

Another Look at Noise-Reducing Antenna Systems

Mark Connelly - WA1ION - 06 JUL 1992

The DX community was recently introduced to noise-reduction concepts by the 1991 articles "**Interference-Reducing Antennas for the BCB / Remote Tuning and Amplified Antenna Signals**" and "**More notes on interference reducing antennas**" by Denzil Wraight and "**Inverted L Noise Reducing MF / VLF Antenna**" by Dallas Lankford. These articles are now available as NRC and IRCA reprints. The authors based their work on ideas put forth by F. R. W. Strafford in *Wireless World*, 25 NOV 1937.

I have experimented with some of these designs. Also, I have come across similar noise-reduction properties when using Beverage-matching transformers, as described by Nick Hall-Patch / John Bryant ("**Impedance Matching a Beverage Antenna to a Receiver**", *Proceedings 1988*) and me ("**Bevmatcher**", 15 JAN 1991).

My experiments indicate that isolating the various grounds is the major factor in reducing local electrical noise from TV's, light dimmers, digital circuits, fluorescent lights, motors, and the like. Isolation transformers and a "field site" earth ground not tied directly to the station (e. g. mains) ground are key elements in the noise-reduction scheme. Improvements have been noted with even a modest separation (such as 30 ft./ 9 m) between station ground and field site ground. If the field site is removed by a greater distance (e. g. 66 ft./ 20 m, or more) from the immediate vicinity of house wiring, all the better. A suitable feedline must be used between the two isolation transformers. Wraight and Lankford have used balanced lines (such as twinlead and "zip cord"). I have had good success using 50-ohm coaxial cable of the RG-58 and RG-8 varieties. My set-up for a single noise-reducing antenna is shown in Figure 1 which accompanies this article.

Note that the field site transformer provides broadband impedance matching (9:1 step down from approximately 450 ohms antenna to 50 ohms transmission line) as well as ground isolation. One could use either the Mini-Circuits T9-1-X65 or an equivalent homebrew model - for instance, Nick's FT50-43 Amidon core with 35 turns primary, 11 turns secondary.

A low-loss matching pad (-1.8 dB) is used to reduce mismatch which could compromise antenna directivity and noise suppression. Refer to my "Bevmatcher" article (cited above). The 9:1 transformer and the matching pad should be enclosed in a weatherproof box.

The transformer on the "shack" end of the cable should be a 1:1 type such as Mini-Circuits T1-6-X65. My Super-MWDX-5 phasing unit design incorporates a 1:1 transformer on each of its two input lines to provide this ground isolation capability when desired.

The antenna length or orientation isn't critical. Any length from 33 ft. / 10 m on up to Beverage length should work. Shorter lengths will probably require in-shack tuned amplification. For a small to medium sized lot, consider a sloper. A 62 ft. / 19 m sloper suspended from a tree or mast can give better directivity and pick-up than any other orientation of that wire length. Additionally, with a decent ground system, it can be used for transmitting on the 75-m (3.8 MHz) ham band if the transformers and pad resistors are switched out of the line.

The field site earth ground system should consist of at least one buried 6.6 ft. / 2 m copper rod and, preferably, more of these plus several radial wires of length comparable to that of the sloper.

I have two such low-noise antenna set-ups which I route to the inputs of a phasing unit and/or MWT-3 regenerative tuner. Amplification in the phasing unit or in the regenerative tuner compensates for the relatively low signal levels from the short slopers. The lack of TV hash, etc. on the two antennas allows me to use phasing to null out "pest" stations to hear DX rather than using phasing to null out local electrical noise to hear routine "pest" stations. Weak DX is besieged by TV-related QRM when loops and whips are used, even when they're located out in the yard as much as 50 ft. / 15 m away from any houses or power lines. A system with two phased noise-reducing slopers, followed by high-Q regenerative amplification, is the best set-up I can fit on my fairly compact (0.344 acre / 0.14 hectare) suburban lot. The slopers are arranged to favor different directions. Obviously, Beverages would do much better, but few DXers have that kind of space at their home QTH's.

FIGURE 1: NOISE - REDUCING ANTENNA SYSTEM

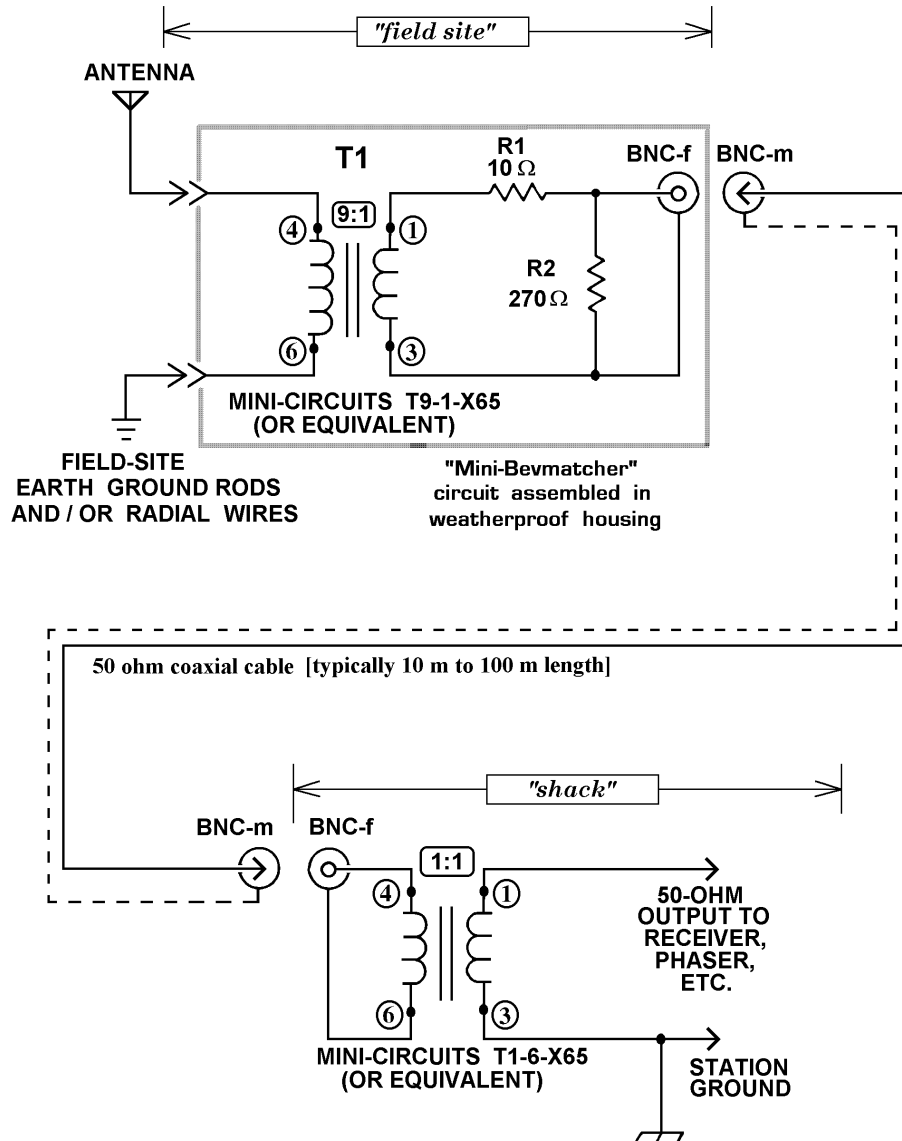


figure 1 above

/* end */