

## Joint Standoff Weapon (JSOW)

### SUMMARY

- The AGM-154A Joint Standoff Weapon (JSOW) Baseline system now meets suitable levels of reliability, logistic supportability, and built-in test capability. System accuracy is improved by 45 percent.
- If the Baseline system configuration changes, we will require operational testing of this weapon system's full capability in the face of strong head and tail winds.
- Follow-on free-flight operational testing of the Unitary system against a realistic threat array is necessary to confirm weapon survivability modeling and simulation results.
- DOT&E is assessing the AGM-154C (Unitary variant) effectiveness and suitability for combat.



*Operational evaluation of the AGM-154C demonstrated the weapon impacted the target and detonated during ten of eleven weapon release events. However, the mission planning system occasionally is unable to complete mission-planning operations.*

### SYSTEM DESCRIPTION AND MISSION

The JSOW, produced by Raytheon, is a family of kinematically efficient (~12:1 glide ratio) 1,000-pound class, air-to-surface glide weapons intended to provide low observable, standoff precision engagement and launch-and-leave capability against a wide range of targets during day/night, all weather conditions. Both JSOW variants employ a tightly coupled Global Positioning System/Inertial Navigation System. JSOW is employed for interdiction of soft/medium fixed, re-locatable, and mobile light armored targets; massed mobile armored targets; anti-personnel; and air-to-surface threats. JSOW primarily functions in a preplanned mission mode. The system will permit pilot manual inputs of up to six targets, as well as third party targeting. The weapon is planned for land- and carrier-based operations.

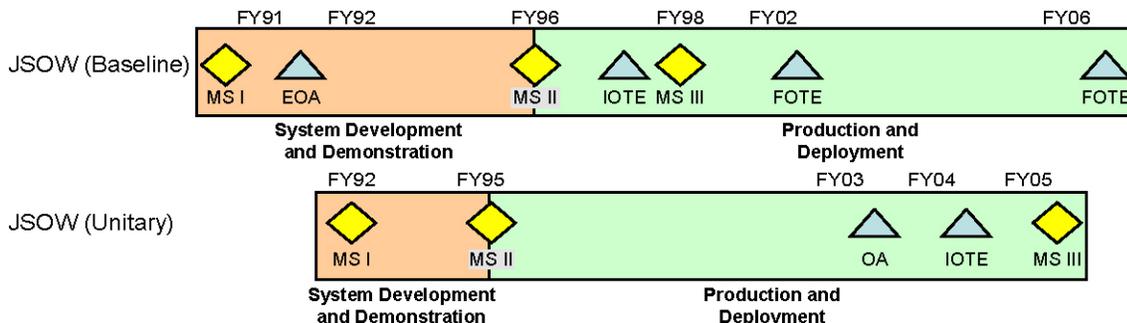
Currently, the Navy's Tactical Automated Mission Planning System and the Air Force Mission Support System accomplish mission planning. Mission planning with the Joint Mission Planning System (JMPS) is anticipated in the future. The following aircraft will employ JSOW: F/A-18C/D and E/F; F-16C/D; F-15E; Joint Strike Fighter; B-1B; B-2A; and B-52H. The weapon comes in two operational variants:

- AGM-154A (JSOW Baseline) – Air Force and Navy: The payload of the AGM-154A consists of 145 BLU-97/B sub-munitions. The BLU-97/B is a combined effects munition. The bomblets consist of a shaped charge for light armor defeat capability, a fragmenting case for material destruction, and a zirconium ring for incendiary effects. JSOW Baseline is designed to conduct pre-planned attacks on stationary soft targets such as air defense sites, parked aircraft, components of airfields and port facilities, command and control antennas, stationary light vehicles, trucks and artillery, and refinery components.
- AGM-154C (Unitary Variant) – Navy only: The AGM-154C, utilizing the same Global Positioning System/Inertial Navigation System as the Baseline variant, will use an autonomous imaging infrared seeker for target acquisition and terminal guidance. The AGM-154C will carry the British Aerospace multiple warhead system (Broach). The Broach warhead, consisting of an augmenting charge and a follow-through bomb, can be set to explode both warheads simultaneously or sequentially. The AGM-154C is designed to attack point targets vulnerable to blast

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and fragmentation effects and point targets vulnerable to penetration, such as industrial facilities, logistical systems, and hardened facilities.

## TEST AND EVALUATION ACTIVITY



### AGM-154A (Baseline Variant)

Test planning for a new software update began in June 2004. Although the new software variant should not reduce wind estimation uncertainties, its software design is intended to:

- Improve weapon performance during in-flight and target area operations when released from high altitude and lower airspeeds.
- Enable achievement of the requirement for low altitude, standoff deliveries.
- Permit an alternative input to the altitude component for use during target area operations.
- Remove a GPS anti-spoofing constraint shown during operational testing to reduce the probability of timely GPS signal acquisition.
- Update weapon logic thresholds.
- Establish a common software build for both the AGM-154A and AGM-154C.
- Enable the AGM-154C to automatically accept a pre-planned fuze delay setting when mission-planning data is initially inserted in the weapon.

Adequate operational test of the fielded software variant concluded in FY03. No additional operational testing occurred in FY04.

### AGM-154C (Unitary Variant)

Initial operational testing began in November 2003 and concluded in September 2004. Testing consisted of captive-carry missions intended to evaluate weapon system terminal seeker performance in complex urban scenes, humid environments, infrared countermeasured environments, and shipboard and carrier takeoff and landing environments. Weapon free-flight testing consisted of 11 single-weapon releases against Defense Intelligence Agency-certified realistic and defended targets.

## TEST AND EVALUATION ASSESSMENT

### AGM-154A (BASELINE VARIANT)

DOT&E's evaluation of the results of Navy Operational Evaluation and Air Force initial operational test and evaluation confirmed that the AGM-154A, in the low-rate initial production configuration, is operationally effective and suitable. Follow-on operational tests to evaluate the effectiveness and suitability of new software and hardware were adequate. Compared to performance during initial operational test, the system tested:

- Demonstrated a 45 percent improvement in accuracy.
- Meets suitable levels of reliability, logistic supportability, and built-in test capability.
- Continues to demonstrate satisfactory performance in a GPS-jamming environment.
- Continues to demonstrate the ability to re-target the AGM-154A in flight; however, the fidelity of onboard sensors in both threshold aircraft for self-targeting does not provide re-targeting coordinates accurate enough to enable a desired level of destruction.
- Meets desired levels for single-shot kill capability, but only in light winds.
- In strong head or tail winds, performance of the AGM-154A may not have improved. Therefore, two AGM-154A weapons should be employed against a single target at perpendicular attack headings to mitigate potential errors in wind estimator performance.

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While AGM-154A accuracy improved, the need to employ two weapons per target does not increase the opportunity to hold more targets at risk. If the AGM-154A wind estimator performance in strong head or tail winds does not improve, diminished performance, as seen in February 2001, is possible. If the Baseline system configuration changes, we will require operational testing of this weapon system's full capability in the face of strong head and tail winds.

## **AGM-154C (Unitary Variant)**

During operational evaluation of the AGM-154C, the weapon impacted the target and detonated during 10 of 11 weapon release events. On one occasion, the weapon revealed a final attack-heading anomaly that necessitated weapon destruction prior to impact on the target. However, an update to weapon software and subsequent operational testing demonstrated correction of the anomaly. Captive-carry missions conducted with the seeker in high humidity and various camouflage, concealment, and deception environments indicate seeker performance is typical of fielded imaging infrared seekers. Although an evaluation of weapon survivability against realistic surface-to-air threat systems was conducted through modeling and simulation, follow-on free flight operational testing of the AGM-154C against a realistic threat array is necessary to confirm weapon survivability modeling and simulation results.

Operational testing also revealed an inability to transfer targeting imagery onboard ship to the mission planning system. Mission planning with the Tactical Automated Mission Planning System resulted in occasional inability to complete mission planning operations. While a software revision introduced during operational evaluation enabled transfer of targeting imagery onboard ship to the mission planning system, the possibility of mission planning interrupts remains. Improvements to the Tactical Automated Mission Planning System to routinely enable completion of mission planning are necessary to render mission planning suitable with the Unitary variant. Operational testing of this software update and the JMPS are necessary before either system is delivered to the fleet.

Weapon impact and detonation of the AGM-154C against all ten operational evaluation targets indicates the warhead is lethal. Results from free-flight tests, along with developmental flight tests, sled tests, and arena warhead characterization tests will support the development of the Joint Munitions Effectiveness Manual.

DOT&E is assessing Unitary variant effectiveness and suitability for combat.

