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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Air Force **Date:** May 2021

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,211.038	44.530	0.000	0.000	0.000	0.000	-	-	-	-	-	-
655191: <i>SDB Increment II</i>	1,211.038	44.530	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 439

**Note**

In FY 2021, PE 0604329F, BA05, Project Small Diameter Bomb(SDB)-EMD efforts were transferred to PE 0207327F, BA07, Project Small Diameter Bomb (SDB), due to SDB II completion of BA05: System Development & Demonstrations(SDD) SDB moved to Operational Systems Development BA07.

**A. Mission Description and Budget Item Justification**

GBU-53/B Small Diameter Bomb Increment II (SDB II) StormBreaker is a joint interest United States Air Force (USAF) and Department of Navy (DoN) Acquisition Category (ACAT) IC program, with the USAF as the lead service. SDB II addresses the following warfighter requirements: attack moving and stationary targets; adverse weather operations; multiple ordnance carriage; precision munitions capability; reduced munitions footprint; increased weapons effectiveness; minimized potential for collateral damage; reduced susceptibility of munitions to countermeasures; and provides a network-enabled weapon capability via Link-16 and Ultra High Frequency (UHF) weapon data link. SDB II is a key component of the Air Force Global Strike Task Force Concept of Operations (CONOPs). The threshold aircraft for the USAF is the F-15E, and the threshold aircraft for the DoN are the F-35B and F-35C. Objective aircraft include the F-22, F-16, F-35A, B-2, A-10, MQ-9, B-1, B-52, AC-130 and the F/A-18E/F. SDB II is compatible with the Bomb Rack Unit-61 (BRU-61) miniature munitions carriage, Type II carriage systems, the Container Numerical Unit-660/E (CNU-660/E) carriage system, the Common Munitions Built In Test (BIT)/Reprogramming Equipment (CMBRE), and the Joint Mission Planning System (JMPS). SDB II will develop and field a single weapon storage container (USAF) and a dual weapon storage container (DoN).

SDB II completed a competitive Risk Reduction in October 2009 and entered Milestone B Engineering and Manufacturing Development (EMD) in August 2010. A Fixed Price Incentive Firm EMD contract with five options for annual Low Rate Initial Production (LRIP) lots (FY15-FY19) was awarded in August 2010. SDB II received Milestone C approval to enter LRIP in June 2015 and completed an Acquisition Program Baseline update. Contract options for LRIP Lots 1-5 have been exercised. Initial Operational Test and Evaluation (IOT&E) started June 2018 and completed December 2019. SDB II was fielded for the F-15E in September 2020. Initial Operational Capability (IOC) for the DoN's F-35B and F-35C is scheduled for FY 2023 and is based on the F-35 B/C hardware and software modification schedule. DoN's first production lot (Lot 4/FY19) supports F/A-18E/F IOC.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.017M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

**UNCLASSIFIED**

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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	45.241	17.280	27.386	0.000	27.386
Current President's Budget	44.530	0.000	0.000	0.000	0.000
Total Adjustments	-0.711	-17.280	-27.386	0.000	-27.386
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.606	0.000			
• Other Adjustments	0.895	-17.280	-27.386	0.000	-27.386

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 655191: *SDB Increment II*

Congressional Add: *Precise Navigation*

Congressional Add: *SDB II Tech Refresh*

Congressional Add Subtotals for Project: 655191

Congressional Add Totals for all Projects

	<b>FY 2020</b>	<b>FY 2021</b>
	4.000	0.000
	10.000	0.000
Congressional Add Subtotals for Project: 655191	14.000	0.000
Congressional Add Totals for all Projects	14.000	0.000

**Change Summary Explanation**

FY21 and FY22 funding decreased as a result of PE 0604329F, BA05, Project Small Diameter Bomb(SDB)-EMD efforts being transferred to PE 0207327F, BA07, Project Small Diameter Bomb (SDB), due to SDB II completion of BA05: System Development & Demonstrations(SDD) SDB moved to Operational Systems Development BA07.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> SDB II Development and Engineering Changes	19.108	0.000	0.000
<b>Description:</b> Development activities to deliver capabilities in the SDB II Capability Development Document (CDD). Design, develop, integrate, model, test, and qualify engineering changes to SDB II baseline hardware and software to meet emerging threat, new technologies and to maintain compatibility with external systems. Activities include, but are not limited to, DoD-			

**UNCLASSIFIED**

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
mandated data link cryptographic modernization, program protection, exportability features, cyber security, advanced guidance, navigation and control, enhanced lethality, precise/advance navigation, and address obsolescence issues and affordability opportunities. Conduct trade studies and concept development for technology refresh redesigns as based on obsolescence forecasts.				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2022 Plans:</b> N/A				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> SDB II M-Code		11.422	0.000	0.000
<b>Description:</b> M-Code provides an enhanced anti-jam capability and secures access to military GPS signals. Activities include, but are not limited to, design, development, test and qualification of engineering changes to the SDB II system required for M-Code, and enhanced anti-jam capability. M-Code will provide the ability to operate in increasing adversarial anti-access/area-denial (A2/AD) jamming environments with increased accuracy, better signal acquisition, and enhanced security features.				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2022 Plans:</b> N/A				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> N/A				
<b>Accomplishments/Planned Programs Subtotals</b>		30.530	0.000	0.000
		<b>FY 2020</b>	<b>FY 2021</b>	
<b>Congressional Add:</b> Precise Navigation		4.000	0.000	
<b>FY 2020 Accomplishments:</b> Continue design, integration, test, and down-select candidate seeker-based algorithms suitable for operation in a GPS denied environment. Currently the program is integrating algorithms into the Integrated Flight Simulator (IFS) to initially characterize performance over various ranges and terrains.				

**UNCLASSIFIED**

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	FY 2020	FY 2021
Efforts anticipate Captive Flight Test (CFT) data collection, and subsequent evaluation of algorithm candidates' performances in order to down-select. <b>FY 2021 Plans:</b> N/A		
<b>Congressional Add:</b> SDB II Tech Refresh <b>FY 2020 Accomplishments:</b> The SDB II Tech Refresh thrust supports the Seeker Cost Reduction Initiative and is a multi-year initiative to increase system affordability, protect our ability to produce and operate, and increase weapon value for the warfighter. This includes, but may not be limited to, reducing the cost of the seeker and other components, subsystems, and assemblies within the weapon and associated system-of-systems; mitigating or responding to Diminishing Manufacturing Sources and Material Shortages (DMSMS); solidifying and/or increasing competition within the supplier industrial base; maximizing operational weapon effectiveness and value through capability enhancements and countering emerging threats; and improving supportability, handling, mission planning and human machine interface.  Conduct Analysis of Alternatives to evaluate redesign of the seeker and/or other components and subsystems within the weapon; evaluate supplier and assembly cost reduction; develop a technology roadmap for system affordability, predictability and operational improvements; analyze system requirements and conduct a Systems Requirements Review; mature key technologies and reduce risk for preferred alternatives; and develop and test software enhancements to provide near and/or longer term performance enhancements to maximize warfighter value for fielded or future weapons. Work may also extend beyond the weapon into the SDB II system-of-systems to improve operational effectiveness, operator reliability, aircraft integration, mission planning and human machine interface. <b>FY 2021 Plans:</b> N/A	10.000	0.000
<b>Congressional Adds Subtotals</b>	14.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• MPAF 02 Line Item SDB002: <i>Small Diameter Bomb II</i>	183.279	209.972	294.649	-	294.649	-	-	-	-	-	-
• RDTE 07 0207327F: <i>Small Diameter Bomb (SDB) - EMD</i>	-	20.780	27.109	-	27.109	-	-	-	-	-	-

**UNCLASSIFIED**

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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 PE 0604329N: <i>Small Diameter Bomb II</i>	44.372	55.275	42.297	-	42.297	-	-	-	-	-	-
• WPN Line Item 223800: <i>Small Diameter Bomb II</i>	108.452	7.824	80.575	-	80.575	-	-	-	-	-	-

**Remarks**

DoN RDT&E funds include F-35B and F-35C Integration and Support Cost.

**E. Acquisition Strategy**

The SDB II Engineering and Manufacturing Development (EMD) contract was awarded using competitive procedures. At the completion of the 42-month Risk Reduction phase in October 2009, one contractor was selected in April 2010 and awarded the EMD contract in August 2010. The EMD contract is a Fixed-Price Incentive Firm (FPIF) contract with priced production options for the first five production lots. SDB II production Lots 1-3 are FPIF. Production Lots 4-5 are firm fixed price. The Government is buying the SDB II based on the contractor System Performance Specification (SPS) which has been approved by the Government. The contractor is accountable for system performance as defined in the SPS and a system warranty as defined in the EMD contract and follow-on production contracts. Accordingly, the contractor is accountable to the Government for the design of the weapon system, as well as the planning and execution of the Development Test and Evaluation (DT&E) program to verify system performance. The Government formally arranges and funds the use of Government flight test support for DT&E and OT&E.

In September 2017, the Government awarded a sole source indefinite delivery indefinite quantity (IDIQ) contract to Raytheon Missile Systems to design, develop, integrate, model, test, and qualify engineering changes to SDB II baseline hardware and software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to M-Code GPS, data link cryptographic modernization, program protection, exportability features, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.

**UNCLASSIFIED**

**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / Small Diameter Bomb (SDB ) - EMD	<b>Project (Number/Name)</b> 655191 / SDB Increment II
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Risk Reduction Contract 1	C/CPFF	Boeing : St. Louis, MO	151.922	-		-		-		-		-	-	-	-
Risk Reduction Contract 2	C/CPFF	Raytheon : Tucson, AZ	150.800	-		-		-		-		-	-	-	-
EMD Contract	C/FPIF	Raytheon : Tucson, AZ	460.169	-		-		-		-		-	-	-	-
Engineering Changes & Technical Support	SS/ Various	Raytheon : Tucson, AZ	153.538	29.381	Dec 2019	-		-		-		-	-	-	136.520
M-Code Integration	SS/ Various	Raytheon : Tucson, AZ	49.712	11.422	Mar 2020	-		-		-		-	-	-	109.437
IMPACT High Pressure Air Compressor System	SS/FFP	Boeing : St. Charles, MO	3.175	-		-		-		-		-	-	-	-
F-15E Integration & Test Support	SS/ Various	Boeing : St. Louis, MO	52.116	1.027	Jun 2020	-		-		-		-	-	-	49.762
BRU-61/A Integration and Test Support	SS/ Various	Boeing : St. Louis, MO	8.529	-		-		-		-		-	-	-	-
Mission Planning	Various	Various : Various	5.732	-		-		-		-		-	-	-	5.832
Data Link Integration & Support	Various	Various : Various	3.004	-		-		-		-		-	-	-	-
System Performance & Lethality	Various	Various : Various	38.950	-		-		-		-		-	-	-	39.334
Other Product Development	Various	Various : Various	11.796	-		-		-		-		-	-	-	69.594
<b>Subtotal</b>			1,089.443	41.830		-		-		-		-	-	-	N/A

**Remarks**  
 Engineering Changes and Technical Support: upgrades to SDB II baseline hardware/software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to, data link cryptographic modernization, program protection, exportability, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.

The increase in F-15E Integration and Test Support in FY22 is due to the biennial weapon OFP update.

**UNCLASSIFIED**

**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> ) - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Other Government Costs	Various	Various : Various	6.376	0.000		-		-		-		-	-	-	8.201
<b>Subtotal</b>			6.376	0.000		-		-		-		-	-	-	N/A

**Remarks**  
Other Gov't Costs: Command & Control Infrastructure Integration subject matter expert (SME) support

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
DT&E	PO	96th Test Wing : Eglin AFB, FL	34.410	1.632	Dec 2019	-		-		-		-	-	-	33.725
DT&E: UTTR, WSMR	Various	Various : Various	10.304	-		-		-		-		-	-	-	-
Targets	Various	Various : Various	25.648	-		-		-		-		-	-	-	-
Other Test Support	Various	Various : Various	9.263	-		-		-		-		-	-	-	11.896
<b>Subtotal</b>			79.625	1.632		-		-		-		-	-	-	N/A

**Remarks**  
UTTR: Utah Test and Training Range  
WSMR: White Sands Missile Range

<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Engineering Professional Administrative Support Services (EPASS)	Various	Various : Eglin AFB, FL	24.008	0.750	Jun 2020	-		-		-		-	-	-	25.508

**UNCLASSIFIED**

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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA)	Various	Various : Eglin AFB, FL	11.586	0.318	Oct 2019	-		-		-		-	-	-	11.536
<b>Subtotal</b>			35.594	1.068		-		-		-		-	-	-	N/A

**Remarks**  
PMA: Other government costs (travel, Government Purchase Card (GPC), equipment supplies, and IT support)

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	1,211.038	44.530	0.000	-	-	-	-	-	N/A

**Remarks**  
Engineering Changes: upgrades to SDB II baseline hardware/software to meet emerging threats, maintain compatibility with external systems and improve system performance. Activities include, but are not limited to, data link cryptographic modernization, program protection, exportability, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.

FINANCIAL PERFORMANCE: SDB II is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. However, the SDB II LRIP contract is a FPIF contract with progress payments. A percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.



**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Air Force		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> ) - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>SDB Increment II</i></b>				
F-15E Integration & Test Support	2	2020	4	2022
M-Code Integration & Testing	1	2020	2	2025
Data Link Crypto Mod Integration & Testing	1	2020	4	2023
Integration & Testing on Threshold F-35B/C	1	2020	4	2023
Precision Navigation	1	2020	3	2022
SDB II Tech Refresh	4	2020	3	2021