



# STIC Note



## Maritime Object Tracking Technology (MOTT) 1.75

### BACKGROUND/PROBLEM

The STIC initiated the Maritime Object Tracking Technology (MOTT) effort in 2016 at the request of CG-5R to evaluate the use of an AIS beacon to assist in the tracking of objects at sea. The initial effort teamed the STIC with the Naval Air Warfare Center to develop a custom-designed Automatic Identification System (AIS) marker buoy. Subsequent testing of the prototype buoys indicated that the buoys did not meet many of the threshold requirements and the production cost was higher than anticipated. Further development of that buoy was not pursued.



Figure 1. Small Boat collecting jettisoned contraband.

During the testing and evaluation period of the original prototype MOTT, the STIC received a strong demand signal from HITRON for a low-cost, helicopter-deployed AIS buoy for tracking jettisoned contraband. The transmissions from currently approved Datum Maker Buoy (Model RB-101) for aircraft deployment are not

displayed on the cutter boat electronic display system. STIC staff decided to pursue commercial-off-the-shelf (COTS) AIS transmitters and place them in air-droppable buoy housings to evaluate the concept of operations and feasibility of using AIS technology for the purpose.

### METHODS

STIC staff identified a low-cost COTS AIS transmitter to use as the foundation for the MOTT 1.75 design. The team designed and 3D-printed a waterproof protective housing for the transmitter. The printed housing also included an on/off switch, charging port, and a strobe light for easier detection at night. To make the transition from the existing VHF transmitter easier, the team used the same buoy components and designed an adapter to mount the new AIS transmitter on the old buoy body.



Figure 2. A case of MOTT 1.75 buoys.

During this process, RDC worked with the Aviation Logistics Center to use the Aircraft Configuration Control Board (ACCB) process to allow the buoys to be deployed from the MH-65

aircraft in both a testing and operational environment.

## EVALUATION

Initial range testing of the MOTT 1.75 was conducted from the surface of the water in New London, CT. The MOTT 1.75 was reliably presented on an AIS display at a distance of approximately 5nm. Successful drop testing was then conducted at HITRON in Jacksonville, FL. MOTT 1.75 was dropped at speeds of up to 50kts and heights of up to 50ft. Evaluation continued with field testing by deployed HITRON units. After several months of deployment, a few of the MOTTs stopped transmitting entirely which is attributed to the quality of the low-cost AIS transmitter. Additional feedback indicated that several antennas were damaged/broken; subsequent designs would have removable antennas.



Figure 3. Test drop of MOTT 1.75.

In addition to Aviation applications of the MOTT 1.75 several were distributed to surface assets in 'go kits' to support increased counter narcotics patrols. They were successfully deployed by surface assets to track floating contraband.

## CONCLUSIONS

After several months of field testing with HITRON, low-cost, air-droppable AIS marking

buoys can be an effective method for aircrews to mark jettisoned contraband for recovery by cutter-based small boats. Basing the MOTT 1.75 design on an existing air-droppable marking buoy made it easier to get the prototype through the ACCB process, allowed for the reuse of old parts, and provided aircrews with a familiar tool.

It should be noted that AIS was not developed for the marking of objects at sea, but for transmitting navigational information to prevent collisions. There is no approved protocol for AIS marker transmissions and the use of FCC-approved AIS equipment for marking purposes is prohibited by current regulations. The discussion of how and if AIS protocols should allow for this and other uses is ongoing.

## FUTURE WORK

The field evaluations of MOTT 1.75 are complete and the STIC will no longer be producing or supporting MOTTs. The effort has been transitioned to the DHS S&T Silicon Valley Innovation Program (SVIP) to further the design with the goal of identifying a commercial source of supply for future buoy procurements. The SVIP team, made up of members from RDC, ALC, CG-926, and DHS, is currently reviewing proposals submitted via the SVIP process. This is phase one of the four phase process. Each phase is allotted six to nine months, with phase two (the next phase) being the start of prototype development for the successful bidders from phase one.

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