Small Diameter Bomb (SDB) Increment I

Executive Summary

- The Small Diameter Bomb (SDB) underwent IOT&E from November 2005 through July 2006. Testing was adequate to assess operational effectiveness and suitability.
- The DOT&E SDB Combined OT&E and LFT&E Report assessed SDB as operationally effective and suitable with some limitations due to bomb rack reliability and deficiencies in software used to predict optimum fuzing solutions for certain targets.
- The Air Force certified SDB for combat use by operational F-15E units in August 2006 and the system was subsequently deployed to Southwest Asia. However, in mid-October 2006, SDB flight operations were suspended due to weapon hardware component failures not observed in IOT&E. Air Force inspection and investigation are ongoing, and repairs are underway to return SDB to operational status.

System

- The SDB is a 250-pound air launched weapon using deployable wings to achieve standoff range.
- SDB uses a combination of Global Positioning System (GPS) and internal inertial navigation system guidance to achieve precise guidance accuracy.
- The SDB warhead is a penetrator design with additional blast and fragmentation capability. Integral fuzing is initiated by warhead impact, with or without a specified function delay, or by reaching a preset height above the intended target.
- SDBs are employed from a four-weapon carriage assembly mounted on F-15E aircraft.
- SDB is supported by the Accuracy Support Infrastructure (ASI) system, a ground-based, theater-deployable, differential GPS system, designed to increase SDB accuracy. ASI collects GPS satellite positioning error data and broadcasts target location corrections to the SDB through the F-15E data link prior to weapon release.

Mission

- Combatant commanders use SDB to attack fixed or relocatable targets that remain stationary from weapon release to impact.
- SDB engages both soft and hardened targets to include communications facilities, aircraft bunkers, industrial complexes, and lightly armored ground combat systems and vehicles.
- SDB permits an increased weapons load out per aircraft compared to conventional air-to-ground munitions for employment against offensive counter-air, strategic attack, interdiction, and close air support targets in adverse weather.
- SDB minimizes collateral damage while achieving kills across a broad range of target sets by precise accuracy, small warhead design, and focused warhead effects.

Activity

- Test and evaluation was conducted in accordance with the December 2004 DOT&E-approved Test and Evaluation Master Plan.
- Air Force Operational Test and Evaluation Center (AFOTEC) conducted the SDB IOT&E from November 2005 through July 2006. Test events included mission planning exercises, ASI deployment and operations, logistics activities and demonstrations, and flight test missions carrying and delivering both live and inert SDBs. AFOTEC conducted testing using production-representative weapons and carriage assemblies against realistic targets.
- IOT&E included operationally representative weapons employment events in a GPS jamming environment. These events characterized SDB performance capabilities in the threat environment likely to be encountered at system operational fielding.
- SDB achieved its IOT&E objectives, and the Air Force certified SDB for combat use by operational F-15E units in August 2006. The system was subsequently deployed to Southwest Asia. However, in mid-October 2006, SDB flight operations were suspended due to weapon hardware component failures not observed in IOT&E. Air Force inspection and investigation are ongoing, and repairs are underway to return SDB to operational status.
- DOT&E issued its report on SDB OT&E and LFT&E in October 2006 in support of the SDB full-rate production decision.

Assessment

- The IOT&E of the SDB system was adequate to support evaluation of the system's operational effectiveness and suitability.
- In the OT&E and LFT&E Report, DOT&E assessed SDB as operationally effective and suitable with some limitations:
  - The BRU-61/A carriage assembly did not meet the Air Force's IOT&E reliability mean time between failure requirement of 250 hours. The SDB program office is in the process of taking corrective action to ensure the BRU-61/A reliability meets the operational requirement.
  - SDB effectiveness and lethality are highly dependent on selection of the optimum weapon fuzing option for targets such as field artillery and lightly armored ground combat vehicles. The currently fielded version of the Joint Munitions Effectiveness Manual Weaponeering Software (JWS) does not accurately predict the optimum fuzing solution for these type targets. Although interim guidance was published, JWS must be improved with accurate SDB effectiveness data to enable successful mission planning without interim work arounds.
  - Additional live weapons event data using impact fuzing is required to validate forthcoming improvements in the FY07 JWS version. This data is necessary to provide a more robust set of empirical data to better characterize the range of SDB capabilities and limitations.
  - IOT&E ASI deployment and operation proved cumbersome and did not meet the Air Force concept of autonomous operational employment. Although the system provided nominal guidance accuracy improvements, it did not influence SDB effectiveness and lethality during IOT&E.
- The root cause of hardware component deficiencies that led the Air Force to suspend SDB flight operations is under investigation. The SDB program office is aggressively engaged in resolving this problem.

Recommendation

- Status of Previous Recommendations. There are no outstanding recommendations from FY05.
- FY06 Recommendations. To address and correct deficiencies and limitations identified in the OT&E and LFT&E Report, the Air Force should:
  1. Improve BRU-61/A bomb rack reliability to meet the operational mean time between failure requirement.
  2. Correct deficiencies in JWS SDB effectiveness data to facilitate accurate and effective mission planning. JWS improvements should provide correct fuze option selection for optimum lethality against all targets.
  3. Conduct follow-on Live Fire testing using impact-fuzed SDBs to validate JWS improvements and to provide a more robust set of empirical data to better characterize the range of SDB capabilities against ground combat systems such as field artillery and lightly armored air defense systems.