

## Horizontal HF System Design

The United States Navy (USN) utilizes omnidirectional High Frequency (HF) whip antennas for shipboard radio communication. These systems generate shipboard Electromagnetic Environments (EMEs) as defined in MIL-STD-464D in Tables I and IX, specifically 200 V/m in the 2 – 30 MHz range. For Electromagnetic Vulnerability (EMV) and Hazards of Electromagnetic Radiation to Ordnance (HERO) testing, Naval Surface Warfare Center Dahlgren Division (NSWCDD) maintains HF transmitter systems that radiate RF with a 35-foot vertically polarized HF whip antenna. Vertically Launched missile systems will experience these HF EMEs during its immediate post-launch phase and therefore need to be HERO and EMV tested prior to shipboard use.

Typically this testing is performed with the HF whip antenna vertically polarized and missile oriented vertically through use of a crane and non-metallic lifting fixture. However, certain missile systems are significantly large and use of available cranes at NSWCDD is not feasible. Hence there is a need for a horizontal HF antenna system which can be used to test the missile while it is oriented horizontally on a non-metallic cart. This design should include a balun or sufficient impedance matching network to effectively drive the antenna with existing NSWC Dahlgren 10kW HF transmitter systems. The systems need to generate the necessary electric fields over a 40 foot length and the generated electric fields should be sufficiently uniform for HF HERO and EMV testing purposes. The specific HF frequencies required for both HERO and EMV testing are listed below.

Principle Investigator/Advisor: Marshall Sowell (US Navy)

Test Frequencies (MHz)	
4.040	13.530
4.803	16.060
5.385	17.048
6.400	18.036
6.970	19.270
7.595	20.510
7.990	21.460
9.050	23.180
9.803	24.450
11.064	26.875
12.045	

