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EXPLOSIVE ORDNANCE DISPOSAL/LOW INTENSITY CONFLICT
CANDIDATE PROJECT SUMMARY

Project Title: Rapid Underwater Ordnance Neutralizer

Submitting Organization: Coastal Systems Station (CSS) Dahlgren Division

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Existing Operational Requirement?: YES

Specific Technical/Operational Need: The EOD operator needs a means of visually identifying and subsequently neutralizing underwater ordnance. Many targets classified by minehunting sonars as "mine-like" are ultimately identified by the divers as non-mine bottom objects (NOMBOs) -- an outcome that wastes time and puts divers needlessly at risk. Furthermore, diver insertion is the only current approach to positive ordnance identification and neutralization. The associated cost in time and effort can range from hours to even days for a single contact. The capability to positively distinguish mines/ordnance from NOMBOs *and to neutralize those mines without putting men into the water* from either small surface craft or airborne platforms would enable higher area clearance rates with a substantial decrease in risk to EOD personnel. This capability is needed in equipment that is easily transportable to the area of operations and deployable from/with relatively small naval craft or craft of opportunity (COOP). An easily-deployed mine identification/neutralization device would yield a high payoff for EOD efforts in underwater military mine clearance and in military operations other than war.

Proposed Technical Approach: CSS proposes to develop a small man-portable mine identifier and neutralization system with the capability to identify and neutralize the relatively thin skinned mines that are typically deployed in the very shallow water (VSW) environment. The system will be packaged for deployment by relatively small craft such as a rigid inflatable boat (RIB) or from a remotely operated waterborne vehicle such as the ASH vehicle developed under the EOD/LIC program. The approach will be to design, fabricate, and test a small (tethered) remotely operated platform that integrates an appropriate COTS underwater digital imaging system, with a minimal active/passive acoustic sensing capability and a projectile-based neutralization device. The neutralization device will basically consist of an underwater gun that fires specially designed projectiles based on existing military or commercial ammunition. A global positioning system (GPS) will be integrated into the topside electronics package for navigation to target locations where classification has been previously performed. A design goal for a production level system would be to make the device small enough and cheap enough that they are essentially expendable. Upon deployment, the vehicle will execute a predetermined search pattern to bring it into sufficiently close proximity to the target for the topside operator to perform an identification. The operator can then make a decision with respect to activating the neutralization system. The demonstration system will be designed to operate from a 24 foot RIB in shallow water at depths ranging from approximately 100 feet to the surf zone (minimum operating depth of 4-6 feet), with the minimum depth constraint imposed on the basis of local sea state. Future generation systems could be adapted to the AMCM mission. The topside electronics, power supply and launch/recovery subsystems will be packaged in such a way that they can be easily mounted and operated on a 24-foot RIB.

A pre-prototype version of the man-portable underwater ordnance identification and neutralization system will be completely fabricated by the middle of the second year of the effort. Each component of the system will be thoroughly tested prior to a series of field tests and demonstrations that will take place toward the end of the second year. The entire package, i.e. the ID/neutralization platform and all associated subsystems, will be delivered to the EOD users at the end of the second year. It is anticipated that the system can be easily be adapted to remote deployment from a platform such as the ASH vehicle. Results will be documented in the form of a final report and draft user manuals. Video documentation of all field tests will also be provided.

Expected Performance: The sensors contained in the proposed system will be based on relatively standard COTS components, and thus will not have the capability to optically acquire targets at long range. However, the ability to acquire and ID the target at distances of 7-15 feet or even further is not an unrealistic performance expectation for daylight operations under normal coastal water conditions. Performance during night operations will be hindered by backscatter from the illumination source in turbid water, and an effort will be made to achieve the maximum performance possible under these conditions. The neutralization capability will potentially have limited effectiveness against thick-walled mines, such as one of the *Destructor* devices due to a limited ability to penetrate the pressure housing. Thin-skinned mines such as those with fiberglass, thin metal, or thin composite pressure housings should be penetrated with ease.

Existing Capabilities: There is currently no diver independent capability to both positively identify and neutralize bottom/volume mines in a very shallow water environment. Developmental systems such as the *Rapid Airborne Mine Clearance System* (RAMICS) and the *Airborne Mine Neutralization System* (AMNSYS) are expected to provide a neutralization capability for dedicated Airborne Mine Countermeasures (AMCM) assets, and of those two systems, AMNSYS represents a logical starting point for developing a manned surface craft or ROV deployed EOD system.

Schedule (Major Milestones)**:**

	FY99				FY00			
Task	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Performance Evaluation and System Configuration Trade-Off Study	xxxx	xx						
Design Platform/Sensor/Neutralization Package & Support Subsystems		xxx	xxxx					
Fabricate Platform/Sensor Package for Operation with 24-foot RIB				xxxx	xxxx	xxxx		
Integrate/package Power Supply and Electronic Instrumentation – Install Subsystems on RIB						xx	xx	
Validation, Field Tests and User Evaluation							xx	xx
Documentation								xxxx

Deliverables: Deliverables will consist of the ID/neutralization device, supporting subsystems, a final report, draft user manuals, and video documentation of the field testing process. It is assumed that the RIB used for this demonstration will be furnished by EOD.

Estimated Cost: FY99 $450,000 - FY00 $500,000 - Total $950,000

Performer (Government)**:** CSS, Code R20, Panama City, FL. Code R20 will identify and select an appropriate commercial partner to assist in the effort.