BETTER SIGNALS

ANTENNAS AND SIGNAL IMPROVING ACCESSORIES

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W9INN 160-80-40M Broadbander

The low-band ham antenna is a problem in today's world of townhouses and tract developments. A second aggravation can be the use of more than one antenna to cover all three bands along with separate cables to the radio room. The W9INN 160-80-40M Broadbander offers effective solutions to the above. An attractive feature of this antenna is good and matched performance on some of the shortwave broadcast bands as well. Basic operation and a typical installation are covered in this column. In a subsequent column several innovations are covered that can be used with the basic W9INN and other wire antennas to add additional matched shortwave broadcast and ham bands to their capability.

The restrictive mounting site problem has been handled in two ways by W9INN. The antenna legs are only an electrical quarter-wavelength long worked against ground like a quarterwave vertical. Thus the feed point is at ground level, Fig. 1. The ground can be as simple as a 5 ′ stake driven into the ground or, radials can be added to improve low vertical angle DX and make the entire antenna less susceptible to changing ground conditions. An antenna worked against a good ground is usually the better way to go with low height antennas as compared to a low dipole when DX'ing is your aim. The low angle results improve with more radials. In fact sixteen of them is a worthwhile objective for the low-band DX'er.

W9INN uses a unique coil he has named a resonactor to decrease the required length of the quarterwave 160 meter leg, Fig. 1. It functions as a loading coil to obtain resonance on 160M and has a high reactance untuned trap-like performance on 80 meters. The 80-160M leg extends from the antenna end to the coaxial SO-239 receptacle at the feed point. The ground space occupied by the antenna is approximately 75 ′.

On the feed point side of the mast, two spreaders space the 40M quarterwave element a proper distance from the 80-160M leg. Both ends are soldered to the inner conductor of the SO-239. As shipped, the antenna is assembled completely except for the attachment of the spreaders. Even these are dressed and can be positioned correctly with ease.

When you order the antenna you can choose three preferred resonant frequencies, one on each band. These will bring you in the ball park even though you do not erect your antenna exactly as shown in Fig. 1. However, ground-system conductivity, height, and angle between the two sides of the 80/160M leg have their influence on the exact resonance points. Mast here was only 23 ′ high and the ground length of the antenna then approached 90 ′. I had to increase the length at all three antenna ends as marked in Fig. 1 to hit the center resonant frequencies of 1.85, 3.8 and 7.22 MHz. The SWR at each frequency was dropped to 1.1-to-1. The 160M 2-to-1 bandwidth was 120 kHz; 80M, 270 kHz. A ratio of less than 1.6-to-1 was maintained over the entire 40M band, and a ratio of 1.2-to-1 over the 15M band. In fact on the latter band the 40M leg operates as a three-quarter wavelength element. The cable length here was 90 ′ and in addition to the ground stake I used three 40M radials. The 160-80-40M Broadbander worked out well on all four bands. It was a joy to be able to operate on all four bands just by retuning the transceiver.

On 80 and 160M and on the other bands too there was no problem in bringing the SWR down to 1.1-to-1 over each of the bands with a tuner. Of course the tuner is only really necessary on 80 and 160 meters when you wish to operate over the entire band. As a bonus the antenna functioned

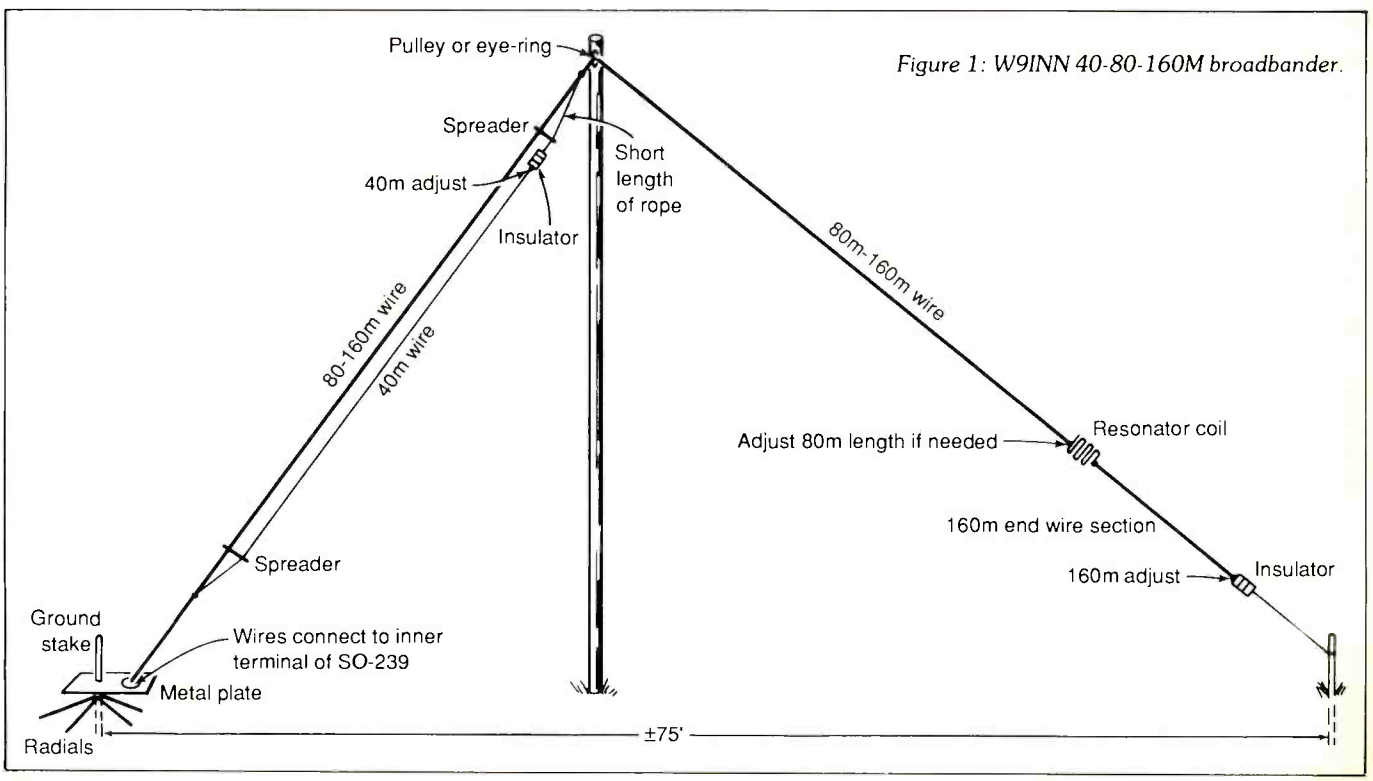

Figure 1: W9INN 40-80-160M broadbander.

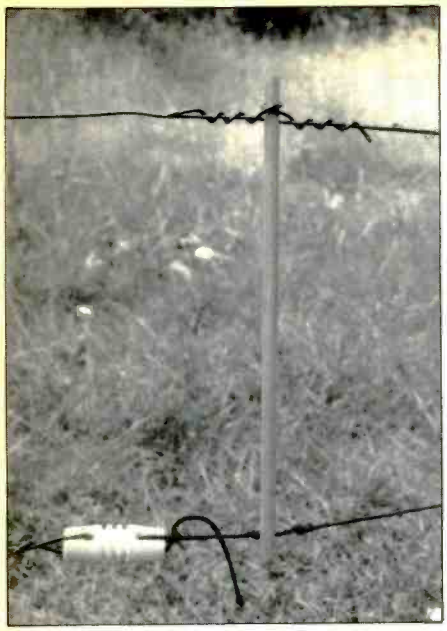

Figure 2: Spreader attachment before erection; 80-160M wire at top of spreader; end of 40M wire at bottom.

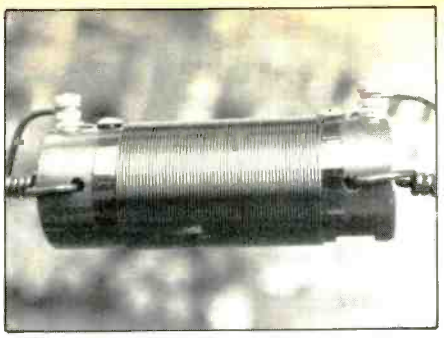

Figure 4: Resonactor coil.

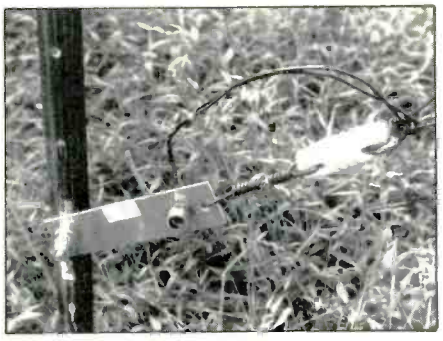

Figure 5: Feed point arrangement.

Figure 6: Antenna bridge at work.

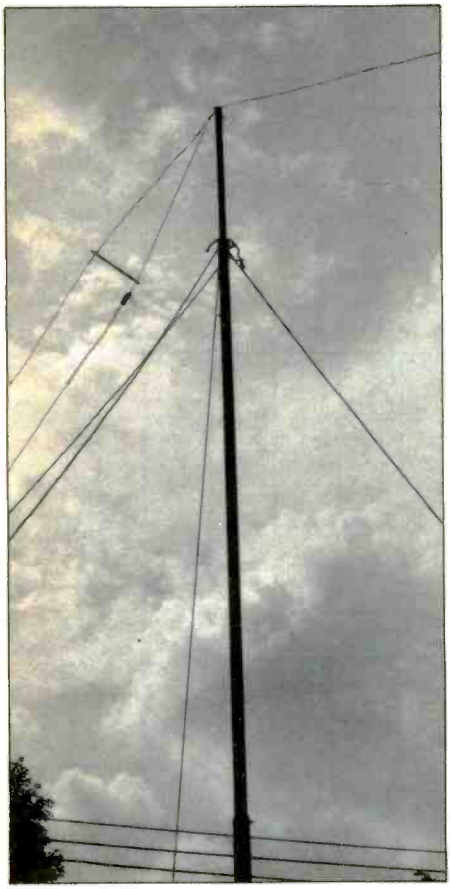

Figure 3: Antenna in position on top of plastic mast.

well as a general purpose shortwave broadcast antenna with some additional boost in performance on the 13, 19, 31, 41 and 75M bands.

The first construction procedure is to stretch out the antenna along the mounting site. Next the spreader near the feed point was attached about 3′ from the feed point, Fig. 1. The top spreader was assembled at ground level, Fig. 2. In the photograph note that the top 80-160M wire passes around the spreader but is held in position by the looped wires that are a part of the spreader assembly. The bottom 40M wire is held to the spreader by a flexible rope, also supplied. The looped wire on the left of the insulator can be used to adjust the 40M wire to resonance. Fig. 3 shows the antenna raised to the top of the mast. The 80-160M wire extends to the right away from the mast.

Similar looped tuning wires are located on the 80M side of the resonactor, Fig. 4, and, for 160M, ahead of the 160M end insulator, Fig. 1.

The feed point assembly is shown in Fig. 5. Note that the two antenna wires are joined and attached to the inner conductor SO-239 receptacle at the rear. All of this is supplied already assembled. The mounting plate itself is grounded to the metal stake. The three 33′ 4″ 40M radials I supplied are attached to the same bolt/nut assembly that holds the plate to the stake.

In my installation I used an MFJ-204B antenna bridge, Fig. 6, to tune the antenna to the three exact center frequencies I desired. This can be done without applying any power to the antenna using the bridge and the receiver part of the transceiver. As mentioned previously I was able to get SWR down to 1.1-to-1. This technique avoids inconsistancies. The antenna becomes resonated in its mounting situation. When you tune the antenna first, the influence of the coaxial line on the SWR readings at the transmitter is minimized. Stated another way, the actual length of the line has a minimal effect on the SWR readings.

W9INN Antennas can be reached at P.O. Box 393, Mt. Prospect, IL 60056.