

## Small Diameter Bomb Increment One (SDB)

---

The Small Diameter Bomb Increment One (SDB) is operationally effective, and it is operationally suitable with some limitations.

### System Overview

SDB weapons system consists of the GBU-39/B 250-pound class air-launched glide bomb and the BRU-61/A carriage assembly. SDB is the first Air Force Miniature Munition weapon system and is designed to increase the number of weapons carried per aircraft for employment in offensive counter-air, strategic attack, interdiction, and close air support missions. Combatant commanders use SDB to attack fixed or relocatable targets that remain stationary throughout the weapon time of flight in all weather conditions. The initial SDB-capable aircraft is the F-15E, and follow-on aircraft include the F-22A, F-35, F-16, B-1, B-2, B-52, and MQ-9.

SDB uses a combination of Global Positioning System (GPS) and internal inertial navigation system guidance to achieve kills across a broad range of target sets through the combination of precise accuracy and warhead effects. It 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 data corrections to the SDB through the F-15E data link prior to weapon release.

### Test Adequacy

The operational testing of SDB adequately supported an evaluation of the system's operational effectiveness and operational suitability.

Air Force Operational Test Command conducted the SDB initial operational test (IOT) from November 2005 through July 2006. Operational test aircrews and maintainers planned, flew, and maintained missions. Test phases and 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. Air Force Operational Test Command conducted testing using production-representative weapons and carriage assemblies. IOT evaluated 51 SDBs in operationally representative free flight test missions to include testing in a GPS jamming environment.

### Operational Effectiveness

SDB is operationally effective and lethal when the optimum fuzing mode is correctly selected. Weapon guidance accuracy combined with appropriate fuze selection will achieve kills across the full spectrum of user-defined target sets. SDB proved lethal against the targets engaged in IOT, and is likely to be lethal against the required targets that were not attacked in testing. SDB demonstrated effective employment and target engagement using both preflight mission planning and airborne targeting using the F-15E onboard sensors to designate and engage targets.

The weapon was not able to perforate all hardened targets with a single SDB, likely requiring two weapons against the same aim point in order to achieve the user's required level of damage for these targets. SDB lethality against relocatable soft surface targets and lightly armored ground combat systems proved heavily dependent upon the fuzing option selected (height of burst or impact) based on actual target location error.

Although limitations in the currently fielded weapons planning software do not support a definitive assessment of the user's requirement of 17 weapons to kill 14 targets, SDB can be expected to perform near its required capability and kill 14 targets with 18 weapons. Additional limitations in the SDB effectiveness modeling resident in this software also lead to inappropriate fuzing solutions for some targets with small target location error.

The ASI system provided incremental guidance accuracy improvements, but did not enhance nor detract from overall effectiveness or lethality.

SDB effectiveness in the presence of GPS jamming is presented in the Classified Annex to this report.

### Operational Suitability

SDB is operationally suitable with some limitations. SDB met user needs for maintainability and reliability with one exception: the BRU-61/A carriage assembly did not meet the user's mean time between failure requirements during IOT. Additionally, the currently fielded SDB mission planning software leads the aircrew to a fuzing option selection that will not achieve the user's required target damage criteria in some target scenarios. Finally, the ASI system required continuous

## ANNEX - BLRIP EXECUTIVE SUMMARIES

monitoring and troubleshooting to maintain availability to support SDB missions. This was deemed not to be significant as ASI did not enhance nor detract from effectiveness or lethality observed in IOT.

### **Recommendations**

SDB is an effective system and is suitable for combat operations with some limitations. To address these limitations, the Air Force should:

1. Improve BRU-61/A bomb rack reliability to meet the user-defined mean time between failure requirements.
2. Improve weapons planning software SDB effectiveness modeling. Improvements are necessary to accurately plan for effective SDB employment using both height of burst and impact fuzing. Follow-on live warhead flight testing against relocatable targets (particularly lightly armored ground combat systems) is required to validate the accuracy of software improvements and provide a more robust set of empirical data to better characterize the range of SDB capabilities and limitations.
3. Reconsider the value added in fielding the ASI system given that it did not fully support the user's concept of employment and did not contribute to nor detract from SDB effectiveness.
4. Take measures to ensure that all SDB weapons procured retain the minimum capabilities in a GPS jamming environment as discussed in the Classified Annex to this report.