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Department of Defense  
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

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# SMALL DIAMETER BOMB INCREMENT II (SDB II)

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Selected Acquisition Report (SAR)



AS OF THE FY 2023 PRESIDENT'S BUDGET  
U.S. AIR FORCE

## Contents

Program Manager .....	3
Mission and Description .....	3
Executive Summary .....	4
Program Highlights Since Last Report .....	4
History of Significant Developments Since Program Initiation .....	5
Schedule .....	7
Schedule Events .....	7
Schedule Notes: .....	7
Significant Schedule Risks .....	7
Performance .....	8
Performance Attributes.....	8
Requirements Source.....	15
Acquisition Budget Estimate.....	16
Total Acquisition and Quantity.....	16
Budget Notes .....	16
Risk and Sensitivity Analysis .....	16
Unit Cost .....	17
Current Baseline Compared with Current Estimate.....	17
Original Baseline Compared with Current Estimate.....	17
Status of Each Major Contract and Significant Factors Contributing to Cost and Schedule Variance; Projected Effects on Future Program Costs .....	17
Unit Cost Notes .....	17
Technologies and Systems Engineering.....	18
Significant Technical Risks .....	18
Contracts .....	19
Contract Notes .....	19
Contract Notes.....	20
Contract Notes.....	21
Contract Notes.....	22

Contract Notes.....23

Deliveries and Expenditures .....24

    Deliveries.....24

    Expended and Appropriated .....24

    Deliveries and Expenditures Notes.....24

Low Rate Initial Production .....24

Operating and Support Costs .....25

    Operating and Support Cost Estimate.....25

        Cost Estimate Sources.....25

    Operating and Support Estimate Compared with Baseline.....25

    O&S Cost Notes.....25

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## Mission and Description

Small Diameter Bomb Increment II (SDB II), GBU-53/B, StormBreaker, is a joint interest Air Force (AF) and Navy ACAT IC program, with the AF as the lead service. SDB II provides the warfighter the capability to attack mobile targets from standoff, through adverse weather. The threshold aircraft for the AF is the F-15E and the threshold aircraft for the Navy are the F-35B and F-35C. Objective aircraft include the F-16, F/A-18E/F, F-22A, F-35A, B-1B, B-2, B-52, A-10, MQ-9, and AC-130. SDB II will be compatible with the BRU-61 (Bomb Rack Unit) miniature munitions carriage, the CNU-660/E (Container Miscellaneous Unit) carriage system, the Common Munitions Bit and Reprogramming Equipment and the Joint Mission Planning System. The SDB II program will develop and field a single-weapon AF storage container and a dual Navy weapon storage container.

## Executive Summary

### *Program Highlights Since Last Report*

#### **Production**

There are 1,641 Air Force (AF) and 840 Department of Navy (DoN) weapons currently in inventory. Production Lots 1-4 are complete, and Lot 5 is ongoing with delivery completion (DD250) slated for February 28, 2022. The first, sole-source production contract (FPIF), Lot 6, was awarded October 15, 2020 for \$271.9M and includes 1,228 weapons (747 AF, 461 DoN, 20 Foreign Military Sales (FMS)). Lot 7 was awarded April 29, 2021 for \$212.7M and includes 1,100 weapons (674 AF, 226 DoN & 200 FMS); Lot 8 was awarded September 29, 21 with priced options totaling \$215.7M and includes 1,140 weapons (976 AF & 164 DoN). Although the production ramp rate continues to demonstrate improvement, SDB II Production is currently constrained to a minimum sustainment rate as reflected in Lot 7 & Lot 8 procurement quantities.

Fin clip design modification (snubber) successfully mitigates fin clip fatigue, and the retrofit on Lots 1-4 was completed May 2021. The evaluation of fin clip material's susceptibility to stress corrosion cracking resulted in a new fin clip design. This fin clip design modification which abates fatigue and stress corrosion cracking was cut into Lot 5 that commenced Jun 2021.

Flight Termination, Tracking and Telemetry obsolescence is driving redesign of the terminate charge and encoder. This results in limited quantities of Guided Test Vehicles (GTVs) until Lot 8. However, there are enough parts to procure 28 GTVs during Lot 6.

The current approved Program of Record procurement quantity is 17,000 total weapons (12,000 USAF and 5,000 DoN). On April 5, 2021, HAF/A5RW increased the SDB II Inventory Objective (IO) to 26,610 weapons (21,610 USAF and 5,000 DoN). This increase drove significant additional costs required to scale and extend the platform, including extended lot integration and test activities and a technology refresh to address obsolescence issues in the seeker; additionally, the F-35 integration delays also add cost to the program. The program also received requirements after Milestone C to incorporate Military-Code (M-Code) Global Positioning System (GPS), crypto modernization and exportability features, requiring hardware upgrades that increase unit cost. On August 6, 2021, the F-35 JPO notified the SDB II program that full weapon integration on the F-35B/C was delayed until January 2025 due to aircraft software. The SAE issued an ADM on January 10, 2022 approving the increased procurement quantity of 26,610 total weapons, restructuring the SDB II F-35B/C IOC milestones to no earlier than January 2025 (objective) and no later than January 2026 (threshold), and also restructuring the SDB II FRP milestones to no earlier than April 2025 (objective) and no later than April 2026 (threshold). The Service Cost Position (SCP) reflecting the new IO estimates caused a Significant Nunn-McCurdy (NMC) breach of 21.7% to the APUC against the current APB. A Program Deviation Report was submitted to the MDA and a notification letter was sent to Congress by the Secretary of the Air Force on March 4, 2022.

#### **Development**

Cryptographic Modernization (CM) of the weapon data link will not meet the JROCM requirement date of January 2022. TacNet (TN) 1.1 CM software development will complete in April 22 and will need to be uploaded to fielded weapons. Completion of TN 1.5 development and testing is currently projected for June 22, with first production delivery 4<sup>th</sup> Quarter FY 2023.

Priority on M-Code Global Positioning System (GPS) upgrade, and Common Architecture for Assured PNT Application-Specific Integrated Circuit (CAAP ASIC) development/procurement is meeting the FY 2011 Congressional M-Code mandate while enhancing anti-jam performance. Program worked with the Defense Microelectronics Activity and Global Foundries to extend the 45nm End-of-Life purchase order date from March 15, 2022 to August 15, 2022. Updated ASIC prototypes will be delivered in April 2022 to allow full verification testing before LTB purchase. An additional extension may be required if a final prototype is required. Receiver



qualification is planned for FY 2023 and AUR qualification for FY 2024 with the first production delivery expected in FY 2026.

Team continues to work on required design changes for wide exportability to F-35 FMS partners.

### Test & Integration

GBU-53/B plans to test and field new 08.XX series Operational Flight Program (OFP) by 4<sup>th</sup> Quarter CY 2022. The new OFP meets the CM mandate and incorporates system performance upgrades and also addresses multiple Deficiency Reports. The Developmental Test/Operational Test (DT/OT) program, up to five guided test flights on three Mission Design Series will validate the upgrades.

F/A-18E/F has conducted eight jettison tests, five normal attack Guided Test Vehicle tests, developmental testing for shipboard suitability, integration flight test (IT-1) and the first operational test shot (OT-1). The final two weapon separation tests are scheduled for January 2022. The remaining four DT and OT tests will resume when CM software and F/A-18E/F OFP H16 are available in June 22. IOC is planned 4<sup>th</sup> Quarter CY2022.

F-35B has completed all jettison, gunfire and Hazards of Electromagnetic Radiation to Ordnance (HERO) test points and six mission systems captive carriage tests and two guided release missions. On track to meet Early Operational Capability (EOC) by end of CY 2022 and IOC 1<sup>st</sup> Quarter CY 2025.

F-35C initial integration flight test planning ongoing; flight test 3<sup>rd</sup> Quarter CY 2022, EOC anticipated 3<sup>rd</sup> Quarter CY 2023, and IOC 4<sup>th</sup> Quarter CY 2025.

There are no significant software-related issues with this program at this time.

### History of Significant Developments Since Program Initiation

Date	Description
July 2009	Joint Requirements Oversight Council (JROC) approved the SDB II Capability Development Document (CDD).
August 2010	Defense Acquisition Executive (DAE) signed an Acquisition Decision Memorandum (ADM) authorizing the program to enter the Engineering and Manufacturing Development (EMD) phase and certified the program pursuant to section 2366b of Title 10, U.S. Code.
October 2010	DAE signed the Milestone (MS) B APB.
January 2011	Conducted the Critical Design Review (CDR). The office of the Deputy Assistant Secretary of Defense for Systems Engineering concluded that the CDR is complete and the SDB II Program is "well situated to continue into the System Capability and Manufacturing Process Demonstration Phase."
July 2012	First Guided Test Vehicle (GTV)-1 flight test.
November 2014	First Live Fire Test.
December 2014	Test, Analyze, and Fix (TAAF) testing complete, culminating over 18 months of testing that totaled 2,190 hours. TAAF demonstrated a reliability of 253 hours Mean Time Between Failure which surpassed the 250 hour requirement.
January 2015	JROC approved use of SDB II CDD in lieu of CPD for production MS C. They also formally added the AC-130 as an objective aircraft.
April 2015	Systems Verification Review.
June 2015	DAE signed the MS C ADM authorizing entrance into Low Rate Initial Production (LRIP).
June 2015	LRIP Lot 1 option exercised for the first 144 USAF weapons.
September 2015	DAE signed the MS C APB. The APB included updated F-15E Required Asset Available dates to account for previous program delays and to allow sufficient time for the remaining Developmental Testing and the upcoming Operational Testing.
September 2016	LRIP Lot 2 option exercised for 250 USAF weapons.
January 2017	LRIP Lot 3 option exercised for 312 USAF weapons.
February 2018	LRIP Lot 4 option exercised for 570 USAF and 90 Navy weapons.

May 2018	Completed Developmental Testing, including the 28-shot Government Confidence Testing.
October 2018	Follow-on Justification and Approval (J&A) signed for Other than Full and Open Competition for production beyond Lot 5, continuing sustainment and modernization.
November 2018	The first Production Reliability Incentive Demonstration flight test was completed.
December 2018	LRIP Lot 5 option exercised for 510 USAF and 750 Navy weapons.
January 2019	First FA-18E/F flight test.
April 2019	Updated APB was signed by the SAE and changed F-15E RAA threshold/objective dates to August 2019/August 2020.
May 2019	Completed Operational Testing (OT) mission scenarios.
September 2019	Completed OT Cybersecurity Testing.
September 2019	Declared a Significant Nunn-McCurdy breach for unit cost.
December 2019	Completed all OT requirements.
January 2020	Current APB updated to reflect new cost objectives following Significant Nunn-McCurdy.
September 2020	ACC/A5/8/9 authorized the fielding of the GBU-53/B, SDB II on the F-15E Strike Eagle.
October 2020	Lot 6, the first sole-source production contract, was awarded for 747 USAF, 461 Navy, and 20 Foreign Military Sales weapons.
June 2021	Six separations completed on the F-35 for initial F-35B Early Operational Capability (EOC) envelope.

## Schedule

### Schedule Events

Events	APB Change 2 (Current) 1/29/2020		Current Estimate 12/31/2021	Actual
	Objective	Threshold		
Milestone B Approval (MS B)	Aug 2010	Aug 2010	-	August 6, 2010
Milestone C Approval (MS C)	May 2015	May 2015	-	May 11, 2015
RAA for SDB II – Threshold Aircraft F-15E (IOC)	*	*	-	*
F-35C Initial Fielding	*	*	*	-
F-35B Initial Fielding	*	*	*	-
Full Rate Production (FRP Decision)	Apr 2022	Apr 2023	Dec 2022	-

### Schedule Notes:

Some of the Schedule Events and Issues for this program are Controlled Unclassified Information (CUI) and have been removed per paragraph (i) of title 10 United States Code 4351 which required the SAR be submitted without any designation relation to dissemination control.

### Significant Schedule Risks

Significant Schedule Risks	
Current Estimate (December 2021)	
1.	F-35 JPO notified SPO that SDB II IOC schedule for F-35B & C is slipping. Current OFP does not support SDB II operations. Working through established processes for official notification and APB update. FRP is tied to F-35 IOC.



# Performance

## Performance Attributes

APB Change 2 (Current) 1/29/2020		Demonstrated Performance	Current Estimate 12/31/2021
Objective	Threshold		
<b>Net Ready</b>			
<p>I) Support net-centric military operations: A) Mission: Positive weapon control during engagement of mobile (moving and stationary) targets enabled by digital communications as planned and/or event-driven. 1) Measure: Receipt of weapon control directives = less than or equal to 12 seconds (Link 16), Transmission of situation awareness messages = less than or equal to 30 seconds UHF. 2) Conditions: Secure and available communications (DoD Chief Information Officer net-centric attribute). B) Mission Activities: Enable target acquisition; Target tracking. 1) Measure: Link 16 Target location accuracy** = 60 meters TLE90 and UHF** = 100 meters TLE90. 2) Conditions: SWE and WE conditions. II) Enter and be managed in the network: A) Link 16 tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal performance = 99% availability; Messaging = MER of less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; Spectrum availability. B) Line-of-sight UHF tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal Performance = 99% availability; Messaging = MER less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; spectrum availability. III) Exchange Information: A) Link 16 weapon control: 1) Measure: Periodicity*** = less than or equal to 12 seconds; Timeliness**** = less than or</p>	<p>(T=O) I) Support net-centric military operations: A) Mission: Positive weapon control during engagement of mobile (moving and stationary) targets enabled by digital communications as planned and/or event-driven. 1) Measure: Receipt of weapon control directives = less than or equal to 12 seconds (Link 16), Transmission of situation awareness messages = less than or equal to 30 seconds UHF. 2) Conditions: Secure and available communications (DoD Chief Information Officer net-centric attribute). B) Mission Activities: Enable target acquisition; Target tracking. 1) Measure: Link 16 Target location accuracy** = 60 meters TLE90 and UHF** = 100 meters TLE90. 2) Conditions: SWE and WE conditions. II) Enter and be managed in the network: A) Link 16 tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal performance = 99% availability; Messaging = MER of less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; Spectrum availability. B) Line-of-sight UHF tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal Performance = 99% availability; Messaging = MER less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; spectrum availability. III) Exchange Information: A) Link 16 weapon control: 1) Measure: Periodicity*** = less than or equal to 12 seconds; Timeliness**** = less than or</p>	<p>The SDB II OFP versions 07.03.07 and 07.11.04 with TacNet v1.1 partially fulfills the interoperability requirements of the Joint Staff- certified Net- Ready KPP and approved architecture viewpoints contained in the Milestone C Information Support Plan (ISP). As of November 2, 2020, Joint Interoperability Test Command (JITC) certifies SDB II OFP versions 07.03.07 and 07.11.04 with conditions as described in Table 1 of the interoperability certification document. This certification is based on performing all joint critical tasks specified in the Milestone C ISP. This certification expires upon changes that affect interoperability or no later than 4 years from the date of issuance.</p>	<p>Support net-centric military operations: A) Mission: Positive weapon control during engagement of mobile (moving and stationary) targets enabled by digital communications as planned and/or event-driven. 1) Measure: Receipt of weapon control directives = less than or equal to 12 seconds (Link 16); Transmission of situation awareness messages = less than or equal to 30 seconds UHF. 2) Conditions: Secure and available communications (DoD Chief Information Officer net-centric attribute). B) Mission Activities: Enable target acquisition; Target tracking. 1) Measure: Link 16 Target location accuracy = 60 meters TLE90 and UHF** = 100 meters TLE90. 2) Conditions: SWE and WE conditions. II) Enter and be managed in the network: A) Link 16 tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal performance = 99% availability; Messaging =MER of less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; Spectrum availability. B) Line-of-sight UHF TDL network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal Performance = 99% availability; Messaging = MER less than or equal to 1%. 2) Conditions:</p>

<p>equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.56 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. B) UHF weapon control JTAC2: 1) Measure: Periodicity***** = less than or equal to 30 seconds; Timeliness***** = less than or equal to 6 seconds; Throughput***** = 16 kilobits per second; Size***** = 1.12 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. C) Link 16 precise participant location and identification TDL 1: 1) Measure: Periodicity***** = less than or equal to 12 seconds; Timeliness***** = less than or equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.315 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available.</p>	<p>equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.56 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. B) UHF weapon control JTAC2: 1) Measure: Periodicity***** = less than or equal to 30 seconds; Timeliness***** = less than or equal to 6 seconds; Throughput***** = 16 kilobits per second; Size***** = 1.12 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. C) Link 16 precise participant location and identification (TDL 1): 1) Measure: Periodicity***** = less than or equal to 12 seconds; Timeliness***** = less than or equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.315 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available.</p>		<p>Operational network; Type 1 encryption; spectrum availability. III) Exchange Information: A) Link 16 weapon control: 1) Measure: Periodicity = less than or equal to 12 seconds; Timeliness = less than or equal to 3 seconds; Throughput = 53.76 kilobits per second; Size = 0.56 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. B) UHF weapon control JTAC2: 1) Measure: Periodicity = less than or equal to 30 seconds; Timeliness = less than or equal to 6 seconds; Throughput = 16 kilobits per second; Size = 1.12 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. C) Link 16 precise participant location and identification (TDL 1): 1) Measure: Periodicity = less than or equal to 12 seconds; Timeliness = less than or equal to 3 seconds; Throughput = 53.76 kilobits per second; Size = 0.315 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. Demonstrated Performance The SDB II OFP versions 07.03.07 and 07.11.04 with TacNet v1.1 partially fulfills the interoperability requirements of the Joint Staff- certified Net- Ready KPP and approved architecture viewpoints contained in the Milestone C Information Support Plan (ISP). As of November 2, 2020, Joint Interoperability Test Command (JITC) certifies SDB II OFP versions 07.03.07 and 07.11.04 with conditions as described in Table 1 of the interoperability certification document. This certification</p>
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		<p>is based on performing all joint critical tasks specified in the Milestone C ISP. This certification expires upon changes that affect interoperability or no later than 4 years from the date of issuance.</p> <p>APB Change 2 (Current) 1/29/2020 Objective</p> <p>I) Support net-centric military operations: A) Mission: Positive weapon control during engagement of mobile (moving and stationary) targets enabled by digital communications as planned and/or event-driven. 1) Measure: Receipt of weapon control directives = less than or equal to 12 seconds (Link 16), Transmission of situation awareness messages = less than or equal to 30 seconds UHF. 2) Conditions: Secure and available communications (DoD Chief Information Officer net-centric attribute). B) Mission Activities: Enable target acquisition; Target tracking. 1) Measure: Link 16 Target location accuracy** = 60 meters TLE90 and UHF** = 100 meters TLE90. 2) Conditions: SWE and WE conditions. II) Enter and be managed in the network: A) Link 16 tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal performance = 99% availability; Messaging = MER of less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; Spectrum availability. B) Line-of-sight UHF tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal Performance = 99% availability; Messaging =</p>
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		<p>MER less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; spectrum availability. III) Exchange Information: A) Link 16 weapon control: 1) Measure: Periodicity*** = less than or equal to 12 seconds; Timeliness**** = less than or equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.56 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. B) UHF weapon control JTAC2: 1) Measure: Periodicity***** = less than or equal to 30 seconds; Timeliness***** = less than or equal to 6 seconds; Throughput***** = 16 kilobits per second; Size***** = 1.12 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. C) Link 16 precise participant location and identification TDL 1: 1) Measure: Periodicity***** = less than or equal to 12 seconds; Timeliness***** = less than or equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.315 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. Threshold (T=0) I) Support net-centric military operations: A) Mission: Positive weapon control during engagement of mobile (moving and stationary) targets enabled by digital communications as planned and/or event-driven. 1) Measure: Receipt of weapon control directives = less than or equal to 12 seconds (Link 16),</p>
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		<p>Transmission of situation awareness messages = less than or equal to 30 seconds UHF. 2) Conditions: Secure and available communications (DoD Chief Information Officer net-centric attribute). B) Mission Activities: Enable target acquisition; Target tracking. 1) Measure: Link 16 Target location accuracy** = 60 meters TLE90 and UHF** = 100 meters TLE90. 2) Conditions: SWE and WE conditions. II) Enter and be managed in the network: A) Link 16 tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal performance = 99% availability; Messaging = MER of less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; Spectrum availability. B) Line-of-sight UHF tactical data link network. 1) Measure: Time to fine synchronization = less than or equal to 60 seconds; Terminal Performance = 99% availability; Messaging = MER less than or equal to 1%. 2) Conditions: Operational network; Type 1 encryption; spectrum availability. III) Exchange Information: A) Link 16 weapon control: 1) Measure: Periodicity*** = less than or equal to 12 seconds; Timeliness**** = less than or equal to 3 seconds; Throughput***** = 53.76 kilobits per second; Size***** = 0.56 kilobits. 2) Conditions: Operational network; Type I encryption; Required spectrum is available. B) UHF weapon control JTAC2: 1) Measure: Periodicity***** = less than or equal to 30 seconds; Timeliness***** = less than or equal to 6 seconds; Throughput***** = 16</p>
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			<p>kilobits per second;                  Size***** = 1.12                  kilobits. 2) Conditions:                  Operational network; Type I                  encryption; Required                  spectrum is available. C) Link                  16 precise participant                  location and identification                  (TDL 1): 1) Measure:                  Periodicity***** =                  less than or equal to 12                  seconds;                  Timeliness***** =                  less than or equal to 3                  seconds; Throughput*****                  = 53.76 kilobits per second;                  Size***** = 0.315                  kilobits. 2) Conditions:                  Operational network; Type I                  encryption; Required                  spectrum is available.</p>
<b>Weapon Loadout</b>			
<p>Four SDB II weapons integrated onto the BRU-61/A. Aircraft will be able to carry and employ both SDB I and II weapons loaded on separate BRU-61/As during the same mission.</p>	<p>(T=O) Four SDB II weapons integrated onto the BRU-61/A. Aircraft will be able to carry and employ both SDB I and II weapons loaded on separate BRU-61/As during the same mission.</p>	<p>Performance has been demonstrated.</p>	<p>Four SDB II weapons integrated onto the BRU-61/A. Aircraft will be able to carry and employ both SDB I and II weapons loaded on separate BRU-61/As during the same mission.*</p>
<b>Weapon Effectiveness</b>			
<p>Given meeting the threshold of WE the SDB II will achieve a minimum PSSK of (O-3), when averaged over various environmental/threat condition cases listed in Appendix F of CDD for SDB II dated July 28, 2009. The JROC reviewed the CDD in lieu of the CPD on November 18, 2014, the JROC subsequently signed the memorandum on January 13, 2015.</p>	<p>SDB II will achieve a minimum PSSK of (T-3) for each target type (Table 6-1 of CDD for SDB II dated July 28, 2009) in each environmental/threat condition case listed in Appendix F of CDD for SDB II dated July 28, 2009. The JROC reviewed the CDD in lieu of the CPD on November 18, 2014, the JROC subsequently signed the memorandum on January 13, 2015.</p>	<p>DOT&amp;E assessed SDB II OT performance has not achieved a minimum PSSK of (T-3) for each target type (Table 6-1 of CDD for SDB II dated July 28, 2009) because the demonstrated Pe/r was significantly lower than predicted by Modeling and Simulation of each environment/threat condition case listed in Appendix F of CDD for SDB II dated July 28, 2009. The Program Office has evaluated the weapon</p>	<p>DOT&amp;E assessed SDB II OT performance has not achieved a minimum PSSK of (T-3) for each target type (Table 6-1 of CDD for SDB II dated July 28, 2009) because the demonstrated Pe/r was significantly lower than predicted by Modeling and Simulation of each environment/threat condition case listed in Appendix F of CDD for SDB II dated July 28, 2009. The Program Office has evaluated the weapon engagement failures and is pursuing algorithm improvements to mitigate. The Program Office implemented an updated OFP (7.12.03) correcting numerous OT issues and is working on future OFP</p>

		engagement failures and is pursuing algorithm improvements to mitigate. The Program Office implemented an updated OFP (7.12.03) correcting numerous OT issues and is working on future OFP updates to correct additional deficiencies. The JROC reviewed the CDD in lieu of the CPD on November 18, 2014, the JROC subsequently signed the memorandum on January 13, 2015.*	updates to correct additional deficiencies. The JROC reviewed the CDD in lieu of the CPD on November 18, 2014, the JROC subsequently signed the memorandum on January 13, 2015.*
<b>Carrier Operability (Navy Unique Requirement)</b>			
SDB II will be compatible with carrier operations without degrading other naval operations. Compatibility includes being capable of at least fifty catapult launches and forty-nine arrested landings; able to be transported, handled, stored, prepared, uploaded, and downloaded; and capable of operating in EMI, EMC, container immersion/washdown, salt fog/salt spray, explosive atmosphere, mechanical shock (i.e., near-miss, catapult launches/arrested landings, and handling shock), acoustic noise, vibration, fluid contamination, corrosive atmosphere, fungus, humidity, ice, and rain environments of aircraft carrier and replenishment ship operations.	(T=O) SDB II will be compatible with carrier operations without degrading other naval operations. Compatibility includes being capable of at least fifty catapult launches and forty-nine arrested landings; able to be transported, handled, stored, prepared, uploaded, and downloaded; and capable of operating in EMI, EMC, container immersion/washdown, salt fog/salt spray, explosive atmosphere, mechanical shock (i.e., near-miss, catapult launches/arrested landings, and handling shock), acoustic noise, vibration, fluid contamination, corrosive atmosphere, fungus, humidity, ice, and rain environments of aircraft carrier and replenishment ship operations.	Demonstrated performance data will be displayed when SDB II completes F-35C OT, AFOTEC provides the final report and analysis is completed.	SDB II will be compatible with carrier operations without degrading other naval operations. Compatibility includes being capable of at least fifty catapult launches and forty-nine arrested landings; able to be transported, handled, stored, prepared, uploaded, and downloaded; and capable of operating in EMI, EMC, container immersion/washdown, salt fog/salt spray, explosive atmosphere, mechanical shock (i.e., near-miss, catapult launches/arrested landings, and handling shock), acoustic noise, vibration, fluid contamination, corrosive atmosphere, fungus, humidity, ice, and rain environments of aircraft carrier and replenishment ship operations.*
<b>Scenario Weapon Effectiveness</b>			
Given SDB II weapon delivery from an objective platform	Given SDB II weapon delivery from a threshold aircraft	Given SDB II weapon delivery	Given SDB II weapon delivery from a threshold



<p>employing self targeting or an SDB II weapon delivery from a threshold or objective aircraft with third party targeting via an objective airborne platform (Paragraph 6.2.3.1.2 of CDD for SDB II dated July 28, 2009), the SDB II weapon will achieve a minimum PSSK of (OB-1) when averaged over all the target types contained in Table 6-1 of CDD for SDB II dated July 28, 2009. The Joint JROC reviewed the CDD in lieu of the CPD on November 18, 2014; the JROC subsequently signed the memorandum on January 13, 2015.</p>	<p>employing self targeting or a threshold aircraft delivering SDB II with third party targeting via a JTAC, the SDB II weapon will achieve a minimum PSSK of (T-1) when averaged over all the target types contained in Table 6-1 of CDD for SDB II dated July 28, 2009. The JROC reviewed the CDD in lieu of the CPD on November 18, 2014; the JROC subsequently signed the memorandum on January 13, 2015.</p>	<p>from a threshold aircraft employing self targeting or a threshold aircraft delivering SDB II with third party targeting via a JTAC, the SDB II weapon will achieve a minimum PSSK of (T-1) when averaged over all the target types contained in Table 6-1 of CDD for SDB II dated July 28, 2009.</p>	<p>aircraft employing self targeting or a threshold aircraft delivering SDB II with third party targeting via a JTAC, the SDB II weapon will achieve a minimum PSSK of (T-1) when averaged over all the target types contained in Table 6-1 of CDD for SDB II dated July 28, 2009. The JROC reviewed the CDD in lieu of the CPD on November 18, 2014; the JROC subsequently signed the memorandum on January 13, 2015.*</p>
<b>Material Availability</b>			
<p>Once 3,000 SDB II weapons are in the inventory, the Materiel Availability for SDB II will be no less than .95.</p>	<p>The Materiel Availability for SDB II will follow this graduated scale: Greater than 500 weapons in inventory - no less than .75 Greater than 1,000 weapons in inventory - no less than .80 Greater than 3,000 weapons in inventory - no less than .90.</p>	<p>93% availability with 851 USAF weapons in inventory.</p>	<p>The Materiel Availability for SDB II will follow this graduated scale: Greater than 500 weapons in inventory - no less than .75 Greater than 1,000 weapons in inventory - no less than .80 Greater than 3,000 weapons in inventory- no less than .90.*</p>

### Requirements Source

Miniature Munitions Capability ORD dated April 8, 2005, CDD dated July 28, 2009, and JROC Memorandum dated January 13, 2015



## Acquisition Budget Estimate

### Total Acquisition and Quantity

Category (\$M) Base Year: 2015	APB Change 2 (Current) 1/29/2020		Current Estimate PB 2023	
	Base Year Objective	Base Year Threshold	Base Year	Then Year
RDT&E	1,893.3	2,082.6	1,971.2	1,933.8
Procurement	2,956.8	3,252.5	3,164.9	3,937.79
MILCON	0.0	0.0		
O&M	0.0	0.0		
R&MF	-	-	-	-
Total Acquisition	4,850.1	-	5,136.2	
Program Acquisition Unit Cost	0.283	0.311	.299	.342
Average Procurement Unit Cost	0.174	0.191	.186	.232
<b>Program End-Item Quantity</b>				
Development	163	-	163	-
Procurement	17,000	-	17,000	-

### Budget Notes

Increase in base year dollars due to the effects of the changing expectations of price levels/purchasing power/inflation in the out-years (in no small part due to COVID-19). The procurement number increased more than the RDTE: because there are more dollars phased in years further out where the index factors get larger.

### Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Procurement Estimate (December 2021)	
The cost estimate includes risk dollars utilizing approved methods per the AF Cost Risk and Uncertainty Handbook. Risk dollars were applied across production lots at varying lower level work breakdown cost elements in accordance with the identified SDB II program schedule and technical risks. SDB II began LRIP in FY 2015.	
Note: This risk methodology does not reflect the program posture that incorporates the increased inventory objective or extended technology refresh, lot integration and test, and software improvement efforts, as the APB that reflects the November 2021 service cost position has yet to be approved.	
Current Baseline Estimate (January 2020)	
USD AT&L directed the SDB II Program to be funded to the Joint Service Cost Position estimate. The cost risk is the difference in the cost estimates and resource requirements, which total approximately TY \$181M	
Original Baseline Estimate (October 2010)	
USD AT&L directed the SDB II Program to be funded to the Joint Service Cost Position estimate. The cost risk is the difference in the cost estimates and resource requirements, which total approximately TY \$181M.	

## Unit Cost

### *Current Baseline Compared with Current Estimate*

Category (\$M) Base Year: 2015	Current Baseline 1/29/2020	Current Estimate PB 2023	% Change
<b>Program Acquisition Unit Cost</b>			
Acquisition Cost	4,850.1	5,136.2	-
Program Quantity	17,163	17,163	-
PAUC	0.283	.299	12.08%
<b>Average Procurement Unit Cost</b>			
Procurement Cost	2,956.8	3,164.9	-
Procurement Quantity	17,000	17,000	-
APUC	0.174	.186	6.39%

### *Original Baseline Compared with Current Estimate*

Category (\$M) Base Year: 2015	Original Baseline 10/8/2010	Current Estimate PB 2023	% Change
<b>Program Acquisition Unit Cost</b>			
Acquisition Cost	4,979.8	5,136.2	-
Program Quantity	17,163	17,163	-
PAUC	0.290	.299	3.10%
<b>Average Procurement Unit Cost</b>			
Procurement Cost	3,237.9	3,164.9	-
Quantity	17,000	17,000	-
APUC	0.190	.186	2.11%

### Status of Each Major Contract and Significant Factors Contributing to Cost and Schedule Variance; Projected Effects on Future Program Costs

See Contracts section for more details where applicable.

### Unit Cost Notes

Above values do not reflect the increase IO or the current November 2021 SCP. A new APB reflecting current program scope is in coordination. The SDB II program's updated SCP reflects an APUC of \$212K (BY 2015) and PAUC of \$291K (BY 2015), exceeding the current (January 2020) baseline estimates of \$174K (BY 2015) and \$283K (BY 2015) by 21.7% and 2.8%, respectively; resulting in cost growth that exceeds the Significant NMC breach parameter (15% or more). The updated APUC and PAUC remain 11.5% and 0.3% as compared to the original baseline estimates of \$190K (BY 2015) and \$290K (BY 2015), respectively.

### Impact to Schedule

On August 6, 2021, the F-35 JPO notified the SDB II program that full weapon integration on the F-35B/C was delayed until January 2025 due to aircraft software. The SAE issued an ADM on January 10, 2022 approving the increased procurement quantity of 26,610 total weapons, restructuring the SDB II F-35B/C IOC milestones to no earlier than January 2025 (objective) and no later than January 2026 (threshold), and also restructuring the SDB II FRP milestones to no earlier than April 2025 (objective) and no later than April 2026 (threshold).

## Impact to Performance

Not Applicable

## Impact to Future Contracts

The impacts to SDB II future contract is still unknown at this time

## Technologies and Systems Engineering

### *Significant Technical Risks*

Significant Technical Risks	
Current Estimate (December 2021)	
1.	There are no known risks with this program at this time.



## Contracts

Contract Identification								
Contract Number		FA8672-18-C-0010						
Contract Title		LRIP Lot 4						
CAGE		15090 – Raytheon Company						
City, State/Province		Tucson, AZ						
Order Number								
Strategy		FAR 15 (Negotiated)						
Contracting Office		FA8672						
Effort Identification								
Effort Number								
Type		Firm-Fixed-Price						
Latest Modification Date		September 20, 2021						
Latest Modification Number		14						
Technical Data Rights								
Supported Phase		Production						
Award Date		February 27, 2018						
Definitization Date		February 27, 2018						
Work Start Date		February 27, 2018						
Contract/Effort Price, Quantity, and Performance								
Initial Price (\$M)		Current Price (\$M)		Estimate at Completion (\$M)		Initial Quantity	Current Quantity	Delivered Quantity
Target	Ceiling	Target	Ceiling	Contractor	PM			
85.9	-	85.9	-	85.9	85.9	660	660	235
Work Completed (%)				N/A				
Cost Variance (\$M)				N/A				
Schedule Variance (\$M)				N/A				

## Contract Notes

The SDB II Lot 4 option was exercised on February 27, 2018 for 570 weapons, 398 single weapon containers, 126 dual weapon containers, 20 PRIDE captive vehicles, 20 PRIDE test vehicles and 45 weapon load crew trainers/conventional munitions maintenance trainers. The February 27, 2018 award was the result of a sole source acquisition as a follow-on to competition. On April 25, 2018 an additional 90 Navy weapons and 10 dual weapon containers were added for a total of 660 weapons (570 USAF, 90 DoN) and 136 dual weapon containers.



Contract Identification	
Contract Number	FA8672-19-C-0010
Contract Title	LRIP Lot 5
CAGE	15090 – Raytheon Company
City, State/Province	Tucson, AZ
Order Number	
Strategy	FAR 15 (Negotiated)
Contracting Office	FA8672
Effort Identification	
Effort Number	
Type	Firm-Fixed-Price
Latest Modification Date	October 19, 2021
Latest Modification Number	8
Technical Data Rights	
Supported Phase	Production
Award Date	December 18, 2018
Definitization Date	December 18, 2018
Work Start Date	December 18, 2018

Contract/Effort Price, Quantity, and Performance								
Initial Price (\$M)		Current Price (\$M)		Estimate at Completion (\$M)		Initial Quantity	Current Quantity	Delivered Quantity
Target	Ceiling	Target	Ceiling	Contractor	PM			
141.4	-	141.4	-	141.4	141.4	1,260	1,260	0
Work Completed (%)				N/A				
Cost Variance (\$M)				N/A				
Schedule Variance (\$M)				N/A				

## Contract Notes

The SDB II Lot 5 option was exercised on December 18, 2018 for 1,260 weapons, 389 single weapon containers, 344 dual weapon containers, 20 PRIDE captive vehicles, 20 PRIDE test vehicles and 36 weapon load crew trainers/conventional munitions maintenance trainers. The work is expected to be complete by December 31, 2021. The December 18, 2018 award was the result of a sole source acquisition as a follow-on to competition.

The contract was award via a Firm-Fixed-Price (FFP) arrangement; therefore, a number of data fields related to cost and incentive type contracts as well as EVM are not applicable, such as target price, ceiling price, contractor estimate at completion, CSSR, CPR, EV Completion, etc. The information provided in the non-applicable data fields is associated with the FFP value. Lot 5 weapon deliveries have been modified to June 2021 through April 2022.

Cost and Schedule Variance reporting is not required on this FPIF contract because an earned value management waiver was granted by the Principal Deputy Assistant Secretary of the Air Force for Acquisition on December 19, 2017 due to utilizing a firm fixed-price incentive (fixed target) contract type, in an effort to conform to the Better Buying Power initiative.

Contract Identification	
Contract Number	FA8672-20-C-0005
Contract Title	Lot 6
CAGE	15090 – Raytheon Company
City, State/Province	Tucson, AZ
Order Number	
Strategy	FAR 15 (Negotiated)
Contracting Office	FA8672
Effort Identification	
Effort Number	
Type	Fixed-Price Incentive (Firm Target)
Latest Modification Date	February 25, 2021
Latest Modification Number	3
Technical Data Rights	
Supported Phase	Production
Award Date	April 28, 2020
Definitization Date	October 15, 2020
Work Start Date	October 15, 2020

Contract/Effort Price, Quantity, and Performance								
Initial Price (\$M)		Current Price (\$M)		Estimate at Completion (\$M)		Initial Quantity	Current Quantity	Delivered Quantity
Target	Ceiling	Target	Ceiling	Contractor	PM			
285.1	292.3	285.1	292.3	292.3	292.3	1,228	1,228	0
Work Completed (%)				N/A				
Cost Variance (\$M)				N/A				
Schedule Variance (\$M)				N/A				

## Contract Notes

SDB II, GBU-53/B Lot 6 Fixed Price Incentive Firm (FPFI) definitization modification was awarded on October 15, 2020 for 1,228 weapons, 874 single weapon containers, 237 dual weapon containers, 5 PEST trainers, 40 guided test vehicle underbuilds, 10 CCRT test vehicles, and 55 weapon load crew trainers/conventional munitions maintenance trainers. The work is expected to be complete by February 28, 2023. The October 15, 2020 award was the result of a sole source acquisition as a follow-on to competition. Earned Value Management System (EVMS). The Program obtained an EVMS waiver for Lot 6 and 7, from former Service Executive for Acquisition on February 24, 2020, and therefore no EVMS reporting is required by the Contractor or Subcontractor. To provide insight into cost, schedule, and performance, the Contractor will submit Contract Funds Status Reports (CFSR) and Cost and Software Data Reporting (CSDR).

Contract Identification	
Contract Number	FA8672-21-C-0005
Contract Title	Lot 7
CAGE	15090 – Raytheon Company
City, State/Province	Tucson, AZ
Order Number	
Strategy	FAR 15 (Negotiated)
Contracting Office	FA8672
Effort Identification	
Effort Number	-
Type	Fixed-Price Incentive (Firm Target)
Latest Modification Date	October 28, 2021
Latest Modification Number	2
Technical Data Rights	
Supported Phase	Production
Award Date	April 29, 2021
Definitization Date	April 29, 2021
Work Start Date	April 29, 2021

Contract/Effort Price, Quantity, and Performance								
Initial Price (\$M)		Current Price (\$M)		Estimate at Completion (\$M)		Initial Quantity	Current Quantity	Delivered Quantity
Target	Ceiling	Target	Ceiling	Contractor	PM			
212.7	221.2	212.7	221.2	212.7	221.2	1,100	1,100	0
Work Completed (%)				-				
Cost Variance (\$M)				-				
Schedule Variance (\$M)				-				

## Contract Notes

SDB II, GBU-53/B Lot 7 FPIF contract award was executed April 29, 2021 for 1,100 weapons, 674 single weapon containers, and 113 dual weapon containers. The work is expected to be complete by February 29, 2024. The April 29, 2021 award was the result of a sole source acquisition as a follow-on to competition. The Program obtained an EVMS waiver for Lot 6 and 7, from former Service Executive for Acquisition on February 24, 2020, and therefore no EVMS reporting is required by the Contractor or Subcontractor. To provide insight into cost, schedule, and performance, the Contractor will submit CFSR and CSDR.



Contract Identification	
Contract Number	FA8672-21-C-0005
Contract Title	Lot 8
CAGE	15090 – Raytheon Company
City, State/Province	Tucson, AZ
Order Number	
Strategy	FAR 15 (Negotiated)
Contracting Office	FA8672
Effort Identification	
Effort Number	-
Type	Fixed-Price Incentive (Firm Target)
Latest Modification Date	January 24, 2022
Latest Modification Number	4
Technical Data Rights	
Supported Phase	Production
Award Date	September 28, 2021
Definitization Date	October 28, 2021
Work Start Date	October 28, 2021

Contract/Effort Price, Quantity, and Performance								
Initial Price (\$M)		Current Price (\$M)		Estimate at Completion (\$M)		Initial Quantity	Current Quantity	Delivered Quantity
Target	Ceiling	Target	Ceiling	Contractor	PM			
92.9	94.8	215.7	224.3	215.7	224.3	491	1,140	0
Work Completed (%)				N/A				
Cost Variance (\$M)				N/A				
Schedule Variance (\$M)				N/A				

## Contract Notes

SDB II, GBU-53/B Lot 8 FPIF contract modification, P00001, was executed on September 29, 2021, added option pricing for additional 1,140 weapons (976 USAF/164 USN), and 1,058 Containers (976 USAF/82 USN). Modification P00002 on October 28, 2021 exercised partial option for 491 USAF AURs and 491 USAF Single Weapon Containers. Modification P00003 on December 17, 2021 exercised partial option for 164 USN weapons and 82 Dual Weapon Containers. Modification P00004 on January 24, 2022 exercised partial option for remaining 485 USAF weapons and 485 Containers. Exercised option work to be complete by January 31, 2025 (USAF), and February 28, 2025 (USN). EVMS. The Program obtained an EVMS waiver, from former Service Executive for Acquisition on February 24, 2020, and therefore no EVMS reporting is required by the Contractor or Subcontractor. To provide insight into cost, schedule, and performance, the Contractor will submit CFSR and CSDR.



## Deliveries and Expenditures

### Deliveries

Quantities	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	163	163	163	100%
Procurement	2,481	2,481	17,000	15%
<b>Total</b>				

### Expended and Appropriated

Appropriation Category (\$M)	Then Year Appropriated Amount	Then Year Expended Amount
RDT&E	1,744.969	1,1645.516
Procurement	1,380.818	792.264
MILCON		
Acq O&M	2.901	751
Percent Expended		78
Year Appropriated to Date		17
Total Years Appropriate Funding (Current Baseline)		23
Percent Years Appropriated		74%

### Deliveries and Expenditures Notes

The Government does not take delivery of the 163 Developmental Test (DT) Assets and will not go to inventory. Total sustainment quantity (17,000) will be delivered to inventory.

### Low Rate Initial Production

	Initial Decision LRIP	Current Total LRIP
Approval Date	8/6/2020	6/4/2015
Approval LRIP Quantity	4,034	9,947
Approval Document Title	Milestone B ADM	Milestone C ADM
Start Year	2013	2015
End Year	2018	2022

The Current Total LRIP Quantity is more than 10% of the total production quantity due to a delay in the completion of OT and Evaluation caused by schedule revisions to the F-35 program, a threshold aircraft. Since the SDB II EMD contract award, the F-35 schedule has been further delayed, which requires an additional increase in the LRIP quantities to 9,947; this change was approved by the Milestone C ADM and accounts for max quantities in Lots 1-5 and most probable quantities in Lots 6-8. These quantities were necessary to provide production-configured or representative articles for OT, to establish an initial production base for the system, and to permit an orderly increase in the production rate for the system sufficient to lead to FRP.

## Operating and Support Costs

### *Operating and Support Cost Estimate*

Category (\$M) Base Year: 2015	SDB II Cost Estimate
Unit-Level Manpower	27.1
Unit Operations	0
Maintenance	191.1
Sustaining Support	411.2
Continued System Improvements	139.7
Indirect Support	0
Other	57.1
<b>Total O&amp;S</b>	<b>826.2</b>

### Cost Estimate Sources

**Type:** Program Office Estimate

**Approved by:** Air Force Cost Analysis Agency, November 10, 2020

**Notes:** O&S values are as of the last approved POE dated November 2020 and do not reflect the November 2021 Service Cost Position or the increased inventory objective of 26,610.

### *Operating and Support Estimate Compared with Baseline*

Category (\$M) Base Year: 2015	APB Change 2 (Current) 1/29/2020		Cost Estimate 12/31/2021	
	Base Year Objective	Base Year Threshold	Base Year	Then Year
Total O&S	782.6	860.9	826.3	1,297.8

### O&S Cost Notes

O&S Values are as of the last approved POE dated November 2020 and do not reflect the November 2021 Service Cost Position or the increased inventory objective of 26,610.