Multiple Mono Band Center Fed Hertz (MMBCFH)

Antenna System - Configuration Information (How it Works)

By Larry E. Gugle K4RFE, RF Design, Manufacture, Test & Service Engineer (Retired)

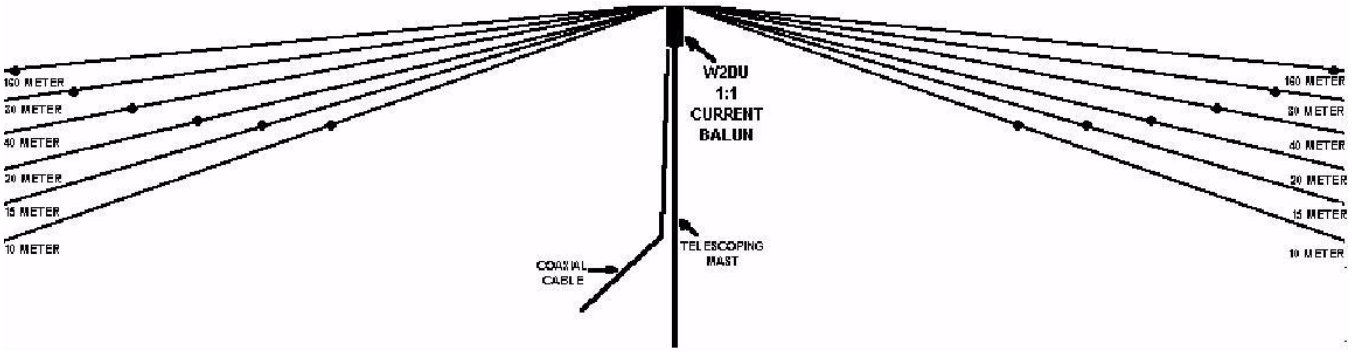

Figure 1—Common Multiple Mono Band Center Fed Hertz Antenna

This configuration information was learned from numerous personal installation experiences, over a Professional RF Communication-Electronics Career and in the Hobby of the Amateur Radio Service.

A "Hertz" Antenna is an Antenna ½-wavelength long or any even or odd multiple of a ½-wavelength long. The "Basic MBCFH"is commonly referred to as a "Basic Dipole" and the "MMBCFH" is commonly referred to as a "Fan Dipole".

Both a ½-wavelength long "Mono Band Center Fed '*Hertz*' (MBCFH) Antenna System", and a ½-wavelength long "Multiple Mono Band Center Fed '*Hertz*' (MMBCFH) Antenna System", mounted in Inverted-'V' configuration, work equally well.

This Dipole (D) Array Antenna System is Center Fed (CF) with 50-Ohm Coaxial Cable,and the Multiple Mono Band (MMB) individual Dipole wire legs are Parallel Connected (PC). The length of each separate individual Dipole is a ½-wavelength long on the band they are cut for,hence each Dipole presents a good impedance match to the Feed Line on the band for which it is intended to operate and a poor match on all the others.

As an example, consider a Fan Dipole consisting of a two band arrangement, with one Dipole cut to a ½-wavelength long on 75 meters and the other cut for ½-wavelength long on 40-meters. With this arrangement, a ½-wavelength Dipole bandwidth is obtained on both 75 and 40-meters, and in addition, the 40-meter Dipole is also a center-fed 3½-wavelength long radiator on 15-meters, which also presents a good match to coaxial feed lines. In practice, a good match results on 75, 40, and 15-meters. The 75 and 40-meter Dipoles are prepared for ½-wavelength long operation using the standard length formula (Length in Feet (L) = 468 / f MHz). Here is how the frequency selection occurs:

1. On 75-meters, the 75-meter Dipole behaves in the conventional manner, but the 40-meter Dipole is inactive because its terminal impedance at 75-meters is approximately 14- j1300 ohms. This impedance results in a mismatch of well over 2400:1 on 50-ohm line, assuring its inactivity.

Consequently, this mismatch is sufficiently severe to result in an inactive 40-meter Dipole on 75-meters, especially since the 75-meter Dipole is taking practically all the power from the line because of its good match.

2. On 40-meters, the 40-meter Dipole behaves in the conventional manner, but the 75-meter Dipole is inactive because its terminal impedance at 40-meters is approximately 5000 ohms. This impedance results in a mismatch of well over 100:1 on 50-ohm line, assuring its inactivity. Consequently, this mismatch is sufficiently severe to result in an inactive 75-meter Dipole on 40-meters, especially since the 40-meter Dipole is taking practically all the power from the line because of its good match.

3. On 15-meters, the mismatch of the 75-meter Dipole is in the same ballpark as it is on 40-meters, assuring inactivity on this band.

4. If a 20-meter Dipole is added, there is a slight degradation in the impedance match of the 40-meter Dipole on 15-meters. This results from a reactance component in the 20-meter Dipole impedance when operating on 15-meters.

5. If a 10-meter Dipole is added, there should be no serious problem, except that it may require a little trimming to obtain a satisfactory match at a particular frequency in the band.

The bandwidth of each Dipole is practically identical with that of a mono band center fed Dipole, and hence, the stagger tuning arrangement provides a Multiple Mono Band Dipole Center Fed Parallel Connected Antenna System far more satisfactory than a Trap Dipole. Each Dipole in the center fed parallel combination may be supported from different directions if different directions of radiation are desired. Otherwise the shorter Dipoles may simply be suspended from the longer ones. Additional information on multi-band Dipoles in the stagger tuned parallel configuration may be found in the ARRL Antenna Book.