

## MQ-4C Triton Unmanned Aircraft System

### Executive Summary

- The Navy conducted an Operational Assessment (OA) from November 2015 through January 2016. Testing was completed in accordance with the DOT&E-approved test plan. In general, the system demonstrated positive trends for sensor performance and reliability during the OA. The maximum detection and classification ranges for maritime targets exceeded Capability Development Document requirements and the Triton crews were able to transmit Electro-optical/Infrared (EO/IR) video to the Surface/Aviation Interoperability Lab via Common Data Link. The system reliability is currently tracking the Reliability Growth Curve annotated in the System Engineering Plan and the Test and Evaluation Master Plan (TEMP). However, the OA revealed deficiencies in the following areas: lack of Due Regard capability (capability to independently maintain prescribed minimum separation distances); poor EO/IR sensor control; poor Electronic Support Measures operator interface; and difficulty managing the temperature of the radar.
- DOT&E published the classified OA report in May 2016, and approved the MQ-4C TEMP in April 2016, to support the Milestone C decision which occurred in August 2016.

### System

- The MQ-4C Triton UAS is an intelligence, surveillance, and reconnaissance system-of-systems consisting of the high-altitude, long-endurance MQ-4C air vehicle, sensor payloads, and supporting ground control stations. The MQ-4C system is a part of the Navy Maritime Patrol and Reconnaissance family-of-systems and will provide multiple types of surveillance data over vast tracks of ocean and littoral areas; overland intelligence, surveillance, and reconnaissance; signals intelligence and target acquisition capabilities designed to complement the P-8A Poseidon Multi-mission Maritime Patrol aircraft.
- The MQ-4C air vehicle design is based on the Air Force RQ-4B Global Hawk air vehicle with significant modifications that include strengthened wing structures and an anti-ice and de-icing system.
- Mission systems include a maritime surveillance radar to detect, identify, and track surface targets and produce high-resolution imagery.
  - An EO/IR sensor provides full motion video and still imagery of surface targets and the Electronic Support Measures system detects, identifies, and geolocates threat radar signals.
  - An Automatic Identification System (AIS) receiver permits the detection, identification, geolocation, and tracking



- of cooperative maritime vessels equipped with AIS transponders.
- Planned future system upgrades include an air traffic collision avoidance radar system and a signals intelligence collection system. Onboard line-of-sight and beyond line-of-sight datalink and transfer systems provide air vehicle command and control and transmit sensor data from the air vehicle to ground control stations for dissemination to fleet tactical operation centers and intelligence exploitation sites.

### Mission

- Commanders employ units equipped with MQ-4C to conduct long-endurance maritime surveillance operations and provide high- and medium-altitude intelligence collection.
  - MQ-4C operators will detect, identify, track, and assess maritime and littoral targets of interest and collect imagery and signals intelligence information.
  - Operators disseminate sensor data to fleet units to support a wide range of maritime missions to include surface warfare, intelligence operations, strike warfare, maritime interdiction, amphibious warfare, homeland defense, and search and rescue.

### Major Contractor

Northrop Grumman Aerospace Systems, Battle Management and Engagement Systems Division – Rancho Bernardo, California

## Activity

- The Navy conducted an OA from November 2015 through January 2016. Testing was completed in accordance with the DOT&E-approved test plan. However, since the MQ-4C is not yet authorized to operate on Navy operational networks, the Navy did not accomplish a cybersecurity Cooperative Vulnerability and Penetration Assessment (CVPA) of the MQ-4C during the OA. DOT&E published the classified OA report in May 2016.
- DOT&E approved the MQ-4C TEMP in April 2016 to support of the Milestone C decision which occurred in August 2016.
- The program has changed its Acquisition Strategy and moved IOT&E from 4QFY17 to 4QFY20 to align with development and fielding of the Multiple Intelligence (Multi-INT) configuration. The Multi-INT configuration provides a signals intelligence capability, and includes sensors, supporting software and hardware, and changes to permit processing of Top Secret and Sensitive Compartmented Information. The Navy intends for the MQ-4C Multi-INT configuration to replace the EP-3 Aries II aircraft for most missions. The Navy plans to field two MQ-4C aircraft in the baseline configuration (non-Multi-INT) in FY18, prior to Initial Operational Capability (IOC), to provide an Early Operational Capability.
- The program continues to pursue a solution providing traffic de-confliction and collision avoidance capability since development of the Air-to-Air Radar Subsystem was stopped. The program intends to select a technical solution after IOC. The Navy is investigating alternative means of Due Regard compliance including procedures and other cooperative avoidance systems already integrated in the MQ-4C in order to support MQ-4C operations at IOC.

## Assessment

- In general, the system demonstrated positive trends for sensor performance and reliability during the OA. The maximum detection and classification ranges for Maritime targets

- exceeded Capability Development Document requirements and the Triton crews were able to transmit EO/IR video to the Surface/Aviation Interoperability Lab via Common Data Link. The system reliability is currently tracking the Reliability Growth Curve annotated in the System Engineering Plan and the TEMP. However, the OA revealed deficiencies in the following areas: lack of Due Regard capability (capability to independently maintain prescribed minimum separation distances); poor EO/IR sensor control; poor Electronic Support Measures Interface; and difficulty managing the temperature of the radar. DOT&E's classified report provides specific information on these and other aspects of the assessment.
- Traffic de-confliction and collision avoidance (Due Regard capability) provides critical mission capability for operation of the MQ-4C in civil and international airspace in support of global naval operations. Any limitation to this capability at IOT&E will reduce the effectiveness of the MQ-4C.

## Recommendations

- Status of Previous Recommendations. The Navy still needs to address the following DOT&E recommendations:
  1. Demonstrate any alternative means of compliance with the Due Regard requirement prior to IOT&E and conduct a CVPA sufficiently in advance of the Adversarial Assessment (AA) to allow the program to correct any discovered cybersecurity vulnerabilities;
  2. Conduct both the CVPA and AA prior to any early fielding of the MQ-4C.
- FY16 Recommendations. In addition to addressing the recommendations above, the Navy should:
  1. Resolve deficiencies documented in the DOT&E OA report prior to IOT&E, especially in the following areas: Due Regard capability; EO/IR sensor control; Electronic Support Measures Interface; temperature management of the radar.