

FUTURE DEFINING

AeroVironment Participates in NATO REP(MUS) 21

Team demonstrates latest capabilities in maritime drone technology

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In mid-September 2021, AeroVironment participated in a major NATO-sponsored exercise called REP(MUS) 21, which stands for Robotic Experimentation and Prototyping Augmented by Maritime Unmanned Systems, 2021. The event took place at the Portuguese Navy Centre for Operational Experimentation in Troia, Portugal, and included the navies from 13 active participating nations and three observing nations. REP(MUS) 21 was jointly organized by the Portuguese Navy, the University of Porto, NATO's Centre for Maritime Research and Experimentation and the NATO Unmanned Systems Initiative. The objective was to enhance NATO members' maritime capabilities.

The exercises, which involved unmanned assets in the air, on the surface of the water, and below the water, focused on testing the interoperability of new technological advances in maritime system networks as well as techniques, tactics, and procedures used in a maritime environment. The event tested the ability of NATO

allies to share control of each other's unmanned systems as well as the information gathered by them in operational scenarios across multiple domains – a concept called Interoperability to Interchangeability (I2I) – which was one major theme of this event.

“For AeroVironment, this was a strategic opportunity to showcase our latest technology to NATO allies for maritime use,” said Stayne Hoff, senior director, AeroVironment business development. “And our I2I-enabled sensor-to-shooter (S2S) demonstration was a huge success.”



Switchblade 300 is launched from the U.K.'s unmanned surface vessel MADFOX for the I2I-enabled sensor-to-shooter exercise. Photo credit: AeroVironment, Sept. 2021.

I2I capability: successfully operating across different equipment and platforms between member nations – in other words, cross-domain capability.

REP(MUS) 21 nations: United States, United Kingdom, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Poland, Portugal, Spain, Turkey, Australia, Greece, Romania

Maritime Unmanned Systems (MUS) are drones above, on and below the water



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To initiate the S2S exercise, a Puma™ 3 AE was launched from USNS Carson City to serve as an ISR asset. Equipped with the Mantis™ i45 payload, Puma 3 AE was flown by military operators on USNS Carson City to positively identify a simulated target of interest. Through successful communication interoperability, Puma 3 AE went under control of Naval Information Warfare Center's C-SCAPE Common Control System and relayed the target information to a Switchblade® 300, which was launched from a U.K. unmanned surface vessel named MADFOX (Maritime Autonomy Demonstrator for Operational eXperimentation). Upon receipt of the target coordinates, Switchblade 300 automatically flew to the moving target, engaged, and then intentionally waved off to successfully complete its mission.

"This was the first time that I2I-enabled AeroVironment assets were successfully demonstrated in flight, as well as it being the first time for demonstrating I2I capability on an S2S operation," said Hoff. "This proved that we can provide NATO customers with the ability to perform I2I-enabled joint maritime missions, whether they are ISR only or S2S."

In a further accomplishment of the S2S exercise, once Switchblade 300 completed its mission, Puma 3 AE autonomously returned to USNS Carson City and was recovered by AeroVironment's Precision Recovery System (PRS) demonstrator. Puma 3 AE's successful recovery was conducted while the ship was underway. During the entire duration of

REP(MUS) 21, Puma 3 AE successfully landed in the PRS net 8 out of 8 attempts.

"It was 100% effective, and the Royal Navy's 700X Puma 3 AE operators onsite were very excited by that," stated Hoff.

Subsequent REP(MUS) 21 demonstrations connected Puma 3 AE aircraft to the U.K.'s MAPLE (Maritime Autonomous Platform Exploitation) Command and Control System, allowing MAPLE operators to control both the aircraft and its i45 payload while in flight. The new ability for C-SCAPE and MAPLE to operate Pumas is facilitated by AeroVironment's new STANAG 4586 Level 4-compliant interface for Crystals™, demonstrated for the first time at REP(MUS) 21 in prototype form.

"The U.S. Navy was excited about the exercise

results and is interested in continuing with AeroVironment on a series of future exercises focused on fielding new UxV capabilities, which could open up maritime opportunities for us," Hoff reported.

The REP(MUS) 21 exercises demonstrated a number of successful outcomes:

- Confirmed AeroVironment's sensor-to-shooter capability significantly improves operator situational awareness, reduces engagement timeframes, and decreases the chances of mis-targeting
- Validated the ability to pass mission-related information between U.K. and U.S. command and control systems as efficient and effective
- Demonstrated the maturity of Puma 3 AE's adoptability for broad naval use



Puma 3 AE is recovered by the Precision Recovery System while USNS Carson City is underway during REP(MUS) 21. Photo credit: AeroVironment, Sept. 2021.