



STIC Note



Remotely Operated Lifesaving Devices

BACKGROUND/PROBLEM

In the Fall of 2019, the Science and Technology Innovation Center (STIC) learned of newly-developed remotely operated lifesaving systems that showed promise in helping in Search and Rescue (SAR) missions and Man Overboard (MOB) events.



Figure 1. Station New London personnel operating the U SAFE Buoy. Photo credit: U.S. Coast Guard.

METHODS

The team conducted market research to understand the types of devices available commercially off-the-shelf. After researching a number of different products, the team selected two for Limited User Evaluation (LUE).

The STIC first purchased the MOB EMILY (Figure 2) produced by Hydronalix. This system consists of a remotely operated, four-foot long electric boat, covered with a foam top and a 2000 foot polypropylene tether reel used as a retrieval system (<https://www.hydronalix.com/mobe>).

The second system was the U SAFE lifesaving buoy (<https://usafe-global.com/>). This system consists of a u-shaped buoy (Figure 3), with two electric motors, which is remotely piloted to the victim and then driven to safety.



Figure 2. Man overboard EMILY. Photo credit: Hydronalix.

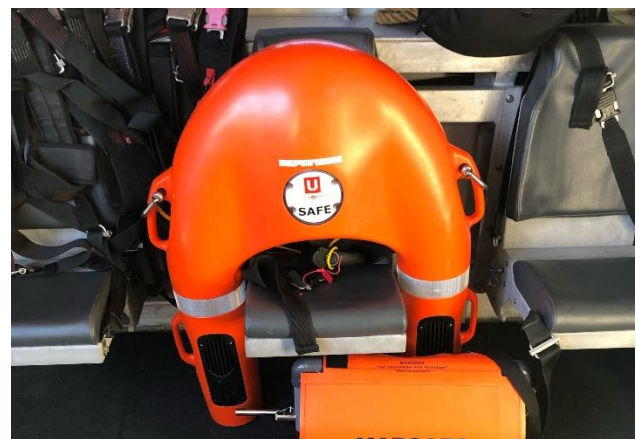


Figure 3. U SAFE Buoy on a 47' Motor Life boat. Photo credit: U.S. Coast Guard.

EVALUATION

The purchase price of the MOB EMILY was approximately \$10K, whereas the U SAFE was approximately \$6.5K. Both the MOB EMILY and U SAFE were initially evaluated by STIC staff. The team found that the EMILY was more complicated and more susceptible to water intrusion, whereas the U SAFE appeared more robust and purpose-built. Each system was shipped to Station Bodega Bay for LUE, while only the U SAFE was provided to Station New London for LUE. Based on the LUEs, the

following categories and observations were identified:

Propulsion – The MOB EMILY system uses a single water jet thruster with a steerable outlet nozzle. This allows the boat to be highly maneuverable, and relatively quick, but it also makes it very difficult to maneuver once there is a victim hanging on the side. This is why the system uses a tether to haul in the victim. In contrast, the U SAFE buoy has two water jet thrusters – one at each of the aft ends of the U – and steering is accomplished via a differential in thrust from each jet. It allows the victim to be situated in the center of the U, and driven to safety (not necessarily back to the mission origination point). Another advantage of the U SAFE design is that it can be flipped over in surf or waves and the mechanical systems work with the software to automatically switch the thrusters so that the port thruster becomes the starboard thruster and vice versa. Like a life-ring, this allows for a symmetrical design that is agnostic to top or bottom.

Durability – The MOB Emily has a large number of parts which are individually packaged in different areas inside the hull. These include items like batteries, control modules, and hoses for the thruster's water-cooled bearings. Water intrusion into the interior of the hull is quite common during operation. The intrusion caused a control module to fail which required Hydronalix to ship a replacement. The U SAFE has very few exposed components and water intrusion was never shown to be a problem. Due to the U SAFE's fully-enclosed design, it is likely that any major service will need to be completed at the factory. Station New London's U SAFE did experience a major casualty in that the remote stopped communicating with the buoy. As of this writing, the STIC team is working with the manufacturer to troubleshoot the problem.

Ease of Use – The MOB EMILY has a number of disadvantages compared to the U SAFE. Charging the battery requires the fairly elaborate cover to be removed and replaced prior to a mission. The U SAFE has an inductive charger that charges both the buoy and remote, and is quickly detached. The MOB EMILY also has a large tether reel associated with its operation; the tether must run free during operation and then be rewound after use.

Other uses – In addition to their life-saving applications, Station Bodega Bay found both systems useful for running messenger lines to vessels that require a tow. They made a bridle for the U-SAFE so that it could be used to pull a messenger line, like the MOB EMILY's tether.

CONCLUSIONS

A significant drawback of both systems is that they require the victim to be conscious to take full advantage of their utility. The U SAFE is deemed to be the more effective of the two devices evaluated. Both systems had critical failures during testing, which indicates that the technology is still developmental. The added cost, inspection regime and maintenance of these items likely means that they are not currently a good investment for use in the CG operational environment.

FUTURE WORK

The STIC will continue to conduct LUEs and work with the CG-731 Rescue and Survival Systems Manager. The plan is to get a U SAFE system to a cutter to evaluate their usefulness as MOB devices to supplement the cutter swimmer during MOB events or training.

The Science and Technology Innovation Center (STIC) is a DHS S&T and USCG collaboration.