) and the antenna (the load). Not much to say for the source except that it can be from 160 meters up thru the GHz range, but focused on 160 thru 2 meters is the bulk of the sources. Power out of 5 W, 100 W or 1500 W is the other variable.

The BVARC web page of Tech Articles has a complete compilation of The Radio Hotel columns <https://bvarc.org/home/tech-downloads/> Take a look at The Radio Hotel series of columns all about **The Antenna – February 2015 thru November 2015**. This 9 part series explains the different important attributes of an antenna system. Note that any antenna is affected by its' local surroundings. The stated attributes, quantities and characteristics are mostly all approximate due to the local environments affect. They are close enough to get us in the ball park of where we wish to be, but not exact.

Now, getting power to the load is a more of an exact science. Transmission lines can be described mathematically. In fact, that is how they are designed -- with equations. Check out another series of **The Radio Hotel -- all about SWR** on the transmission lines (coax or twin lead, etc.) This is a whole new area of understanding. **7 Parts from May 2014 thru December 2014.**

Please extend your knowledge search to other Radio Hotel articles or books and articles from other authors, of which there are many. Maybe the style that I write in does not suit you very well, but another author will be of a style that will have you understanding everything easily. I have always said, some like Bill Bryson, some like James Michner.

Knowing just the basics of antenna theory and transmission line theory and how it affects our ham radio stations' performance is a cardinal rule of being a Ham. I have always said that our antennas from the transmitter/receiver out to and including the antenna is a "system" and understanding that "system" is the way forward to a more enjoyable Ham Radio experience. Enjoy your hobby – W5RH

*(Note: I was scheduled to give the February meeting presentation about the HF antenna system but family medical circumstances got in the way and when you read this I will be in W3 land. I will do the HF Antenna presentation at a later date)*