

MQ-9 Reaper Armed Unmanned Aircraft System (UAS)

Executive Summary

- The Air Force subdivided Increment I capability development into two Block upgrades to meet the Increment I Capability Production Document requirements: Block 1 (original capability) and Block 5 (improved capability).
- The Increment I Block 1 MQ-9 continues to lack an all-weather Hunter-Killer capability due to deficiencies in its Synthetic Aperture Radar (SAR) and Ground Control Station (GCS).
- The Air Force is developing the Increment I Block 5 systems to fully integrate needed capabilities within the SAR and GCS, thereby satisfying the Increment I requirements for the Hunter-Killer capability.
- The observations during the FY08 Increment I Block 1 IOT&E, combat operations, and Force Development Evaluation (FDE) events indicate an Increment I Block 5 IOT&E of the MQ-9 system will be required to fully assess and characterize its effectiveness, suitability, and satisfaction of KPPs.
- The deficiencies identified during the ongoing GBU-38 Joint Direct Attack Munition (JDAM) FDE indicate that the Developmental Testing of JDAM integration with the MQ-9 system was insufficient.
- Because the MQ-9 system has only completed limited Information Assurance (IA) testing, IA vulnerabilities and deficiencies are not well characterized, and the system continues to operate under an Interim Certification to Operate.

System

- The MQ-9 Reaper Armed Unmanned Aircraft System (UAS) is a remotely piloted, armed, air vehicle that uses optical, infrared, and radar sensors to locate, identify, target, and attack ground targets.
- This system includes Ground Control Stations (GCS) for launch/recovery and mission control of sensors and weapons.
- The MQ-9 is a medium-sized air vehicle that has an operating ceiling up to 50,000 feet, an internal sensor payload of 800 pounds, an external payload of 3,000 pounds, and an endurance of approximately 14 hours, with stronger landing gear than its predecessor, the MQ-1 Predator.
- The MQ-9 shares command and control characteristics with the MQ-1 Predator.
- The MQ-9 is commanded by ground elements via Ku-band satellite (employing remote split operations with GCS units



- in the United States) and C-band line-of-sight data links (for launch and recovery operations in theater.)
- The MQ-9 carries AGM-114, Hellfire II anti-armor precision laser-guided missiles and GBU-12, 500-pound laser-guided bombs.
- The Air Force is using an evolutionary acquisition approach for meeting Increment I Capability Production Document requirements, with Block 1 and Block 5 air vehicles and Block 15 and Block 30 GCSs. The Air Force plans to satisfy Increment II Capability Development Document requirements in FY15 and beyond with a Block 10 air vehicle and a Block 50 GCS.

Mission

- The Combatant Commander uses the MQ-9 onboard sensors and weapons to conduct armed reconnaissance and pre-planned strikes. Units equipped with MQ-9s can find, fix, track, target, engage, and assess critical emerging targets (both moving and stationary).
- MQ-9 units can also conduct aerial intelligence gathering, reconnaissance, surveillance, and target acquisition for other airborne platforms.

Major Contractor

General Atomics Aeronautical Systems Inc. – San Diego, California

Activity

- DOT&E approved the current MQ-9 Test and Evaluation Master Plan (TEMP) in October 2005, which included the original Increment I capability. The Air Force is currently

staffing an updated draft TEMP (to support the Increment I Block 5 Milestone C decision scheduled for May 2011) outlining the testing needed to evaluate Increment I Block 1

and Block 5 capabilities. Testing in FY10 has not been conducted in accordance with a DOT&E-approved TEMP.

- In December 2009, the Air Force proposed that the MQ-9 Increment I Block 1 system had been granted a Milestone C approval in February 2008 as part of the Air Force low-rate initial production (LRIP) decision. The Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)) concurred that Milestone C approval had been granted. The Air Force bought 24 Increment I Block 1 air vehicles and 6 GCSs and associated equipment in FY10, and plans to buy 48 Increment I Block 1 LRIP systems in FY11. The Air Force plans to transition all production to the Increment 1 Block 5 configuration in FY12.
- In May 2010, the Air Force completed the Preliminary Design Review for the Increment I Block 5 system.
- The Air Force Operational Test and Evaluation Center (AFOTEC) submitted an Operational Assessment test plan for DOT&E approval in October 2010 to support the Increment I Block 5 Milestone C decision planned for May 2011.
- The Joint Interoperability Test Command conducted limited IA testing in 2010 to assess system vulnerabilities.

Developmental Test and Evaluation

- The Air Force is conducting developmental test and evaluation of software load 904.0 in test aircraft and 904.2 in the software integration laboratory. Both software loads bring capability improvement to the air vehicle and GCS to help meet the Increment I Block 5 requirements and are expected to field in FY11. In addition, software loads 904.4 and 904.6 will complete the Increment I Block 5 capability requirement in late FY11.
- The Air Force completed developmental test and evaluation of the new digital Bomb Rack Unit (BRU) 71 to replace the BRU-15.
- Significant government-led developmental testing continued through FY10, including testing of incremental operational flight program improvements, high capacity electrical system, improved landing gear, automatic takeoff and landing capability, and Lynx SAR targeting.
- Big Safari conducted developmental testing of the Gorgon Stare Quick Reaction Capability (QRC) Wide Area Airborne Surveillance (WAAS) system for the MQ-9 during FY10, and plans to complete the Operational Utility Evaluation by December 2010 to field the system in January 2011.

Force Development Evaluations

- The Air Force began an FDE in March 2009 to support the fielding of software load 903.8, which contains many improvements to the operator displays (including laser altimeter and heads up display pitch markers), situational awareness, and flight safety.
- The Air Force began an FDE in November 2009 to support the fielding of GBU-38 JDAM with the Joint Programmable Fuse (JPF) on the MQ-9 Reaper.
 - GBU-38 JDAM testing was paused twice due to unexpected proximity fuze functioning and discovery

of several different anomalies resulting in five potential Category 1 deficiencies. Testing will resume (and will be conducted in accordance with a DOT&E-approved test plan) following resolution of the latest deficiencies and determination of path forward.

- Software load 903.8 Rev H was fielded in September 2010 without the GBU-38 JDAM weapon system.

Assessment

- The Increment I Block 1 MQ-9 continues to lack an all-weather Hunter-Killer capability due to deficiencies in its SAR and ground control station. The SAR is the only onboard sensor with the ability to locate and track targets through clouds, providing all-weather capability. Functional control of the SAR is not fully integrated into the sensor operator station in the GCS, and the SAR cannot yet generate target coordinates with sufficient accuracy for JDAM targeting. JDAM is the only precision-guided Reaper weapon that can be employed in all weather conditions.
- The observations during the FY08 Increment I Block 1 IOT&E, combat operations, and FDE events indicate an Increment I Block 5 IOT&E of the MQ-9 system will be required to fully assess and characterize its effectiveness, suitability, and satisfaction of KPPs.
- The deficiencies identified during the ongoing GBU-38 JDAM FDE indicate that the developmental testing of JDAM integration with the MQ-9 system was insufficient.
- The Big Safari Gorgon Stare WAAS system is not an MQ-9 program of record, but is tested with MQ-9 personnel, processes, and infrastructure, and is distracting to the developmental test and evaluation activities of program of record components.
- Because the MQ-9 system has only completed limited IA testing, IA vulnerabilities and deficiencies are not well characterized, and the system continues to operate under an Interim Certification to Operate.

Recommendations

- Status of Previous Recommendations. The Air Force made little progress in addressing the recommendations in the MQ-9 Beyond Low-Rate Initial Production (BLRIP) Report submitted to Congress in March 2009.
- FY10 Recommendations. In addition to completing the FY09 BLRIP recommendations, the Air Force should:
 1. Plan the Increment I Block 5 IOT&E, FDE, and FOT&E activities required to fully assess Increment I effectiveness and suitability deficiency corrections, KPPs, incremental improvements, and intelligence, surveillance, and reconnaissance capabilities.
 2. Resolve deficiencies with GBU-38 JDAM integration and complete the JDAM FDE.