

## **Fundamental design of submarine communication buoy with oceanic condition considerations**

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Communication with active United States Navy submarines is often difficult while the submarines are in active operation. Submarines must float close to the surface of the ocean, at a depth of less than thirty meters, to engage in heavy communication with command operations. When a submarine is on a mission; however, the submarine will operate at depths of one-hundred meters or greater, and significant communication is limited. A solution to this communication limitation includes the use of very-low or extremely-low frequency transmissions. Transfer of information is at a rate of 8 bytes/second, so only basic encrypted text can be transmitted to the operating submarine. To achieve this communication method, a buoy must be designed to house the electrical hardware that emits the very-low and extremely-low frequency signals. The buoy is built to withstand deployment from a P-8 Poseidon aircraft at an altitude of 500; 10,000; and 35,000 feet. Once the buoy has been deployed, it must survive harsh oceanic conditions for at least six months, which includes heating and cooling considerations, durability, long-term power storage, and power generation.