

## MQ-4C Triton Unmanned Aircraft System

### Executive Summary

- Due to a series of system integration and software maturity problems, the Navy delayed MQ-4C first flight and the planned developmental flight test program from May 2012 to May 2013. As a result, the Navy was unable to execute previously approved program development, test, and production schedules leading to an operational assessment in FY13 and a Milestone C decision in FY14. The Navy is currently developing revised program plans and schedules necessary to update the acquisition program baseline.
- Since the MQ-4C first flight test in May 2013, initial safety of flight and air vehicle envelope expansion testing has proceeded as planned with only minor problems or delays. At the current pace of test execution, initial air vehicle testing will continue into FY14, while software development timelines will drive mission system integration and sensor performance testing to late FY14.
- The Northrop Grumman Multi-Function Active Sensor (MFAS) risk reduction flight test program identified several system performance problems for resolution prior to MFAS integration on to the MQ-4C platform. The contractor implemented a series of radar software changes to improve sensor stability, maritime target surveillance and tracking performance, and synthetic aperture radar image quality.

### System

- The MQ-4C Triton Unmanned Aircraft System 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, with capabilities designed to complement the P-8A Poseidon.
- 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, anti-ice and de-icing systems, and an air traffic de-confliction and collision avoidance radar system.
- The MQ-4C is equipped with the MFAS maritime surveillance radar to detect, identify, and track surface targets and produce high-resolution imagery. The MQ-4C



- electro-optical/infrared sensor provides full motion video and still imagery of surface targets. An Electronic Support Measures system detects, identifies, and geo-locates radar threat signals. An Automatic Identification System (AIS) receiver permits the detection, identification, geo-location, and tracking of cooperative vessels equipped with AIS transponders.
- Onboard line-of-sight and beyond line-of-sight datalink systems transmit sensor data from the air vehicle to ground control stations for dissemination to fleet tactical operation centers and intelligence exploitation sites.

### Mission

- Commanders use units equipped with MQ-4C to conduct maritime surveillance operations and provide high-altitude, long-endurance intelligence collection.
- MQ-4C operators 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

- Due to a series of system integration and software maturity problems, the Navy delayed MQ-4C first flight and the planned developmental flight test program from May 2012 to May 2013. As a result, the Navy was unable to execute previously approved program development, test, and

production schedules leading to an operational assessment in FY13 and a Milestone C decision in FY14. The Navy is currently developing revised program plans and schedules necessary to update the acquisition program baseline.

# NAVY PROGRAMS

- Since beginning the MQ-4C flight test in May 2013, the Navy has accomplished a series of flight tests focusing on air vehicle guidance and control, flight envelope expansion, flying qualities, communication systems, and other basic air vehicle functions.
- The Navy continued to expand ground test activity using the Navy Systems Integration Laboratory and other software development and verification facilities. Ground testing focused on supporting flight test activities, development of sensor software, and interoperability risk reduction testing.
- The Navy continued MFAS radar risk reduction flight testing on a Northrop Grumman surrogate test bed aircraft to identify and resolve potential radar performance problems prior to integration on the MQ-4C air vehicle. The contractor completed more than 25 test flights by the end of FY13 with plans to continue this risk reduction activity through December 2013.

## Assessment

- The Navy is currently revising program test and production schedules due to technical problems encountered during early developmental testing. Since first flight and air vehicle envelope expansion test activities were delayed for one year due to system technical difficulties, the operational assessment and associated Milestone C decision will likely be delayed until FY15 with IOT&E rescheduled for FY17. A final decision on program schedule revisions is on-hold pending resolution of FY14 budget uncertainties.
- Since the MQ-4C first flight test in May 2013, initial safety of flight and air vehicle envelope expansion testing has proceeded as planned with only minor problems or delays. At the current pace of test execution, initial air vehicle testing will continue into FY14, while software development timelines will drive mission system integration and sensor performance testing to late FY14.

- The Northrop Grumman MFAS risk reduction flight test program identified several system performance problems for resolution prior to MFAS integration on to the MQ-4C platform. Radar software changes have been implemented to improve sensor stability, maritime target surveillance and tracking performance, and synthetic aperture radar image quality.
- The Navy encountered significant technical difficulties during early development of the planned MQ-4C air traffic de-confliction and collision avoidance radar system. The program is currently analyzing other technical options to provide air traffic collision avoidance capabilities. This is a critical mission capability for operation of the MQ-4C in civil and international airspace in support of global naval operations.

## Recommendations

- Status of Previous Recommendations. The Navy made progress implementing the FY12 recommendation to retain previously approved system demonstrations and operational assessments in revised program schedules leading to a Milestone C decision. The Navy is integrating this recommendation into a revised acquisition program baseline and schedule expected to be submitted for approval in FY14.
- FY13 Recommendations. The Navy should:
  1. Develop a revised program test schedule that reflects the extensive FY13 program test delays.
  2. Develop and submit for approval a revised Test and Evaluation Master Plan that reflects a revised program test and evaluation strategy through the Milestone C decision, IOT&E, and initial operational fielding.