Coax Antenna Performance Relative to Hookup Wire

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OBJECTIVE:

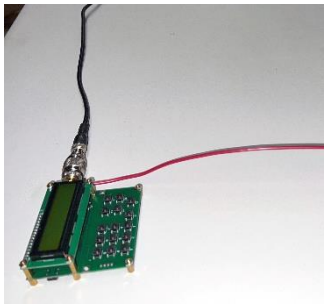
Use an ordinary RF signal generator to produce RF energy into the spectrum via 50 Ohm BNC coax connector cabling. If the signal generator has no counterpoise to offer via its ground, then attach hookup wire of sufficient length to the RF signal generator outer connector or shield connector. The 50 Ohm BNC connector cabling, of course, has its shield connected to the connector shield connection.

QUESTION:

Will the 50 Ohm BNC shielded cable be able to act as a radiating antenna? It is supposed that its shield will prevent the escape of electromagnetic energy since it is connected to the signal generator return.

VALIDATION CRITEREA:

Two configuration will be fabricated.



1. First configuration:
    a. A 50 Ohm BNC connection cable of known length will be attached to the signal generator output.
    b. A length of hookup wire will have one end of its bare copper lead wrapped around the rf signal generator connector outer surface. The intent is for it to serve as an antenna counterpoise.
2. The second configuration
    a. The same configuration as above will be assembled except that the 50 Ohm BNC connection cable will be replaced by hookup wire of an equal length.
3. An Icom 706MkII transceiver will tune to each radiation for an S-meter reading. The transceiver’s antenna is the same one it uses for everyday HF global communications—A 160 meter, OCF dipole.
4. Slight variations in resonant frequency are allowed owing to the possibility of slightly different velocity factors.
5. SUPPOSITIONS:
    a. It is assumed that the hookup wire configuration will do a little better than the coax since it is unemcumbered.
    b. The coax shield is understood to be not contributing to radiation but may be a slight impediment since it is proposed to be dead wood.
    c. One faction proposes that any radiation from the coax antenna will be limited to what is allowed to escape from the end and therefore be very slight relative to what the hookup wire antenna is able to produce.
    d. The other faction proposes that the S-meter readings from both antennas will be significant with the coax antenna emitting slightly less than the hookup wire antenna.
6. The supposition is that

ASSUMPTIONS:

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It is assumed that both the hookup wire and BNC shielded cabling have a velocity factor of 0.80.

PROCEDURE:

Both configurations of antenna assume a radiating element that is a quarter wavelength long. Both coax and hookup wire radiating elements are 2.026 meters representing λ/4. Applying the velocity factor of 0.80, the effective length then becomes 1.621 meters. Since this represents λ/4, then therefore is 6.483 meters or 46.273 MHz.

WHAT WAS OBSERVED:

1. The resonant frequencies for both antennas were identical—47.320 MHz.
2. The bandwidth for both was 47.316 MHz < f_o < 47.324 MHz
3. The S-meter readings were
    a. The hookup wire S-meter reading was S18.
    b. The coax wire S-meter reading was S9.

CONCLUSION:

While the coax antenna was clearly experiencing an impediment, there was no sharp attenuation of radiation for the coax configuration.