A Novel Homebrewed High Impedance Choke Balun for Under $50

by Jerry Campbell K4ZHM

There are many novel ideas on balun and antenna construction. The balun described herein is a rather unique method of constructing a balun of stacked toroids and coax within a PVC pipe that provides inherent support.

I wanted to construct a new 80 meter antenna and was going to use a balun consisting of about 21 turns of RG-8 coax. Then a friend (NR0V) mentioned the article "*A Ham's Guide to RFI, Ferrites, Baluns, and Audio Interfacing"* by Jim Brown K9YC from **audiosystemsgroup.com/RFI-Ham.pdf**. After reading the article I chose to construct the choke balun described within it, which is 6 turns of RG-8 on a stack of 5 FT-240, #31 mix toroids, and has an impedance of greater than 5000 Ω at 3.5 MHz. Jim states on page 28 that his work and experience proves that, as suggested by Chuck Counselman (W1HIS), a value of 5000 Ω is a more suitable target value to to optimize noise suppression. This is in comparison to a value of 273 Ω impedance at 4 MHz for a 12 turn coiled coax choke balun (*ARRL Antenna Handbook, Chapter 26, Table 3, page 26-23*) and the traditional view that 500 Ω is enough (page 28 of Jim's article).

Jim has written a very instructive paper and should be read by all interested in learning about RFI and baluns.

I originally planned to put the entire coil assembly inside the 4" diameter PVC pipe, but after winding the balun, I found that approximately 9 inches in diameter is about as small as the assembly can be made without compromising the integrity of the coax. I then decided to use the PVC pipe as support for the balun assembly by winding the coax through the core in the center of the PVC pipe and through side holes in the PVC pipe. The 4" PVC pipe can thus be used and the PVC assembly will still protect the toroid stack from the weather. It worked out well and it wasn't difficult to wind the coax through the holes in PVC pipe and the stacked toroids in the center (a small amount of petroleum jelly helps in threading the coax through the toroid stack).

I ended up with the balun shown in the last picture. The balun looks neat, like something from Tesla's world. But, more importantly, it works. Total cost (toroids and PVC) is less than $50.

The following pictures depict the construction of the balun. The hole positions along the pipe axis are about 9" apart. A center to center hole separation around the circumference of 2" will keep the turns spaced far enough apart as they should not be bunched together. RTV applied on any openings will seal them well enough to keep water from entering on the sides. Drilling six or eight 1/16" holes in the assembly bottom provides for any necessary drainage and the holes are small enough to keep out bothersome insects.

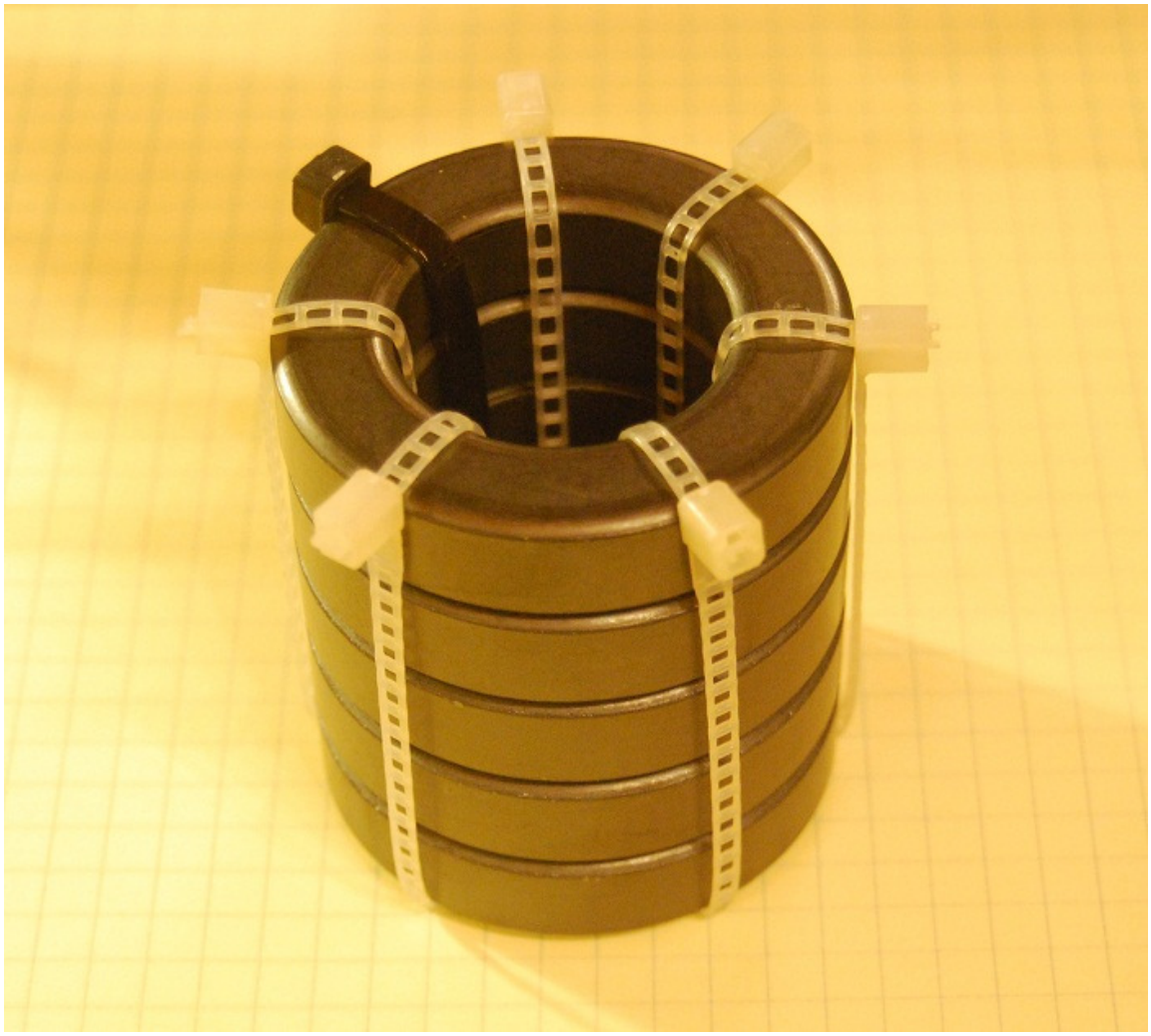

Figure 1 – FT-240, #31 mix toroids

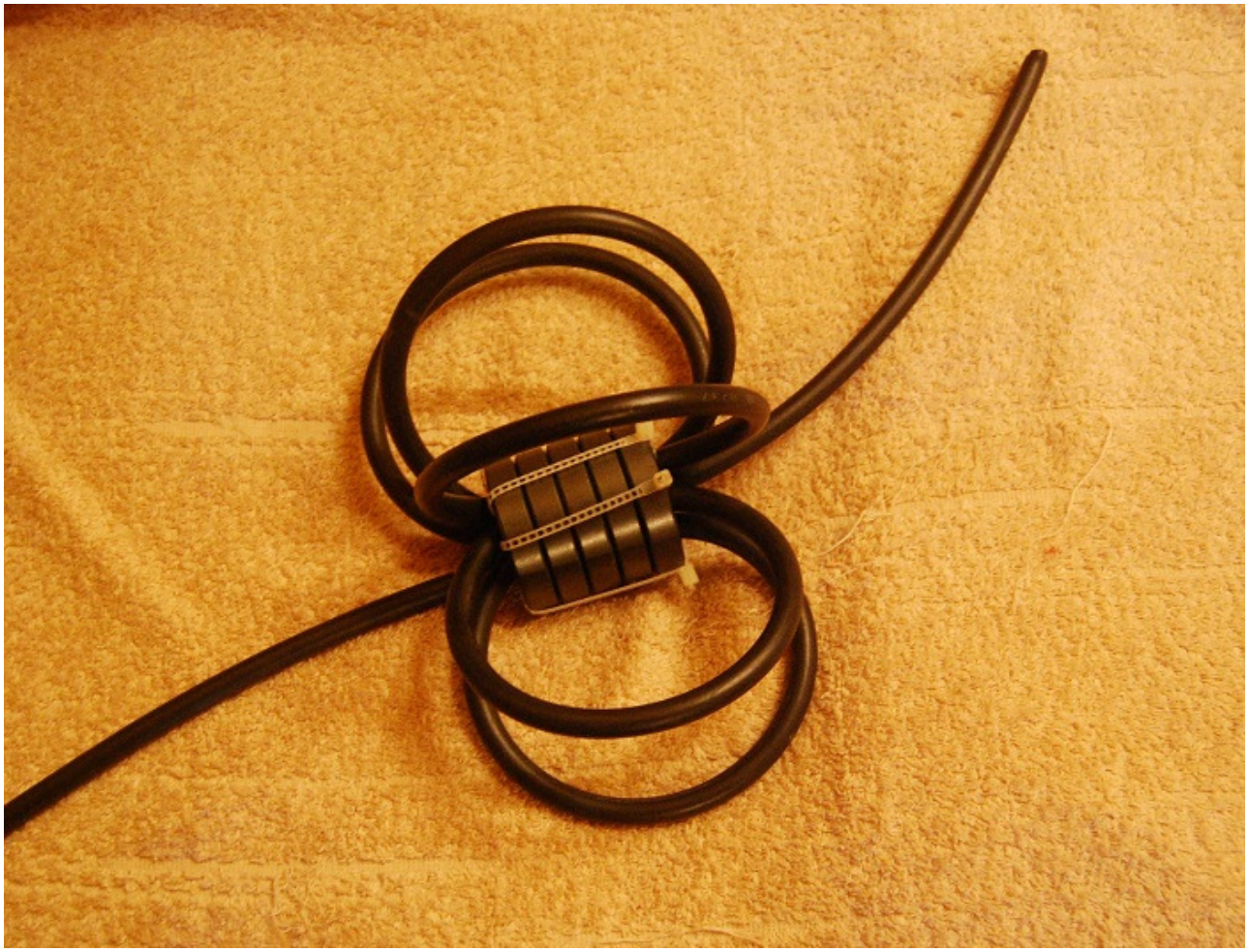

Figure 2 – 6 turn balun

Figure 3 – 6 turn balun assembly

Figure 4 – 6 turn balun assembly

Figure 5 – Balun prior to final assembly

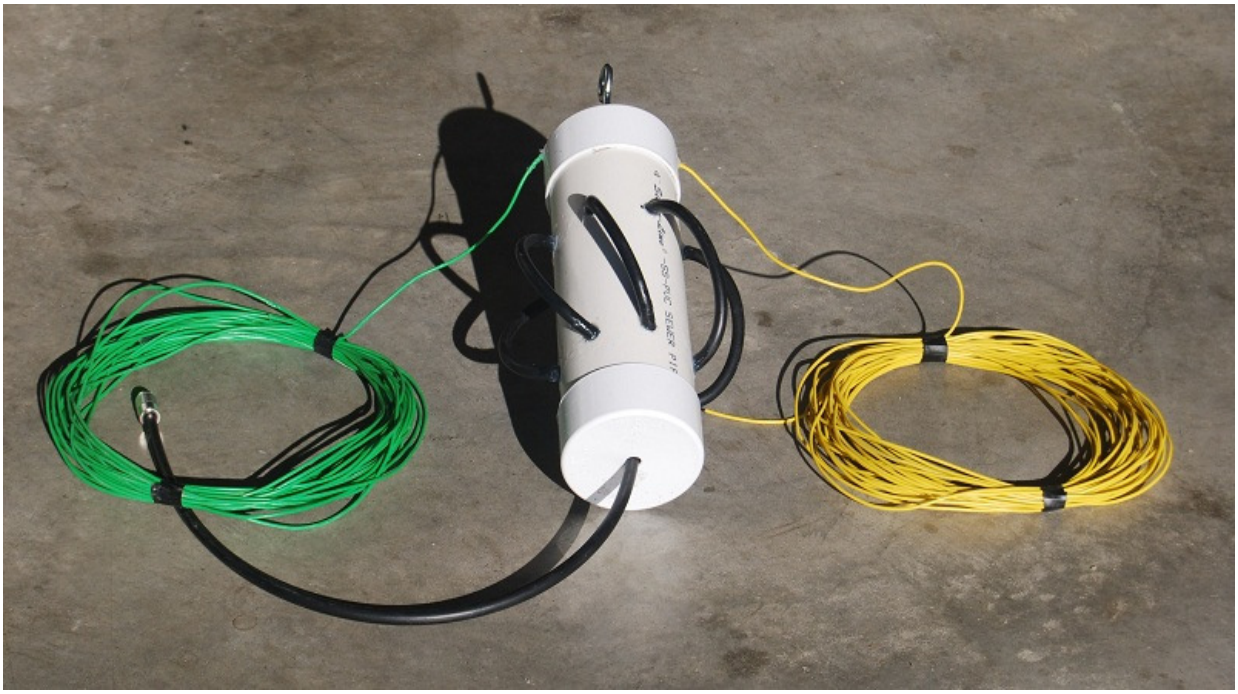

Figure 6 – Completed balun and antenna

Figure 7 – Balun and antenna mounted on tower

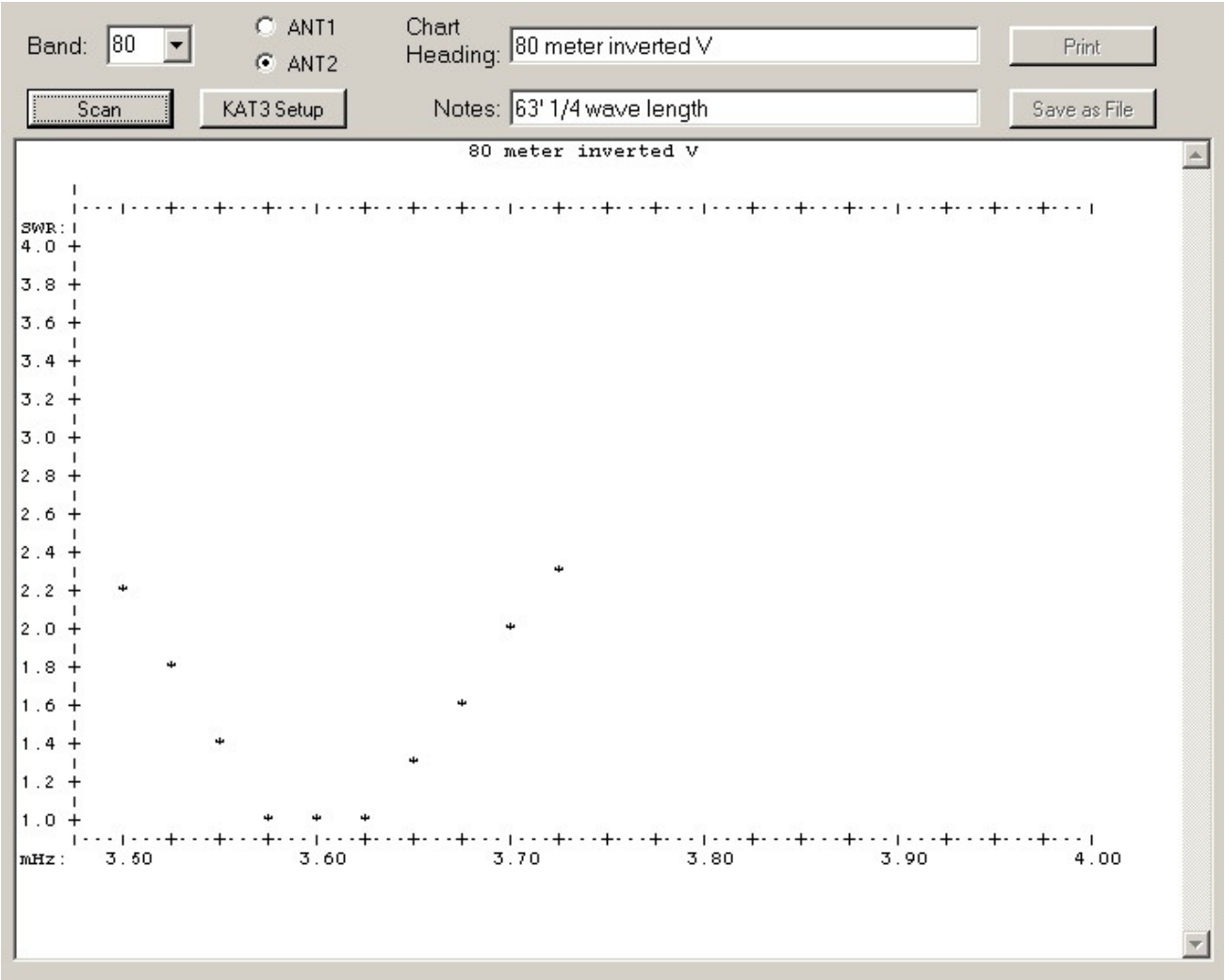

Figure 8 – SWR Plot