



STIC Note

Space Accountability



BACKGROUND

The Science and Technology Innovation Center (STIC) evaluated several underwater video camera systems to determine their utility for U.S. Coast Guard (USCG) Tactical Law Enforcement Team (TACLET) operations. Part of the TACLET’s mission is drug interdiction. The goal of this effort was to improve the capability to perform inspection of the hull below the waterline to search for hidden compartments or parasitic attachments.

This evaluation compared the ease-of-use, image quality, and affordability of underwater video cameras to determine if they can add value to USCG operations.



Figure 1. Testing of MarCum camera attached to telescoping rod (Source: U.S. Coast Guard).

- Reach & Rescue – Inspection and Search Camera.
- Aqua-Vu – AV715c Saltwater Edition.
- MarCum Technologies – Pursuit HD L Underwater Viewing System.

The Reach & Rescue camera system is modeled in the same style as pipe inspection cameras. The Aqua-Vu and MarCum Technologies (“MarCum”) camera systems are advertised as recreational fishing cameras.



Figure 2. Photos of sailboat propeller from the MarCum system (Source: U.S. Coast Guard).

EVALUATION

To address this operational gap, the STIC began market research for underwater camera systems with a monitor for live video feedback. There are two general markets for underwater video cameras: recreational fishing and pipe inspection. The fishing style cameras are typically lightweight and portable. The pipe inspection style cameras are generally bulkier and more costly.

The STIC team selected three camera systems for testing:

The Aqua-Vu and MarCum systems were tested in a dry, surface environment and a wet, submersed environment. The Reach & Rescue system was only tested in a dry environment. By design, the video cable and reel of the Reach & Rescue system is bulky. Any movement of cable reel during operation of the system results in complete interruption to the video feedback. Taking into consideration the dynamic environment of TACLET operations, it is not feasible for the system to be kept perfectly still. Due to this constant interference in video feedback, it was decided the Reach & Rescue system would not be tested in an underwater environment.

The STIC team tested the Aqua-Vu and MarCum cameras locally in New London at Fort Trumbull State Park pier. Both cameras were connected to a telescoping pole and submerged near a pier piling to test the user interface and video quality at various distances from the piling.

Table 1. Comparison of key features for the three tested cameras.



Brand/Camera	Reach & Rescue Inspection & Search Camera	MarCum Technologies Pursuit HD L Camera	Aqua-Vu AV715c Saltwater Edition
Cost	\$2900	\$580	\$600
Video Quality	Poor	Good	Good
Recording	Yes	Yes	No
Battery Life	Undisclosed	6 hours	10 hours
Cable Length	65, 100 or 30 ft.	50 ft.	75 ft.
Lighting	LED	IR & LED	IR

CONCLUSIONS

The Reach & Rescue camera system was nearly five times the cost of the MarCum and Aqua-Vu systems. However, the Reach & Rescue exhibited significant limitations compared to the other two systems. The large size and weight, the bulky cable design, and the disruptions in video feedback are perceived design weaknesses and the Reach & Rescue system is not recommended for USCG operational use.



Figure 3. Testing of Aqua-Vu camera attached to telescoping rod (Source: U.S. Coast Guard).

The MarCum and Aqua-Vu camera systems are comparable in price and video quality. However, the Aqua-Vu AV715c Saltwater Edition lacks recording capability, visible LEDs, and on-screen display data

such as depth and direction. (It is noted that Aqua-Vu sells other versions of their camera that may include these capabilities. However, they are not advertised for saltwater). The Aqua-Vu system is also greater than twice the size and weight of the MarCum system, which is compact at 2.7 lbs.

The smaller size, the on-screen display of camera depth and direction, the IR & LED lighting, and the recording capability are advantageous and result in the MarCum Pursuit HD L camera system being well-suited for the USCG operational environment.

FUTURE WORK

Going forward, the MarCum and Aqua-Vu cameras will be shipped and transferred to TACLET units to be used in a real-time operational environment. The STIC will continue to receive feedback from the TACLET units to ensure this solution is meeting operational needs. The STIC will monitor the market for similar technologies that can be used to serve as an advantage in the field of tactical, underwater inspection.

The Science and Technology Innovation Center (STIC) is a collaboration between the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) and the USCG Research & Development Center (RDC).