

## Undersea drones pull duty in Iraq hunting mines

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WOODS HOLE - It looks like a torpedo, but this device doesn't explode. It searches for mines and other objects that do. The Woods Hole scientists who built it over the course of 10 years dubbed their handiwork REMUS, for Remote Environmental Monitoring UnitS. In their first-ever use in hostile waters, the undersea drones were used as part of a team that helped clear mines from the Iraqi port of Umm Qasr, according to the U.S. Office of Naval Research.

Their success allowed 232 tons of badly needed food, water, blankets and other supplies to reach Iraqi civilians over the weekend. Not only was REMUS conceived at Woods Hole Oceanographic Institution, the drones are built at **Hydroid** Inc. in Falmouth. "The main benefit of this is that they are taking divers out of the water," said Ken Jordan, **Hydroid's** president and a Navy veteran. Jordan said he was told by Navy officials that REMUS can do the work of 12 to 16 divers. And unlike its human counterparts, REMUS is undeterred by cold temperatures, murky water, sharks or hunger.

The device is part of a broader class of technology known as autonomous underwater vehicles. Its predecessors, such as the submersible drone Jason that explored the gloomy interior of the sunken Titanic, were tethered to larger vehicles. But REMUS drones are, in effect, wireless and more adaptable.

Before REMUS is put to work, two sound-emitting transponders are placed in nearby waters and their positions set by portable global navigation devices. When REMUS is placed in the water, it navigates like a farmer plowing a field by sending and receiving signals from the transponders.

Each REMUS is 62 inches long, weighs 80 pounds and runs from 3 to 5 knots at depths to 300 feet. The systems costs about \$250,000. Office of Naval Research spokesman Tom Swean confirmed yesterday that REMUS devices were used at Umm Qasr. National security considerations prevented him from saying whether any mines were found. REMUS is used by the San Diego-based Naval Special Clearance Team One, which consists of Navy SEAL divers, ordinance disposal divers, Marine Corps reconnaissance swimmers and dolphins.

Use of REMUS is not limited to searching for explosives in hostile harbors. It was also used to scan the waters off San Diego in late 2001 before the arrival of an aircraft carrier. The REMUS system includes two computers, one that handles navigation and the other runs a sonar program that creates images of the sea bottom.

The drone can collect data on salinity and water temperature and images for maps. This information is valuable to biologists, oceanographers and geologists, according to scientists at WHOI.

The next generation of REMUS devices will dive to depths close to 20,000 feet. Jordan said he signed a contract with the Navy in June 2002 to deliver 20 of the devices within a year.

**Hydroid's** other customers include the Naval Post-Graduate School, Stanford University, the University of Rhode Island and the University of Massachusetts at Dartmouth.

Officials from Germany, Finland and Singapore have showed an interest in the REMUS system, Jordan said.

As part of its contract with the Office of Naval Research, **Hydroid** will deliver a so-called sculpin system, consisting of a set of three REMUS drones. "It works three times as fast," Swean said. The Office of Naval Research has funded academic research at Woods Hole, MIT and other research institutions since its founding in 1948.

The first contract between the Navy and WHOI was signed in 1940. During World War II, Woods Hole was a major research center for antisubmarine warfare, sonar, underwater photography, anti-fouling paint and other advances.

"We went from seasonal and a handful of people to 450 people during the war years," said Shelley Dawicki, WHOI's director of communications. "It fundamentally changed the institution," she said, giving WHOI an international reputation. Ben Allen, a senior engineer on the team that developed REMUS, said the creation of its technology "is very much in keeping with the history of the oceanographic institution."

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