

Fabrication and Testing of a Vehicular Low-profile HF Double Half Loop Antenna

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Communications through HF frequency band is an important component of communication systems for organizations involved in emergency response, remote communications, and military operations. As the demand for higher digital throughput, the need for the wideband HF antennas to be deployed on different platforms such as vehicles has grown. This paper discussed vehicular on-the-move low profile double half loop antenna (DHLA) with focus on the full scale prototyping and testing. The antenna is designed to support 24 kHz channels for near vertical communication mode from 2 to 10 MHz. Because of the electrically small size of the antenna, radiation resistance is small, and thus strong current is excited during a signal transmission. To sustain the high current and reduce Ohmic loss, the antenna is made of thick (3.175 cm diameter) aluminum tubes. The tubes are cut into sliding sections connected by copper couplers for easy adjustment of the antenna length and height to a platform. The vehicle platform is the Marine Corps MRAP-All Terrain Vehicle (M-ATV). The DHLA has two arms that both are 0.75 m tall 3.6 m in length, and are separated by 3 m. Aluminum is used for its structural rigidity and light weight. Mechanical connection and electrical isolation at the feed is realized by means of ceramic insulators. Numerous other factors and design decisions regarding the fabrication of this antenna such as weather proofing, choice of materials, custom machining of parts, wind loading, realization of the antenna feed and the connector assembly are also considered in details in this work. Tests with commercial available and homemade tuners are performed.