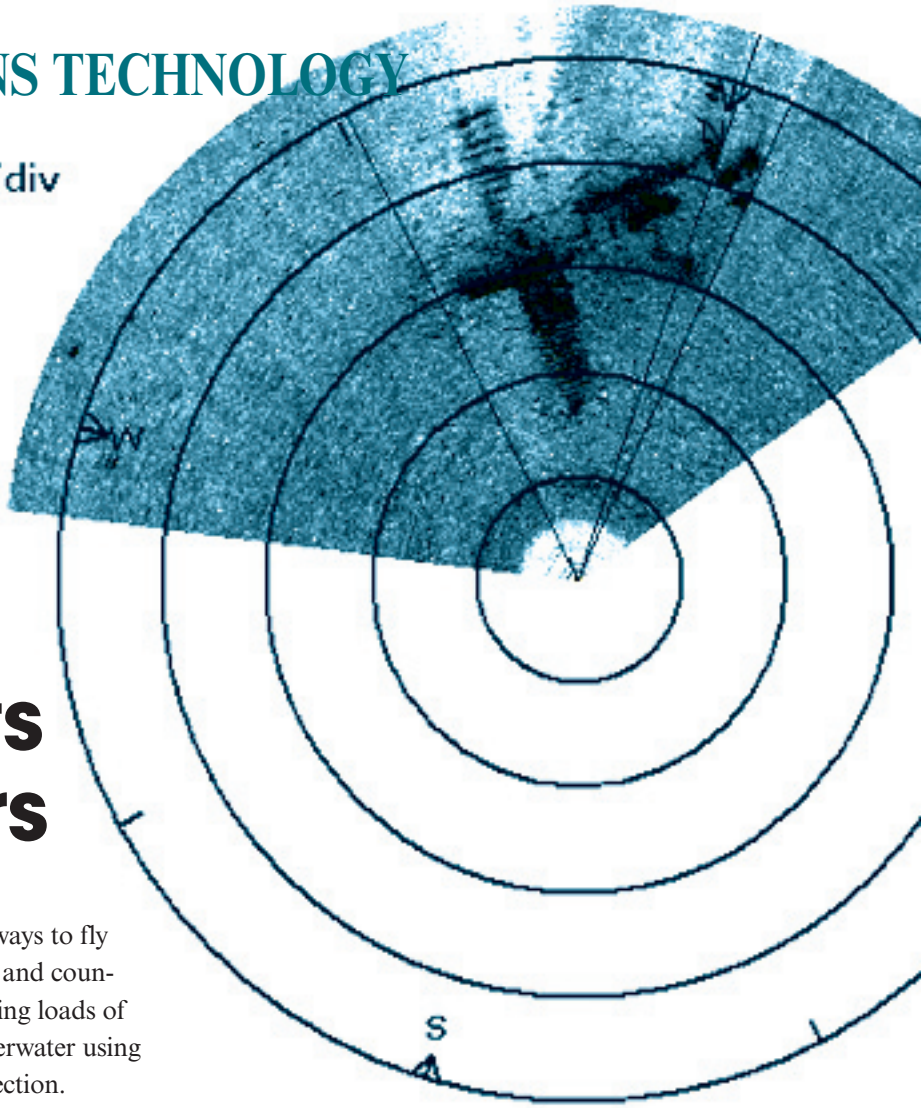
By Steve Campbell

Underwater sonar tech aids evidence recovery and protects police divers



Sonar image from Big Bear Lake plane recovery.

Drug smugglers constantly seek new ways to fly under the radar of law enforcement and counter-drug surveillance personnel while delivering loads of contraband. Their latest method: going underwater using "cocaine" submarines or divers to avoid detection.

The need to patrol the soft underwater belly of the nation's coastlines is growing. Two years ago, U.S. counter-drug surveillance members spotted just three semi-submersible submarines, but that number jumped to 40 by 2007, and in 2008, officials estimate numbers could climb as high as 120, according to a report in the *St. Petersburg Times* in Florida.

And while using semi-submersibles in narco-trafficking is a new phenomenon, employing divers to traffic drugs is not. Back in 2001, United Kingdom police arrested two divers under a boat in the Thames River and seized cannabis with a street value of £2.5 million.

The attraction to move operations underwater lies in the fact that the water itself is the weakest link in the air, land and sea police system that protects U.S. harbors, ports and ships from criminal and terrorist activity. While extensive security precautions apply to air travel and important land installations, the civilian maritime industry remains virtually unprotected. Ports can be entered easily by vessels, especially small- and medium-sized ones, and there are virtually no restrictions controlling the presence of scuba divers and what they do once they're in the water.

"Criminal elements attempting to use underwater routes are not as easily perceived as if they were coming into the airport, down the freeway or in a ship," explains Phil Andrew, manager of underwater security for Kongsberg Mesotech, a global provider of underwater sonar technologies and sonar supplier to the San Bernardino County (California) Sheriff's Department dive team. "The rise of terrorist threats, combined with drug smuggling, makes the need even greater to monitor the underwater lanes of our ports and ships using sonar detection technologies."

Advances in sonar

One technique smugglers use involves bolting a drug shipment to a ship's outside hull in a foreign port. When the ship arrives in North America, the drug cartels' diver swims up to the hull undetected and unfastens the drugs. Change the above scenario from diver to terrorist delivering a bomb, and the importance of securing a

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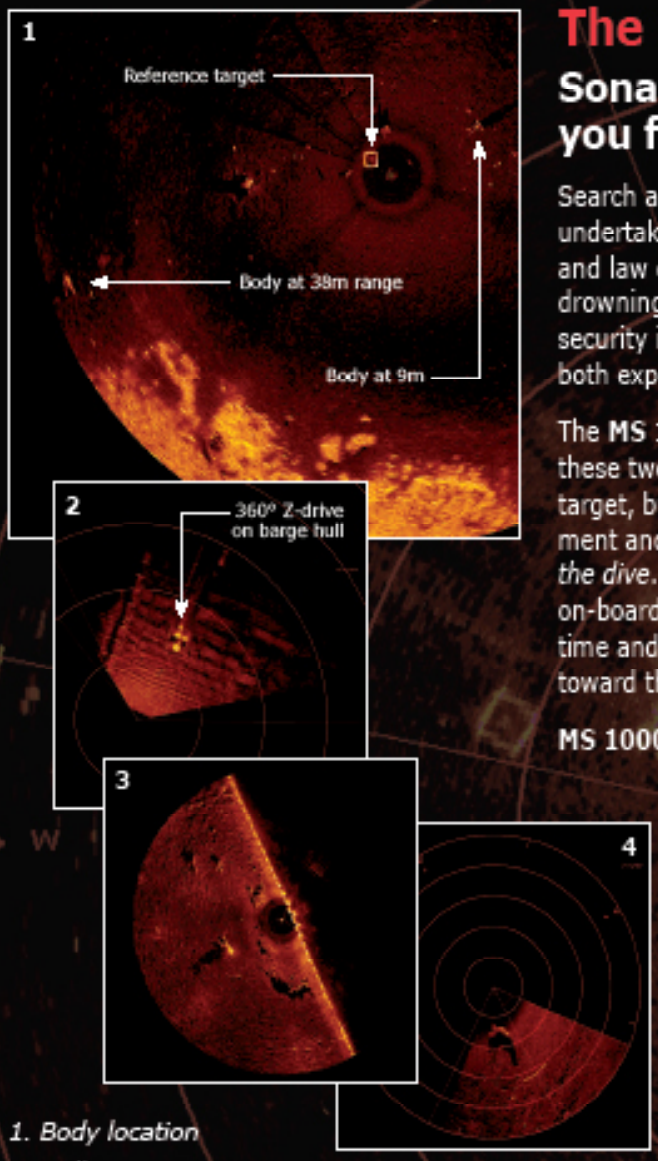
Less search— more recovery...



1. Body location
2. Hull inspection
3. Diver alongside sheetpile
4. Homicide victim

The MS 1000 Scanning Sonar:

Sonar images that quickly help you find what you're looking for

Search and recovery operations are expensive and dangerous undertakings that stretch the often limited resources of rescue and law enforcement agencies worldwide. From locating drowning victims to scouring ship hulls for contraband, from security inspections to evidence recovery, dive operations are both expensive and risky.

The **MS 1000 Scanning Sonar System** reduces or eliminates these two factors, allowing you to not only quickly pinpoint your target, but to see in stunning detail its surrounding environment and any hazards it contains—*all before you commence the dive*. Furthermore, when your dive team is deployed your on-board personnel are able to monitor their progress in real time and, with through-water communications, guide them toward the target and away from danger.

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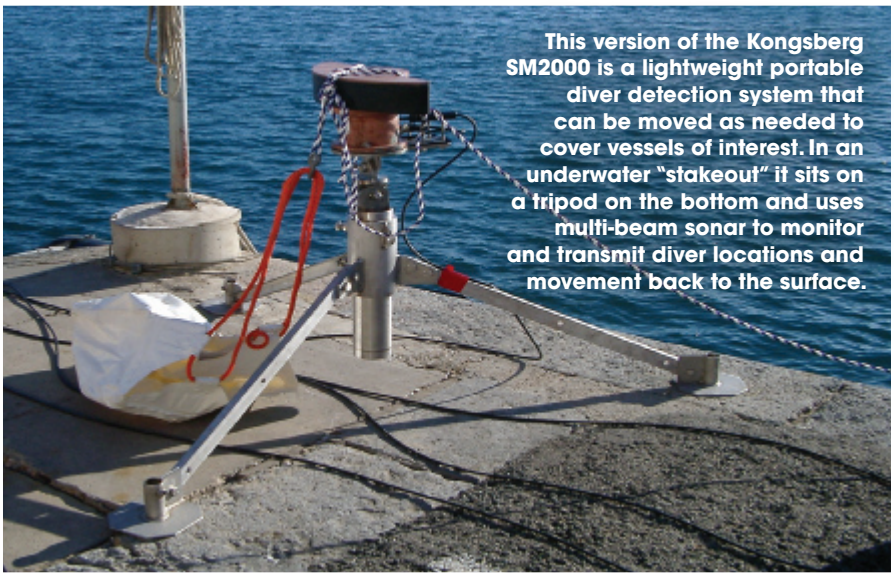
port's underwater flanks becomes even more urgent. Advanced sonar technologies enhance underwater security by spotting hull anomalies and enabling police officials to set up underwater "stakeouts," such as the one carried out on the Thames River.

Since its invention and usage beginning halfway through the 20th century, some key trends improving underwater sonar include greater portability, expanded image resolution, and enhanced processing capabilities for incoming data.

Side-scan and scanning sonar are the two main sonar technologies, both of which have different but complementary applications. Side-scan sonar emerged in the late 1960s and is useful for mapping large targets or areas, and for seabed surveys that go on for thousands of feet. In the mid-1980s, scanning sonar emerged, enabling detailed and rapid examination of complex geometric structures such as bridge foundations, piers, ship structures and others. These systems help create detailed pictures of cracks or other



This version of the Kongsberg SM2000 is a lightweight portable diver detection system that can be moved as needed to cover vessels of interest. In an underwater "stakeout" it sits on a tripod on the bottom and uses multi-beam sonar to monitor and transmit diver locations and movement back to the surface.

Courtesy Kongsberg Mesotech Ltd.

weak spots that can be examined more closely by divers and engineers.

New sonar technologies now allow surveillance operators to set up a system that can track movements by divers and other small targets of interest in harbors, and around ships and piers. A single sonar head with a 360-degree field of view can monitor 500,000 square yards, detecting and tracking movements of targets exhibiting diver-like characteristics. One significant advance is the application of state-of-the-art computer processing speeds, which enable users to better analyze and organize incoming signals and data from the sonar.

Advanced computing algorithms also make it possible to accurately differentiate divers from seals and other animals. Sonar enables users to spot and track divers or submersibles to calculate their speed before dispatching a diver interception team. And the technology's enhanced portability enables users to move these units around as needed, e.g., for times when high-value targets such as naval fleets or cruise ships enter a harbor.

Diver safety and productivity

Ultimately, the foundation of underwater security rests with dive team members who must submerge in order to enforce the law and maintain security. These divers face extreme risks as part of their regular duties, such as freezing turbulent water with poor or zero visibility.

Divers sometimes perform this work on their own time to conduct criminal investigations; locate contraband, bodies, boats or planes; or map out underwater crime scenes. In murky waters, divers regularly have to reach out and feel around by hand, when there could be razor-sharp glass or sheet metal inches from their faces or blocking their way. Often they have absolutely no idea where those hazards may lurk.

"The safety of police dive teams is the top priority, but dives often occur in murky or turbulent waters where you can't see even your hand in front of you," says Sgt. Jeff Morgan, commander of San Bernardino's dive team. "Advanced

sonar technologies enable the dive operation manager to know exactly what is down there, pinpoint its location for a quick recovery, and make the dive much more efficient and safe for the divers."

Sonar equipment becomes the "eyes" down below as observers on the surface monitor sonar screens in real time to tell divers the exact positions of targeted objects and hazards. From a risk-management viewpoint, this technology's ability to safeguard divers while they're working underwater may be its most valuable use to law enforcement.

Making the best use of the limited time divers may remain underwater becomes another critical benefit. Instead of fumbling around a seabed crime scene as if blindfolded in a darkened room, sonar technology pinpoints exactly where divers should go. In a body recovery situation, for instance, surface observers can send divers directly to the right spot, while steering them around hazards that lie in their path.

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— Phil Andrew, Kongsberg Mesotech

For example, Big Bear Lake outside San Bernardino often presents zero visibility for divers. But when a private plane crashed into the lake in front of eye witnesses on June 23, Morgan and his divers knew exactly where to look. Or, so they thought. "We had a number of witnesses, including a deputy sheriff, who carefully marked his location and where he saw the plane enter the lake," Morgan says. "Unfortunately, the plane's forward momentum carried it 80 yards away from the point of entry. Given that we only had about 6 inches of visibility, it might have taken us days to find the wreckage."

But with a sonar system, they

were able to spot the plane and bring it up within three hours. "The sonar unit saved us countless hours," says Morgan. "Once we located it, we were able to drop a line down to it and send a diver down to check for fuel leakage and put on the lift bags. What would have been a long expensive operation was completed within a few hours."

There is often a large amount of evidence to recover in an underwater crime scene. In these cases, sonar can be utilized to first map out then take a picture of the scene, providing a detailed record. Law enforcers can use this image to develop a productive recovery program.

"Our investment in this technology has paid for itself many times over in reducing overtime costs alone," concludes Morgan, a national expert who helped pioneer the use of sonar technologies in body and evidence recovery.

San Bernardino's dive team has a long history in successfully using sonar. Divers first discovered its value five years ago when they were unable to locate the body of an 18-year-old jet skier in the lake. A month later, after getting their first sonar unit, divers discovered the body as they searched for a boat that had crashed and sunk into the lake.

"Sonar has truly revolutionized the way public safety diving is conducted in our country and made it far more productive and safe," notes Morgan. "While we use it mainly for body recovery, recovering wreckage and imaging underwater evidence fields, there are many different public safety applications for this technology ranging from intercepting drug smuggling to public infrastructure inspections." ■

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