

MQ-1C Extended Range Gray Eagle Unmanned Aircraft System (UAS)

Executive Summary

- The Army conducted the MQ-1C Extended Range Gray Eagle Unmanned Aircraft System (UAS) FOT&E II, July 30 through August 17, 2018, in accordance with the DOT&E-approved Test and Evaluation Master Plan and operational test plan.
- DOT&E submitted an FOT&E II report in early FY19. In that report, DOT&E concludes:
 - The Extended Range Gray Eagle-equipped unit was effective at conducting Composite Flight Platoon (CFP) operations and can provide continuous multi-discipline intelligence collection, surveillance, reconnaissance, and precision strike support to combat units.
 - The Extended Range Gray Eagle-equipped unit demonstrated the ability to provide the time on-station at the operational range specified in the Army Capability Production Document.
 - The aircraft demonstrated a significant increase in endurance capability over the baseline Gray Eagle aircraft.
 - The Extended Range Gray Eagle system is operationally suitable.

System

- The Extended Range Gray Eagle Company UAS is composed of the following major components:
 - Twelve unmanned aircraft, each with a Common Sensor Payload with a high definition electro-optical/infrared (EOIR) and a Laser Range Finder/Laser Designator capability, a STARLite Extended Range Synthetic Aperture Radar/Ground Moving Target Indicator (SAR/GMTI) radar, a Tactical Signals Intelligence Payload when fielded, and an Air Data Relay control capability
 - Each aircraft is equipped with a Standard Equipment Package that includes a communications relay package, Identification Friend-or-Foe equipment, and Air Traffic Control radios
 - Each aircraft has the ability to carry up to four HELLFIRE missiles
 - Six Ground Control Stations designated as the Universal Ground Control Station (UGCS)
 - Three Mobile Ground Control Stations (MGCS)



- Nine Tactical Common Datalinks Ground Data Terminals
- Three Satellite Communications Ground Data Terminals
- Twelve Satellite Communications Air Data Terminals
- Six Tactical Automatic Landing Systems
- The Army is initially fielding two Extended Range Gray Eagle UAS companies to the U.S. Army Special Operations Command, within the 160th Special Operations Aviation Regiment (SOAR) and the U.S. Army Intelligence and Security Command, within the Aerial Exploitation Battalions (AEB) of the 116th Military Intelligence Brigade.

Mission

The SOAR and AEBs employ Gray Eagle to support their core mission of continuous multi-discipline intelligence collection, surveillance, reconnaissance and precision strike during division, or echelons above division, offensive, defensive, and stability operations.

Major Contractor

General Atomics Aeronautical Systems, Inc., Aircraft Systems Group – Poway, California

Activity

- The Army conducted the MQ-1C Extended Range Gray Eagle UAS FOT&E II at Air Force Plant 42 Palmdale, California, and the National Training Center (NTC), Fort Irwin, California, July 30 through August 17, 2018, in accordance

- with the DOT&E-approved Test and Evaluation Master Plan and operational test plan.
- The FOT&E II unit conducted missions in support of a Brigade Combat Team and Special Operations Forces

conducting a training rotation at the NTC. This combination of testing with training created a realistic, challenging, and stressful test environment for the Gray Eagle CFP. The platoon flew 481 flight hours during the test.

- The Army collected data from the FOT&E II to assess the new MQ-1C capabilities and employment concepts. These include:
 - An aircraft endurance capability increase
 - The capacity of a CFP to conduct one 24-hour orbit on a continuous basis
 - Upgrades to the payloads and significant software functionality enhancements made to the system since the 2015 FOT&E
 - Employment concept from a company conducting split-based operations from two locations to the SOAR/AEB Company employment concept of deploying CFPs independently at disparate locations. The CFP consists of four Extended Range Gray Eagle aircraft, ground control equipment, two UGCS, one MGCS, three universal ground data terminals, one satellite communication ground data terminal, and an automatic take-off and landing subsystem
- DOT&E submitted a Gray Eagle FOT&E II report in early FY19.

Assessment

- During FOT&E II, the Extended Range Gray Eagle-equipped unit was effective at conducting CFP operations and could provide continuous multi-discipline intelligence collection, surveillance, reconnaissance, and precision strike support to combat units.
- The CFP demonstrated the capability to provide one 24-hour orbit on a continuous basis.
- The Extended Range Gray Eagle-equipped unit demonstrated the ability to provide the time on-station at the operational range specified in the Army Capability Production Document.
- The time and effort to perform routine aircraft maintenance has improved since the 2015 FOT&E. Aircraft design changes added new access panels and replaced captive fasteners with Arconic fasteners that enabled maintainers to complete tasks more quickly and reduced wear on fasteners. Greater accessibility to the avionics bay and other airframe areas improved maintenance efficiency.
- The Army has improved integration of the Gray Eagle capabilities into combined arms combat operations. Gray Eagle tactics, techniques, and procedures have matured since the 2015 FOT&E.
- The EO/IR and SAR/GMTI sensors provided imagery products that supported processing, exploitation, and dissemination of intelligence information.
- The Extended Range Gray Eagle system is operationally suitable.
- The Extended Range Gray Eagle demonstrated meeting reliability requirements specified in the Army Capability Production Document for the Ground Control Equipment, for

the aircraft, and for the common sensor payload. It did not meet the reliability requirement for the SAR/GMTI radar.

- Even though the SAR/GMTI capability has improved since the 2015 FOT&E, a preponderance of the SAR/GMTI radar system aborts are attributed to operator error and complicated operational procedures. Soldiers described the sensor as difficult to operate and required frequent in-flight troubleshooting.
- The Gray Eagle cybersecurity posture has improved since the 2015 FOT&E, but the system remains vulnerable to cyber-attack.
- The design of the UGCS shelter has improved since the 2015 FOT&E, but has a number of deficiencies that reduce operator efficiency and increase operator stress and fatigue.
 - Operators reported that the government-furnished headsets became uncomfortable over a period of time and pose a health risk because the operators must share the few headsets. Toward the end of test, the unit procured commercial off-the-shelf headsets for crew member use. Survey feedback from soldiers reflected the commercially procured headsets were an improvement over the government-furnished headsets.
 - The Aviation Mission Planning System is not fully integrated into the UGCS set-up/starting procedures. Operators must manually input most pre-mission data.
- Due to insufficient cooling capability, when temperatures within the MGCS get excessive, there is potential for overheating of the electrical systems requiring the transfer of aircraft control to one of the other UGCSs. The process/procedure to transfer control during high heat conditions was in the standard operating procedures but not documented in the technical manual.

Recommendations

The Army should:

1. Increase reliability, simplify operating procedures, and improve training on the SAR/GMTI payload.
2. Simplify the transfer of the Aviation Mission Planning System mission data into pre-mission UGCS setup procedures through the use of a data transfer card much like that of manned aircraft systems.
3. Provide soldiers with better quality headsets that will reduce or eliminate operator discomfort and fatigue and issue them to each crew member to eliminate the health risks associated with the sharing of headsets.
4. Field the MGCS with an environmental control unit that is capable of cooling the shelter adequately. For the current MGCS, add the temperature limitations to the technical manuals to ensure that soldiers operating the MGCS are aware that it can potentially overheat and require transfer to a backup UGCS.
5. Eliminate the cybersecurity vulnerabilities and confirm corrections in follow-on testing.