

RQ-7Bv2 Block III SHADOW – Tactical Unmanned Aircraft System

Units equipped with the RQ-7Bv2 Shadow Block III are operationally effective, demonstrating ability to acquire targets at greater distances and accuracy than Shadow Block I operators. The Shadow Block III is operationally suitable, demonstrating significant improvement in mean time between system abort as compared to the Shadow Block I. The Army began fielding RQ-7Bv2 Shadow Block III in September 2021.



System Description

The RQ-7Bv2 Shadow Block III is an upgrade to the RQ-7 Shadow Tactical Unmanned Aircraft Systems intended to provide commanders with increased situational awareness, improved wide-area target acquisition, and high-value target tracking to shape the operational environment. The Shadow Block III will replace 184 of 440 Shadow Block I aircraft in Shadow formations.

Program

The RQ-7Bv2 Shadow Block III is an Acquisition Category IC program. The Army Acquisition Executive is the milestone decision authority. DOT&E approved the Test and Evaluation Master Plan, which included a fielding update, on September 9, 2020. The Army completed an FOT&E and an Adversarial Assessment in 1QFY21 to support a materiel release decision in November 2021.

Major Contractors

- Unmanned Aerial System: Textron Systems – Hunt Valley, Maryland.
- Sensor Payload: L3 Harris WESCAM – Burlington, Ontario, Canada.
- Engine: UAV Engines Limited – Lichfield, England, United Kingdom.

Test Adequacy

The RQ-7Bv2 Shadow Block III FOT&E was adequate to assess operational effectiveness, suitability, and survivability in support of a materiel release decision in November 2021. The Army Test and Evaluation Command conducted testing in accordance with a DOT&E-approved test plan. The FOT&E included new equipment

training, force-on-force missions, manned-unmanned teaming (MUMT), HELLFIRE live missile engagement missions with AH-64D and AH-64E attack helicopters, and an Adversarial Assessment.

Performance

Effectiveness

Units equipped with the Shadow Block III are operationally effective. Shadow Block III operators can acquire targets at greater distances and accuracy than Shadow Block I operators. Shadow Block III target location errors are acceptable at all operational ranges. The Shadow Block III can perform MUMT with the AH-64D and AH-64E up to the ability for Apache aircrews to take control of Shadow Block III remotely. MUMT increases the survivability and lethality of Apache aircrews and the operational effectiveness of RQ-7.

The Army has not updated Shadow tactics that capitalize on the improved capabilities of the Shadow Block III. Lack of innovative tactics led the test unit to operate the Shadow Block III in the same manner as the Shadow Block I, reducing the effectiveness of the Shadow Block III. The Shadow Block III also has a higher fuel consumption rate than the Shadow Block I, which may reduce available support to commanders and increase required Shadow platoon maintenance.

Suitability

The Shadow Block III is operationally suitable, and demonstrated a mean time between system aborts of 20.0 hours, meeting its requirement of 20 hours. This is a significant improvement (130 percent increase) from the Shadow Block I mean time between system aborts of 8.7 hours during operational testing. The Shadow Block III demonstrated a mean time between essential function failure of 4.8 hours, equal to Shadow Block I. The Shadow Electro-optical Infrared Laser Designator payload demonstrated a mean time between payload system abort of 130.1, meeting its 110-hour requirement.

The Shadow Block III engines were a recurring problem, with the test unit replacing six engines during FOT&E. Engine problems included excessive sputter prior to launch, oil leaks, coolant leaks, and throttle issues. The Shadow Block III maintenance

concept emphasizes engine replacement over repair, with engines returning to the English manufacturer for repair. This concept may not support sustained combat operations.

The Shadow Block III New Equipment Training was suitable in preparing operators and maintainers. More hands-on training and additional instructors could further improve unit training. MUMT workload was minimal for Shadow operators but excessive (rated as not possible) for AH-64E aircrews under some conditions.

Survivability

The Shadow Block III is vulnerable in a cyber-contested environment and in a contested electromagnetic spectrum environment. Shadow Block III is susceptible to visual and audio ground detection making it vulnerable to certain kinetic threat engagements. The effect of those vulnerabilities on the Shadow Block III survivability and residual mission capability is detailed in the classified annex of the RQ-7Bv2 Block III Shadow FOT&E II report published in May 2021.

Recommendations

The Army should:

1. Determine the cause of target location errors, even though they are acceptable at all operational ranges, to further improve the operators' understanding and confidence in the Shadow Block III's capabilities.
2. Address the operational effects of the Block III reduced on-station time due to higher fuel consumption to improve Shadow Block III availability to commanders.
3. Isolate the cause of engine sputtering observed during testing and determine an effective mitigation to avoid mission delays.
4. Evaluate the Shadow Block III maintenance concept and assess feasible repairs for maintenance personnel.
5. Develop, codify, and update TTPs in the Shadow aircrew training manual to include tasks that include mitigating the effects of electronic warfare, execution of MUMT operations, and effective use of the Shadow Block III's improvements.

6. Revise New Equipment Training to allow for more hands-on experience and increase equipment quantities and availability during such training to improve Shadow Block III units readiness following the training.