

## Small Diameter Bomb Increment II (SDB II)



The Small Diameter Bomb Increment II (SDB II) program continued integration testing on the F-35B/C and F/A-18E/F. Cryptographic information delivery, mission planning, and Operational Flight Program (OFP) compatibility continued to delay test progress. This resulted in only one F-35 test mission and three F/A-18E/F missions in FY23. The program now anticipates SDB II initial operational capability (IOC) on F/A-18E/F in FY24 and on F-35B/C in FY25.

## SYSTEM DESCRIPTION

---

SDB II, also known as the GBU-53/B Stormbreaker, is the second increment of a 250-pound air-to-ground glide bomb. It is a network-enabled weapon (NEW) equipped with an encrypted weapon data link (WDL) radio, which allows it to destroy moving targets in adverse weather at standoff range. When launched, SDB II guides to a designated target cue using an inertial navigation unit. In normal attack mode, the attacking aircraft or a third party updates the target location with inflight target updates (IFTUs) sent via the WDL. Finally, the weapon uses a multi-mode seeker to precisely locate, identify, and terminally guide to the target. SDB II also has laser illuminated attack and coordinate attack modes to engage laser-illuminated targets or GPS coordinates.

## MISSION

---

Combatant Commanders will use SDB II to attack stationary and moving ground and littoral targets at standoff ranges in a variety of conditions including adverse weather.

## PROGRAM

---

SDB II is a joint Air Force and Navy Acquisition Category IC program intended to deliver expanded capability deferred from SDB I. DOT&E approved the SDB II Milestone C Test and Evaluation Master Plan (TEMP) in April 2015.

This TEMP outlines a two-phase multi-Service operational test and evaluation (MOT&E). Phase I achieved SDB II fielding on the F-15E in FY20 with IOC declared in September 2022. Phase II intends to achieve early fielding with limited capability on the F-35B/C in FY24, followed by IOC in FY25. In FY20, the Navy initiated a quick reaction assessment (QRA) to integrate SDB II into the F/A-18E/F. DOT&E approved a six-event QRA test plan, which the Navy expects to complete in FY24.

In January 2022, the Service Acquisition Executive for SDB II issued an acquisition decision memorandum approving an increase of 9,610 weapons to the total production quantity. This will provide a total inventory objective of 26,610 (21,610 for the Air Force and 5,000 for the Navy). The program anticipates a full-rate production decision in FY25, concurrent with F-35 IOC.

### » MAJOR CONTRACTOR

---

- Raytheon, a subsidiary of RTX (formerly Raytheon Technologies) – Tucson, Arizona

## TEST ADEQUACY

---

During FY23, the Navy conducted two live-fly operational tests for F/A-18E/F integration and the Marine Corps conducted one live-fly test for F-35B/C integration. DOT&E observed these events, which the Services executed in accordance with DOT&E-

approved test plans. Concurrent software developments delayed test missions and limited NEW testing using the OFPs and Mission Planning Environment (MPE) software intended for operational fielding. The Operational Test Agencies will test these capabilities during the two remaining F-35B, four remaining F-35C, and three remaining F/A-18E/F OT missions.

Additionally, range safety restrictions continue to impose significant limitations on SDB II employment envelopes and F-35 self-lasing. These restrictions prevent testing SDB II's full operational capabilities.

MOT&E Phase I cyber survivability testing, conducted by the Air Force in FY19, was inadequate to support an independent survivability evaluation. The test asset was not production representative and testing lacked adequate documentation and engineering support to determine the emulated cyber threat's level of sophistication. Both the Navy and Air Force program offices are actively working to rectify these shortfalls during MOT&E Phase II.

## PERFORMANCE

---

### » EFFECTIVENESS

---

MOT&E Phase I verified SDB II's operational effectiveness on the F-15E. Despite ongoing efforts to modernize encryption keys and update aircraft, weapon, and mission planning software, the program has not yet demonstrated

operational effectiveness on the F-35B/C or the F/A-18E/F. Both platforms have been unable to use the weapon's full NEW functionality with the aircraft OFPs and MPE software intended for operational fielding. However, SDB II did perform as expected during one successful F-35B test in laser illuminated attack mode. The Navy also used previous versions of the F/A-18E/F OFP/MPE and test (not operational) encryption keys to conduct a successful operational test with NEW capability against a moving land target and a successful developmental test against a moving maritime target.

FY22 reporting highlighted a hardware issue affecting F/A-18E/F SDB II employment during bomb rack ejection. In FY23, the program implemented a materiel solution; however, further data analysis is required to determine whether this sufficiently reduces the likelihood of degrading weapon performance.

## » **LETHALITY**

---

MOT&E Phase I verified SDB II's lethality against a variety of static and moving targets including legacy main battle tanks, infantry fighting vehicles, anti-aircraft guns, surface-to-air missile target-erector-launchers, and small patrol boats. The program has not yet demonstrated lethality with the F-35B/C or F/A-18E/F.

## » **SUITABILITY**

---

MOT&E Phase I, completed in FY20, first highlighted concerns with cryptographic key loading and

mission planning for the SDB II as employed by the F-15E. These same issues delayed F-35 and F/A-18E/F integration testing. Synchronizing cryptographic keys across the weapon, the MPE, and the key filler devices is a complex process that involves several management nodes outside the program office. Additionally, in FY22, the DoD mandated WDL conform to new standards established by the National Security Agency (NSA)-led Cryptographic Modernization Program. In several cases, these new requirements delayed delivery of the operational cryptographic keys necessary for NEW testing.

## » **SURVIVABILITY**

---

The cyber-OT&E shortfalls from Phase I need to be addressed during MOT&E Phase II before providing an independent survivability evaluation. With input from DOT&E, the program office and Navy Operational Test Agency are currently drafting an updated cyber survivability test plan.

## **RECOMMENDATIONS**

---

The DoD should:

1. Continue to streamline cryptographic material delivery, management, loading, and verification processes.
2. Continue to work with candidate open-air ranges to mitigate F-35 self-lasing restrictions and allow operationally representative SDB II employment by all platforms.

The Navy should:

1. Continue to develop and fund an adequate MOT&E Phase II cyber survivability T&E strategy to support an evaluation of SDB II survivability in a cyber-contested environment.

The SDB II Program Office should:

1. Update the Milestone C TEMP to reflect the updated Phase II cyber survivability T&E strategy.
2. Continue efforts to streamline the mission planning process across all objective platforms, particularly regarding cryptographic data entry.