

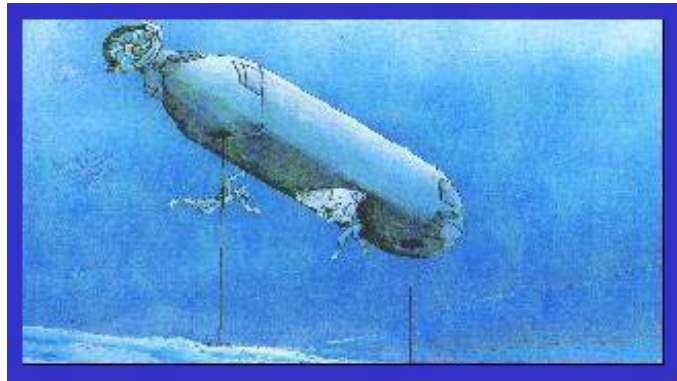


CEROS Project Description

Project: ASDS Considering CEROS Developed Diver Homing Device

Contractor: Neptune Technologies, Inc., Kailua HI

Description: The Advanced Seal Delivery System (ASDS) is a combat submersible intended to clandestinely carry Navy SEALs and their combat gear to and from hostile shores, enabling a number of special operations missions. The boat was designed and developed by a team composed of Northrop Grumman's Oceanic & Naval Systems business unit, NAVSEA, USSOCOM and Naval Special Warfare Command. ASDS permits long-range special forces operations. It also enhances the effectiveness of the insertion teams by delivering them to their destination rested and better equipped, and provides a means of conducting shore surveillance prior to landing. The ASDS can be carried by six specifically modified LOS ANGELES Class SSNs, all VIRGINIA Class SSNs, and also SSGNs, once SSGNs are made operational. ASDS specifications include:



Range: 125 NM
Cruise Speed: 8 knots
Crew: 2
Passengers: 8 SEALs + Equipment

The additional operational flexibility enabled by the ASDS also resulted in the need for better homing devices than originally planned. These homing devices must be capable of supporting multiple teams and marker beacons, and operate in deeper, darker stretches of ocean. The existing homing system employed by the SEALs:

- Operates at a single frequency with un-encoded transmissions (prevents use with multiple markers or dive-teams)
- Light-intensity-range-determination indicator is ineffective and can provide erroneous data when multiple units are operating simultaneously
- Transmission frequencies are well within the interception envelope of standard sonars

Under the sponsorship of the National Defense Center of Excellence for Research in Ocean Sciences (CEROS), Neptune Technologies of Kailua, HI designed, built, and tested a Diver Homing Device in 1997. The Diver Homing Device was a prototype electro-acoustic system that allowed a diver to home on an ultra-sonic transmitter. Maximum design range was 500

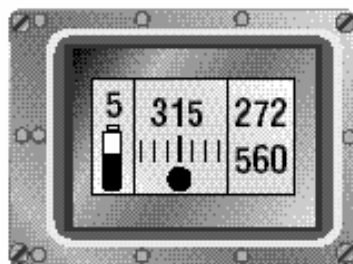
meters (for depths not exceeding 25 meters system had an effective range of at least 20 times the dive depth.) Power was provided by self-contained batteries with a minimum lifetime of 10 hours per unit. Multi-path reflections and reverberation from the sea surface and bottom were handled in such a way as to not reduce directionality effectiveness. Additionally, the unit was designed to function in conditions of poor visibility, currents, surges, and water temperature extremes. The Diver Homing Device consists of three basic components:

- 100 kHz, 126 dB re 1 μ Pa/V transmitter 4 ½ in. in diameter by 7 in. long weighing 4 lbs
- 3 ½ in. wide by 1 ½ in. thick 6 7/8 in. long receiver weighing 1 ¼ lbs.
- Diver (used as an acoustic shield to eliminate directional ambiguity)

Neptune Technologies received patent number 5,666,326 on September 9, 1997 for “Homing Device for Underwater Divers”

Recent interest by the SEALS has resulted in Neptune Technologies leveraging the CEROS work and submitting a proposal to develop a secure homing system for SEAL teams that should overcome the deficiencies of the existing system. The proposed system will employ ultrasonic transducers to achieve Low Probability of Intercept (LPI) and will consist of five Diver Navigation Devices (DVD) and five Marker Transponders (MT). Additional improvements include incorporating a magnetic compass, dual ultrasonic homing transducer, multiple target selection, and battery status on a dashboard type display with digital readouts for confident and reliable navigation. Neptune will overcome the existing deficiencies by:

- Using discrete frequencies for five markers to enable divers to locate multiple objects
- Using a digital read out for Range and Bearing
- Operating at high frequencies well above normal sonar systems and employing an IFF-like interrogate/respond sequence. (No transmissions are made by the MT until interrogated by the DVD.)



Diver Navigation Device

This contract was performed under the sponsorship of the Defense Advanced Research Projects Agency. The content of this document does not necessarily reflect the position of the Federal Government, and no official endorsement should be inferred.