

The Radio Hotel – Re-learning Something Old

Baluns and Chokes

by Rick Hiller – W5RH

My long time friend Rod, K5BGB, is always asking me probing questions about antennas, especially his. Now, there are 2 things I know about Rod. One – he doesn't own a microphone; and two -- being a physicist and a Ham he has probably forgotten more about practical radio theory etc. than I will ever know. (Both facts indicate that he has been a ham for a long time).

So recently, Rod asks me about a varying SWR problem on his G5RV antenna system. It is a typical G5RV implementation. 103 foot antenna wire fed with 300 ohm twin lead to a balun and then 50 ohm coax to the shack. Typical, as Sir Louis Varney would have wanted it. Now, I am not going to describe Rod's problem, but I will tell you that it led me to read (again) about baluns and chokes. I have always asked the question "**When is a choke a balun and when is a balun a choke?**" I think I finally have a reasonable answer.

The key to the answer was to ask the question properly, as the answer is in the question.

When does a choke function as balun? Answer -- When it is applied at the correct position in the antenna system. The choke is a brute force device not allowing common mode, RF currents to flow.

When does a balun function as a choke? Answer -- I don't think ever. The balun's function does not allow errant current to be generated in the first place. (So I guess it is the ultimate choke – HI.) The best place for a true balun is at the antenna feedpoint where it is designed to create a smooth transition from unbalanced to balanced and inhibits the production of errant, shield traveling, L3 RF currents.

Frequency response should be a concern

A balun, the transmission line transformer type, influences the actual signal RF. It modifies the TEM mode RF flow within the unbalanced coaxial transmission line; whereas an external choke only inhibits the flow of errant RF L3 or antenna currents on the coax shield. In a multi-band antenna implementation, like an EFHW or a G5RV, the frequency response of the balun transformer is extremely important in determining the antenna system's performance. The frequency response of the shield located choke is important too, but it will not hinder the desired RF going to and from the antenna. The shield choke simply hinders errant RF that is trying to flow back toward the shack on the shield's outside surface. Hence, measurement or knowledge of the balun transformer's frequency performance is imperative for knowing the antenna system operational conditions, especially on a multi-band antenna system. Utilizing the proper mix # of the ferrite cores plays a large part in the frequency range determination of both the ferrite based balun and choke.

With this, I think I have increased my understanding of chokes and baluns. I can now re-read Sevick's books on TLT's and Baluns, with a better basic understanding of what I really need. I always find it best to have a reason for reading a book other than just reading to gain knowledge. I find it best to be investigating an issue and digging for the answer. Hopefully now, I won't have to dig too deep to further learn something old.

Check out --Transmission Line Transformers -- Jerry Sevick, W2FMI

Building and Using Baluns and Ununs -- Jerry Sevick, W2FMI

Baluns: What They Do and How They Do It -- Roy Lewallen, W7EL

Ferromagnetic Core Design and Application Handbook – Doug Demaw, W1FB

Be inquisitive. Enjoy your hobby – 73...Rick