

## BACKGROUND

By Samuel Sloniker

Antennas are an important part of any radio system. An antenna is an electrically conductive object connected to a transmitter, receiver, or transceiver, used to convert between radio-frequency electrical signals and actual radio waves traveling through the air. Without an antenna, even the most advanced transmitter cannot put signals in the air, and a receiver will have no signals to receive without an antenna. Often, a low-end transceiver with a good antenna will have better performance than a high-end radio with a poor antenna. Experimental antenna designs can sometimes achieve better results than more traditional designs.

Antennas are usually made of metal, often in the form of wire, metal pipes, or in many devices such as cell phones, printed circuit board traces. Metal works well for antennas that do not need to be adjusted frequently, but can be somewhat difficult to tune and otherwise adjust. However, metal antennas are not the only type that can be used; salt water has been tested and found to work nearly as well as wire antennas (Sloniker), showing that antenna designers are not limited to metal. Liquid-based antennas are somewhat limited in their utility to experimenters; due to gravity, salt water and other liquid conductors are not suitable for many types of antennas other than vertical monopoles. A

material suitable for antenna construction, including in non-vertical antennas, that can be easily adjusted without wasting excessive amounts of material would be useful to antenna designers because it would reduce the cost and time required for designing experimental new types of antennas.

Considering that salt water, which has different electrical properties from more common conductors used in antennas, has been shown to be nearly as efficient as wire, it seems likely that other conductors, such as graphite pencil “lead” on paper, would also work. A pencil-lead antenna could be easily adjusted both in length (for tuning) and in overall design (for experimental antenna development). It is likely that a traditional metal antenna would be more efficient and therefore better for communication use, but a pencil-lead antenna would have several benefits for testing new antenna designs.

## WORKS CITED in BACKGROUND

Sloniker, Samuel. "Saltwater Antenna: 2 Meter Vertical Monopole Antenna Using Saltwater Instead of Wire." [https://w7bkg.org/w/images/1/14/Saltwater\\_antenna.pdf](https://w7bkg.org/w/images/1/14/Saltwater_antenna.pdf) (accessed November 1, 2022).