Vertical Take-Off and Landing Unmanned Aerial Vehicle (VTUAV)

Executive Summary

- The Navy stopped production of the MQ-8B air vehicle after procuring 23 MQ-8Bs. They have not conducted IOT&E on the MQ-8B air vehicles. The Navy is considering replacement of the Schweizer 333 (MQ-8B) airframe with the Bell 407 (MQ-8C). MQ-8C development is in response to a U.S. Special Operations Command Joint Universal Operational Needs Statement.
- The Test and Evaluation Master Plan (TEMP) approved in 2007 is outdated and does not contain a clear path to successful development, integration, and testing of the Vertical Take-Off and Landing Unmanned Aerial Vehicle (VTUAV).
- The Navy deployed MQ-8B Fire Scout systems aboard Navy frigates USS *Simpson* and USS *Klakring* during 2012. The USS *Simpson* supported forward presence and training operations off the west coast of Africa while the USS *Klakring* conducted operations off the Horn of Africa. The *Simpson* and *Klakring* deployments aboard Navy frigates demonstrated that the VTUAV has potential to provide the commander with valuable Intelligence, Surveillance, and Reconnaissance (ISR) once the program addresses shortcomings identified during developmental testing. Demonstrated component lifecycle reliability is well below program planning levels.
- Past and present MQ-8B deployments aboard frigates and operations in support of the ISR Task Force resulted in a critical shortage of spare parts.
- Operational deployments and developmental testing confirmed that system reliability, availability, communications relay, and documentation remain unsatisfactory.
- Moving from the MQ-8B to the MQ-8C airframe may or may not improve VTUAV reliability.

System

- The VTUAV is a helicopter-based tactical Unmanned Aerial System comprised of up to three Fire Scout air vehicles with payloads, a shipboard integrated Ground Control Station with associated Tactical Common Data Link (TCDL), and the Unmanned Aerial Vehicle Common Automatic Recovery System (UCARS).

- The Navy intends the VTUAV with the MQ-8B to have the following capabilities:
    - Combat radius – 110 nautical miles
    - Endurance at combat radius – 3 hours on station
    - Target Identification – Small fast attack boats at 6 kilometer range
    - Initial payload consists of the AN/AAQ-22D Bright Star II electro-optical and infrared imaging system with laser designator
- The Navy is considering replacement of the Schweizer 333 (MQ-8B) airframe with the Bell 407 (MQ-8C).

Mission

Aviation detachments equipped with VTUAVs perform reconnaissance, surveillance, target acquisition, and communications relay missions in support of littoral Anti Submarine Warfare, Anti-Surface Warfare, and Mine Warfare operations. System deployments during 2012 provided reconnaissance and surveillance to units conducting combat operations ashore.

Major Contractor

Northrop Grumman-Ryan Aeronautical – San Diego, California

Activity

- The Navy has stopped production of the MQ-8B air vehicle after procuring 23 MQ-8Bs. Instead, the Navy has focused on development of the MQ-8C air vehicle (also known as the "Endurance Upgrade") as a Rapid Deployment Capability. The Navy is considering replacement of the Schweizer 333 (MQ-8B) airframe with the Bell 407 (MQ-8C).
- MQ-8C development is in response to a U.S. Special Operations Command Joint Universal Operational Needs

Statement. The Program Office issued a sole source contract to Northrop Grumman for MQ-8C development.

- Northrop Grumman is conducting MQ-8C risk reduction flight testing using internal research and development funds.
- The Navy is considering procurement of 31 MQ-8C air vehicles (28 production air vehicles plus 3 research, development, and engineering air vehicles).
- The Navy has not conducted IOT&E on the 23 MQ-8B air vehicles already procured.
- The Navy is working on the integration of weapons and a search radar capability to the MQ-8B air vehicle in response to a Navy Urgent Operational Need.
- The Navy deployed MQ-8B Fire Scout systems aboard Navy frigates USS *Simpson* and USS *Klakring* during 2012. The USS *Simpson* supported forward presence and training operations off the west coast of Africa while the USS *Klakring* conducted operations off the Horn of Africa. The Navy's Commander, Operational Test and Evaluation Force published a Quick Reaction Assessment in September 2012.
- One Fire Scout system continues to support ISR Task Force operations in Afghanistan.
- The Navy lost two MQ-8B aircraft in April 2012. Operators aboard USS *Simpson* intentionally ditched one air vehicle after encountering problems with the recovery system. The Navy recovered this air vehicle. The second air vehicle was destroyed after crashing while operating in support of the ISR Task Force in Afghanistan.
- In May 2012, Naval Air Systems Command published an Interim Summary Report addressing the status of MQ-8B developmental testing.
- The Navy plans to update the TEMP by April 2013; this update is expected to expand the scope of IOT&E.

Assessment

- The TEMP approved in 2007 is outdated and does not contain a clear path to successful completion of IOT&E. The TEMP does not clearly define the objectives of near-term testing, nor does it prioritize future upgrades such as search radar and weapons integration.
- Developmental testing during 2012 verified the correction of several deficiencies that adversely affected system performance. Software updates corrected the target location error and payload automatic caging deficiencies. The software now allows skilled operators to conduct dual air vehicle operations.
- The *Simpson* and *Klakring* deployments demonstrated that the VTUAV has the potential to provide the commander with valuable ISR once the program addresses shortcomings identified during developmental testing.
- Data collected during operational deployments and developmental testing show that the VTUAV system has performed to a satisfactory level in the areas of air vehicle operations, maintainability, compatibility, interoperability, human factors, and safety.

- Demonstrated component lifecycle reliability is well below program planning levels. This resulted in unacceptable values for Availability, Mean Flight Hours Between Operational Mission Failures, and Mean Flight Hours Between Unscheduled Maintenance Actions, preventing the program from entering into IOT&E. This poor reliability adversely affects performance of the forward-deployed systems and increases the workload of the aviation detachments.
- The Navy based Fire Scout spare parts budgeting on design reliability and operating tempo in support of the Littoral Combat Ship. Past and present deployments aboard frigates and operations in support of the ISR Task Force combined with significantly lower lifecycle reliability have caused a critical shortage of spare parts.
- Data collected during operational deployments and developmental testing confirmed that system performance in the areas of reliability, availability, communications relay, and documentation remain unsatisfactory.
- The Navy has yet to assess several critical areas related to VTUAV performance. These include tactics, logistics supportability, training, and manning. Each of these areas, in and of themselves, could render the system not effective or not suitable during IOT&E.
- Moving from the MQ-8B to the MQ-8C airframe may or may not improve VTUAV reliability. While the Navy will not see some failure modes specific to the MQ-8B on the MQ-8C, the MQ-8C includes systems not found on the MQ-8B.

Recommendations

- Status of Previous Recommendations. The Navy has made satisfactory progress on three of the four FY11 recommendations. It has developed overland ISR standard operating procedures and an operator training syllabus for aviation detachments operating VTUAV. The Navy has also established an office to review and coordinate all Navy UAS development and fielding, which addresses the recommendation to conduct an end-to-end review of its command and control network to facilitate the dissemination of near-real-time video. Given the delay in IOT&E, the one remaining recommendation to expand the scope of IOT&E will be addressed as the Navy updates the TEMP.
- FY12 Recommendations. The Navy should:
  1. Conduct in-depth shipboard testing to fully characterize TCDL performance to include air vehicle orientation in relation to the ship and ship orientation in relation to the air vehicle.
  2. Use available data to conduct a formal assessment of VTUAV tactics, logistics supportability, training, and manning to identify areas of risk to successful IOT&E.
  3. Conduct a failure mode analysis between the MQ-8C and the MQ-8B to determine which failure modes are common, which failures modes do not transfer from the MQ-8B to the MQ-8C, and which failure modes are unique to the MQ-8C.