

# The Radio Hotel - SWR/Matching & Learning More by W5RH

In the past 7 months I have tried to show how the antenna system's components all work together and how they interact. The Radio Hotel column's subjects all centered around the SWR – Standing Wave Ratio. Much more detail in the system's workings needs to be understood in order to get a complete picture. Back in the 80's, when I was relearning RF electronics, it took me quite awhile for all of this to make sense with all of the interactions that are happening. I truly hope that it takes you much less time than I. Once you understand the theory it's great, as you can immediately apply that knowledge to any antenna system situation and understand what that system is trying to accomplish and how it is doing it. Another nice thing is that you will stop worrying so much about SWR and the "bad things" that it brings. You will take care of what you can using the best components and just operate.

So, the final step in this series on SWR is for you to extend your knowledge beyond that given in **The Radio Hotel** over the past 7 months. This is where you come in and take over with some extracurricular reading material. I will recommend 3 of my favorite books about transmission lines and the "system" that are worth their weight in knowledge gold:

- 1) ARRL Guide to Antenna Tuners – Joel Hallas – W1ZR ARRL 2012 (very practical)
- 2) Reflections (1, 2 or 3) – Walt Maxwell (particularly applicable Ham Radio based theory)  
(the free 1967 QST series will do just fine)
- 3) Antennas, Transmission Lines and Wave Guides -- King, Mimno and Chen (1947)  
(includes -the secret ingredient of the infamous W5GI "Mystery Antenna")

(Note: I have also compiled a listing of a substantial bibliography of the articles I read and referenced to write this series on SWR. You can find that list on the BVARC.org website – Click on the "Tech Articles" page link in the Home page left side listing then on that page find **The Radio Hotel Bibliography.pdf**)

If any of the above books don't quite do it for you, there are many others, like the ARRL Antenna Handbook (any issue, 1939 to the present). You should realize that one author might sound like jibberish, but another explaining the same thing, will grab you with clarity. Some enjoy Hemmingway, others like Bill Bryson. Choose an author and writing style that suits your knowledge fancy. (This is a hobby, not a graduate course) If you are like me you will not "get it" on the first read (I do hope you do though). I take the advice of the late Dr. Richard Feynman about understanding: take one sentence, or fact, at a time, understand it, and then build on it and its' interaction with the next fact.

Some software would be good too. There are 2 TL application calculators that I can recommend. TLW, by Dean Straw, from the ARRL – usually on the Antenna Handbook DVD. Also TL Details, by Dan Maguire, AC6LA, downloadable ZIP file from the web at <http://www.ac6la.com/tldetails1.html>. Both of these applications are really sweet TL calculators and they will show you a whole lot about transmission lines and matching. Little by little...step by step...inch by inch....it will all start to make sense. Good luck.

Finally, if I had a bit of wisdom to impart about antennas it would be 2 things -- 1) that antennas should always be looked at as a "system" consisting of transmission lines, matching networks and the antennas themselves; and 2) a firm grasp of the fundamental principles and characteristics of antennas and transmission lines is absolutely essential for it to all make sense. If a working knowledge of antenna systems is what you want, then find yourself an "Antenna Elmer" who can answer your questions and banter with you knowledgeably in discussion.

I hope you have enjoyed this first series in **The Radio Hotel**. (If not, please, let me know your comments) I hope to start up again soon and talk specifically about antennas. Why they work, how they work and their varying characteristics. Here's hoping that you get a good antenna or transmission line book from Santa. Happy Holidays to you and yours, whichever holiday you celebrate. 73.....Rick – W5RH

*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.*