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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force **Date:** February 2019

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>					R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	16.765	49.590	28.043	0.000	28.043	6.197	6.597	6.717	6.838	Continuing	Continuing
653133: <i>Bombs & Fuzes</i>	-	11.276	44.692	19.054	0.000	19.054	1.122	1.416	1.442	1.468	Continuing	Continuing
655361: <i>Stores-Aircraft Interface</i>	-	5.489	4.898	8.989	0.000	8.989	5.075	5.181	5.275	5.370	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Armament Ordnance Development program provides for the initial and continuing development of weapons, munitions, and munitions equipment for aircraft integration, support, and operational use. This program also provides for the development and integration of advanced position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). This program develops, characterizes, and improves current, future, and legacy munitions, ammunitions, and subsystems.

653133: The Bombs & Fuzes project improves conventional weapons/munitions (kinetic and non-kinetic), fuzes, and height-of-burst sensors (HOBS), and develops and integrates complementary position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). This project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes. Bombs & Fuzes provides research, development, and testing of conventional warheads, fuzing, HOBS modifications, and anti-personnel anti-materiel (APAM) weapons to improve lethality against area, mobile, hard and deeply buried, and fixed targets. This project provides for the development and testing necessary to provide a suitable manufacturing base of conventional warheads, fuzes, HOBS, and munitions materiel handling equipment (MMHE).

In FY2019, Joint Air-to-Ground Missile for Fixed Wing (JAGM-F) was a new start.

655361: The Stores-Aircraft Interface project conducts stores-aircraft interface upgrades and standards development to include the Universal Armament Interface (UAI). UAI is an Air Force initiative to develop standardized software interfaces in aircraft weapons and mission planning. The savings realized from this effort is on average 6 years of schedule and \$22M per aircraft/weapon combination. This is accomplished by enabling integration of weapons independent of aircraft Operational Flight Programs (OFP) cycles. UAI is currently implemented on the F-15E, F-16 Block 40/50 and European Participating Air Forces (EPAF) F-16 aircraft, Small Diameter Bomb (SDB) I and II, Joint Direct Attack Munition (JDAM), Laser JDAM, Joint Air-to-Surface Stand-off Missile (JASSM), and Precision Guided Munitions Planning Software (PGMPS). Planned implementation include Joint Strike Fighter (JSF/F-35), B-21, MQ-9, JASSM-Extended Range (JASSM-ER), F/A-18, Advanced Anti-Radiation Guided Missile - Extended Range (AARGM-ER), Combat Weapons Delivery Software (CWDS), SPEAR3, Joint Strike Missile (JSM), and the Turkish Stand Off Missile - Joint (SOM-J). The UAI program office is responsible for development and enhancement of the standard, support to coalition/allied/joint interoperability efforts for weapons-platform interface, provision of certification tools, and implementation support to aircraft and weapons.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Armament/Ordnance Development weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

UNCLASSIFIED

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As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.						
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. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		46.540	58.590	13.043	0.000	13.043
Current President's Budget		16.765	49.590	28.043	0.000	28.043
Total Adjustments		-29.775	-9.000	15.000	0.000	15.000
• Congressional General Reductions		0.000	0.000			
• Congressional Directed Reductions		-32.092	-9.000			
• Congressional Rescissions		0.000	0.000			
• Congressional Adds		0.000	0.000			
• Congressional Directed Transfers		0.000	0.000			
• Reprogrammings		2.793	0.000			
• SBIR/STTR Transfer		-0.476	0.000			
• Other Adjustments		0.000	0.000	15.000	0.000	15.000
Change Summary Explanation						
FY 2018, decrease of \$32.092M for Sensor Fuzed Weapon-ER, BPAC 651033.						
FY 2018, reprogrammed \$2.000M to BLU-134/B and \$0.794M to Universal Armament Interface (UAI).						
FY 2019, decrease of \$9.000M for JAGM-F.						
FY 2020, increase of \$11.000M for JAGM-F.						
FY 2020, increase of \$4.000M for UAI.						

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development				Project (Number/Name) 653133 / Bombs & Fuzes			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
653133: Bombs & Fuzes	-	11.276	44.692	19.054	0.000	19.054	1.122	1.416	1.442	1.468	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Bombs & Fuzes project improves conventional weapons/munitions (kinetic and non-kinetic), fuzes, and height-of-burst sensors (HOBS), and develops and integrates complementary position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). This project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes. Bombs & Fuzes provides research, development, and testing of conventional warheads, fuzing, HOBS modifications, and anti-personnel anti-materiel (APAM) weapons to improve lethality against area, mobile, hard and deeply buried, and fixed targets. This project provides for the development and testing necessary to provide a suitable manufacturing base of conventional warheads, fuzes, HOBS, and munitions materiel handling equipment (MMHE).

- Munitions Materiel Handling Equipment (MMHE): MMHE is a continuing project to develop and improve the standardization and commonality of munitions handling and armament equipment to preclude duplication. Efforts are primarily the study, design, and development of MMHE and armament control systems; however, support may be provided to other functional areas as requested. Procurement will be performed and funded by the applicable weapons system project.

- Medium Caliber Ammunition project assesses, refines, and develops medium caliber ammunition, to include, but not limited to, conducting 25mm (F-35) qualification testing, comparative testing, and mitigating ammunition inventory health issues.

- Insensitive Munitions (IM) project supports AF IM strategic planning to achieve IM compliance IAW U.S. Code, Title 10, Subtitle A, Part N, Chapter 141, Section 2389, ensuring safety regarding insensitive munitions. Models and validates munition performance, integrates less sensitive explosive fills, addresses IM explosive fill deficiencies, and develops bomb case modifications to improve the response of conventional weapons to unplanned stimuli. This project explores and develops IM solutions.

- Next Generation Area Attack Weapons (NGAAWs) are a family of unitary area attack weapon capabilities to meet the DoD policy regarding cluster munitions and unintended harm to civilians. They consist of BLU-134/B and BLU-136/B warheads with a height of burst sensor. BLU-134/B Improved Lethality Warhead (ILW), NGAAW Increment I, is a near-term solution for area attack as an anti-personnel anti-materiel (APAM) weapon that improves lethality using a 500 lb warhead design and any variants. The BLU-136/B NGAAW Increment II continues development to provide significantly increased capability and lethality against area targets as an APAM weapon. This effort is being executed using an accelerated acquisition strategy to study, design, develop, and test a 2,000 lb unitary warhead design and any variants based on target sets.

- Cockpit-selectable Height-Of-Burst Sensor (C-HOBS): The C-HOBS sensor will be a replacement for the current DSU-33D/B proximity sensor. C-HOBS will replace the single factory height-of-burst setting with the addition of multiple height-of-burst options selectable via both manual switches and a cockpit interface. These selection

UNCLASSIFIED

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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development	Project (Number/Name) 653133 / Bombs & Fuzes				
options allow flexibility during flight to address a wide array of targets. The C-HOBS is intended to interface with and provide a cockpit-selectable proximity function to general and special purpose weapons.						
- Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) is an improvement to the Army-led JAGM which will allow the missile to be released from fixed wing aircraft in order to eliminate time sensitive moving targets and high value covered/sheltered targets. JAGM-F will be able to combat adverse weather/low visibility battlefield and countermeasure environments as well as austere communication environments. JAGM-F will have the ability to engage multiple target types near-simultaneously in multiple engagement modes. Efforts include but are not limited to testing, qualification, and design/build demo components to production standards. Intent is to investigate meeting all BRU-55, BRU-57, and BRU-61 environments.						
In FY2019, Joint Air-to-Ground Missile for Fixed Wing (JAGM-F) was a new start.						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Munitions Materiel Handling Equipment (MMHE)		0.932	0.696	0.714	-	0.714
Description: Armament Standardization/Control/Munitions Materiel Handling Equipment (MMHE) is a continuing project to develop and improve the standardization and commonality of munitions handling and armament equipment to preclude duplication. Efforts are primarily the study, design, and development of MMHE and armament control systems; however, support may be provided to other functional areas as requested. Procurement will be performed and funded by the applicable weapons system project.						
FY 2019 Plans: Complete 20 MMHE support equipment projects to include engineering, drafting, proof load, technical data, and safety authorizations. Fabricate 15 prototypes for test and evaluation purposes. Complete 15 first article equipment fabrications for drafting verification and delivery to Air Force units for additional test and evaluation. Provide support to all system program offices with new weapons and aircraft configurations, as needed. Continue support to the F-35 program with equipment to aid safe munitions loading and handling of various pylons and adapters. Continue to support the B-21 program office with evaluations and recommendations for equipment to aid safe munitions loading and handling of various pylons and adapters. Continue support to DARPA with designs and manufacturing of equipment to aid safe munitions loading and handling of Hypersonic weapons. Continue support and sustainment of all previously existing items developed by the MMHE program office. Continue to provide MMHE Sustainment office at Robins AFB with engineering support.						
FY 2020 Base Plans: Complete MMHE support projects to include engineering, drafting, proof load, technical data, and safety authorizations. Fabricate prototypes for test and evaluation purposes. Complete first article equipment fabrications for drafting verification and delivery to Air Force units for additional test and evaluation. Provide						

UNCLASSIFIED

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Appropriation/Budget Activity 3600 / 5		R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development		Project (Number/Name) 653133 / Bombs & Fuzes		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
support to all system program offices with new weapons and aircraft configurations, as needed. Continue support to the F-35 program with equipment to aid safe munitions loading and handling of various pylons and adapters. Continue to support the B-21 program office with evaluations and recommendations for equipment to aid safe munitions loading and handling of various pylons and adapters. Continue support to DARPA with designs and manufacturing of equipment to aid safe munitions loading and handling of hypersonic weapons. Continue support for Air Force Research Laboratory on future munition concept demonstrators. Continue support and sustainment of all previously existing items developed by the MMHE program office. Continue to provide MMHE Sustainment office at Robins AFB with engineering support. FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to increase in MMHE projects.						
Title: Medium Caliber Ammunition Description: The Medium Caliber Ammunition efforts support the warfighter's medium caliber ammunition research, development, test, and evaluation (RDT&E) requirements, DoN/USAF collaboration for the medium caliber family of ammunition, foreign comparative testing, inventory health challenges, procurement of ammunition, and other emerging technologies. FY 2019 Plans: Provide engineering and technical support for PGU-48/B rounds as well as further comparative testing and engineering & manufacturing development (EMD) of alternative products/sources. Assess and mitigate Medium Caliber ammunition inventory health challenges. FY 2020 Base Plans: Continue to provide engineering and technical support for PGU-48/B rounds as well as further comparative testing/EMD of alternative products/sources. Initiate development of the 30mm replacement round. Assess and mitigate Medium Caliber ammunition inventory health challenges. FY 2019 to FY 2020 Increase/Decrease Statement: N/A		0.200	0.100	0.100	-	0.100
Title: Insensitive Munitions (IM) Description: Model and validate munition performance; assess and correct IM deficiencies; explore and develop new IM technology; conduct strategic IM planning for the AF; support Joint Service IM efforts; provide technical guidance and test expertise to AF IM programs.		0.300	0.300	0.300	-	0.300

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Execute the Insensitive Munitions Strategic Plan (IMSP) and Plan of Action and Milestones (POAM). Model and validate munition performance; support DoD and Joint Service IM planning; provide IM planning expertise to individual AF programs and continue to improve, characterize, and integrate less sensitive explosive fills; assess and correct identified IM explosive fill deficiencies; and develop bomb case modifications to improve the response of conventional weapons to unplanned stimuli.						
FY 2020 Base Plans: Execute the Insensitive Munitions Strategic Plan (IMSP) and Plan of Action and Milestones (POAM). Begin Phase II of the Liner project for the BLU-117 which includes engineering passive venting using IM features. Once features are implemented, qualification testing will take place.						
FY 2019 to FY 2020 Increase/Decrease Statement: N/A						
Title: BLU-136/B Next Generation Area Attack Weapon Increment II Description: The Next Generation Area Attack Weapon Increment II (NGAAW II) continues development of anti-personnel anti-materiel (APAM) weapons to improve lethality against area targets via an accelerated acquisition strategy. This effort studies, designs, develops, and tests a warhead design and any variants which significantly improve lethality against APAM while meeting current DoD policy on cluster munitions and unintended harm to civilians.		8.718	0.000	0.000	-	0.000
FY 2019 Plans: N/A						
FY 2020 Base Plans: N/A						
Title: BLU-134/B Improved Lethality Warhead (ILW), Next Generation Area Attack Weapon Inc I Description: This Next Generation Area Attack Weapon (NGAAW Inc I), formerly known as Improved Lethality (IL), continues and expands development planning and legacy warhead efforts in designing anti-personnel anti-materiel (APAM) weapons to improve lethality against area targets. This effort studies, designs, develops, and tests warhead and fuzing modifications which improve lethality against area targets while meeting current		0.331	0.000	0.000	-	0.000

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
DoD policy on cluster munitions and unintended harm to civilians. These improvements may be synergistic with maintaining a suitable manufacturing base.						
FY 2019 Plans: N/A						
FY 2020 Base Plans: N/A						
FY 2019 to FY 2020 Increase/Decrease Statement: N/A						
Title: Cockpit-Selectable Height-Of-Burst Sensor (C-HOBS)		0.795	21.000	6.940	-	6.940
Description: Cockpit-selectable Height-Of-Burst Sensor (C-HOBS). The C-HOBS sensor will be a replacement for the legacy DSU-33D/B proximity sensor. C-HOBS will replace the single factory height-of-burst setting with the addition of multiple height-of-burst options selectable via both manual switches and a cockpit interface. These selection options allow flexibility during flight to address a wide array of targets. The C-HOBS is intended to interface with the weapon via the cockpit and provide a cockpit-selectable proximity function for general and special purpose weapons.						
FY 2019 Plans: Continue design and development effort; design and initial qualification tests; and integration work. Conduct government/industry reviews working towards completion of Milestone B efforts. Evaluate production representative articles and prepare Initial Product Baseline and Product Support Plan. Initiate a CDR Assessment based on test results for the Milestone Decision Authority (MDA) in preparation of a LRIP Production Decision in FY20 with a Full Rate Production Decision in FY21.						
FY 2020 Base Plans: Continue to mature development; design and qualification tests; and integration work. Conduct government/industry reviews working towards completion of Milestone B efforts. Evaluate production representative articles and complete Initial Product Baseline and Product Support Plan. Complete a CDR Assessment based on test results for the Milestone Decision Authority (MDA) in preparation of a LRIP Production Decision with a Full Rate Production Decision in FY21.						
FY 2019 to FY 2020 Increase/Decrease Statement:						

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)							FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding decreased due to ramp down in development efforts.											
Title: Joint Air-to-Ground Missile for Fixed Wing (JAGM-F)							0.000	22.596	11.000	0.000	11.000
Description: Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) is an improvement to the Army-led JAGM which will allow the missile to be released from fixed wing aircraft in order to eliminate time sensitive moving targets and high value covered/sheltered targets. JAGM-F will be able to combat adverse weather/low visibility battlefield and countermeasure environments as well as austere communication environments. JAGM-F will have the ability to engage multiple targets types near-simultaneously in multiple engagement modes. Efforts include but are not limited to testing, qualification, and design/build demo components to production standards. Intent is to investigate meeting all BRU-55, BRU-57, and BRU-61 environments.											
FY 2019 Plans: Model the design and build, Jettison and Capture Analysis, Mechanical Design, Electronic Design and Testing, Electrical Packaging, software design and code development, weapons system integration, aircraft systems integration, test vehicle design and build, and test vehicle flight planning.											
FY 2020 Base Plans: Continue to model the design and build, Jettison and Capture Analysis, Mechanical Design, Electronic Design and Testing, Electrical Packaging, software design and code development, weapons system integration, aircraft systems integration, test vehicle design and build, and test vehicle flight planning. Purchase additional government furnished equipment (GFE) and flight test support.											
FY 2020 OCO Plans: N/A											
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased due to ramp down in development efforts.											
Accomplishments/Planned Programs Subtotals							11.276	44.692	19.054	0.000	19.054
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PAAF 01 Line Item 353020: General Purpose Bombs	341.501	811.170	0.000	631.194	631.194	1,106.037	896.535	905.658	484.254	Continuing	Continuing
• PAAF 01 Line Item 356120: Fuzes	60.369	180.691	0.000	158.889	158.889	226.259	163.565	168.021	140.557	Continuing	Continuing

UNCLASSIFIED

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Appropriation/Budget Activity 3600 / 5				R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development				Project (Number/Name) 653133 / Bombs & Fuzes				
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• PAAF 01 Line Item 352010: Cartridges	205.853	188.227	0.000	193.091	193.091	186.551	171.852	168.021	149.779	Continuing	Continuing	
Remarks												
D. Acquisition Strategy												
- Fuzes (including C-HOBS) is a continuing effort with most activities performed through contracted services.												
- Munitions Materiel Handling Equipment (MMHE) project activities are performed in-house with limited technical and analysis contract support.												
- Medium Caliber Ammunition project activities are performed in-house with technical and analysis contract support, organic government test support, and possible contracted services (small contracts).												
- Insensitive Munitions project activities are performed in-house with limited technical and analysis contract support.												
- The BLU-136/B NGAAW Inc II warhead design program will implement an accelerated acquisition program strategy. This strategy includes rapid development and prototyping of a warhead design resulting in a final, validated Technical Data Package (TDP). The TDP will be used to compete for initial production and follow on procurement to meet the warfighter requirement. The NGAAW program will continue to evaluate product improvements.												
- Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) will utilize the Defense Ordnance Technology Consortium (DOTC) contract combined with modeling and simulation contract support and government test support.												
E. Performance Metrics												
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.												

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development				Project (Number/Name) 653133 / Bombs & Fuzes					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
IM	Various	Various : TBD	-	0.300	Mar 2018	0.300	Mar 2019	0.300	Mar 2020	-		0.300	Continuing	Continuing	-
MMHE - Prototypes	Various	Prototype Fabrication Shop : Eglin AFB, FL	-	0.322	Apr 2018	0.086	Apr 2019	0.134	Apr 2020	-		0.134	Continuing	Continuing	-
BLU-134/B / BLU-136 ILW - NGAAW Concept Development	Various	Various : Eglin AFB, FL	-	4.703	Aug 2018	-		-		-		-	Continuing	Continuing	-
CHOBS - HW/SW	C/Various	Various : Eglin AFB, FL	-	0.500	Jan 2019	16.385	Mar 2019	3.440	Dec 2019	-		3.440	Continuing	Continuing	-
JAGM-F	C/FFP	DOTC : Huntsville, AL	-	0.000		20.217	Feb 2019	7.396	Oct 2019	0.000		7.396	Continuing	Continuing	-
Subtotal			-	5.825		36.988		11.270		0.000		11.270	Continuing	Continuing	N/A
Remarks															
NGAAW concept development continues.															
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MMHE - Shipping/Supplies	Various	MMHE Program Office : Eglin AFB, FL	-	0.130	Mar 2018	0.130	Mar 2019	0.130	Mar 2020	-		0.130	Continuing	Continuing	-
JAGM-F - Government Furnished Equipment	C/TBD	Army : Huntsville, AL	-	-		0.560	Apr 2019	1.549	Dec 2019	-		1.549	Continuing	Continuing	-
Subtotal			-	0.130		0.690		1.679		-		1.679	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
BLU-134/B / BLU-136 ILW - Test and Evaluation	PO	Various : Various	-	3.525	Aug 2018	-		-		-		-	Continuing	Continuing	6.530

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development				Project (Number/Name) 653133 / Bombs & Fuzes					
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
CHOBS - Test and Evaluation	C/Various	Various : Various	-	-		2.700	Mar 2019	3.000	Jul 2020	-		3.000	Continuing	Continuing	-
MMHE - Test Support	PO	96 TW : Eglin AFB, FL	-	0.040	Apr 2018	0.040	Apr 2019	0.050	Nov 2019	-		0.050	Continuing	Continuing	-
JAGM-F - Test Support	PO	Various : Various	-	-		1.489	Mar 2019	1.624	Dec 2019	-		1.624	Continuing	Continuing	-
Subtotal			-	3.565		4.229		4.674		-		4.674	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Medium Caliber - PMA	Various	Various : Eglin AFB, FL	-	0.200	Jun 2018	0.100	Jun 2019	0.100	Jun 2020	-		0.100	Continuing	Continuing	-
MMHE - PMA	Various	Various : Eglin AFB, FL	-	0.440	Jun 2018	0.440	Jun 2019	0.400	Jun 2020	-		0.400	Continuing	Continuing	-
BLU-134/B / BLU-136/B - PMA	Various	Various : NV	-	0.821	Jul 2018	-		-		-		-	Continuing	Continuing	-
CHOBS - PMA	Various	Various : Eglin AFB, FL	-	0.295	Jul 2018	1.915	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	-
JAGM-F - PMA	Various	Various : Eglin AFB, FL	-	-		0.330	Mar 2019	0.431	Oct 2019	-		0.431	Continuing	Continuing	-
Subtotal			-	1.756		2.785		1.431		-		1.431	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	11.276		44.692		19.054		0.000		19.054	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
Appropriation/Budget Activity 3600 / 5		R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>			Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Bombs and Fuzes</i>																												
Munitions Materiel Handling Equipment (MMHE): design, prototype, test priority MMHE projects																												
Execute IMSP POAM																												
BLU-134/B ILW Mold Design, Build, Test																												
BLU-136/B- Warhead Design / Initial Prototype																												
CHOBS - RFP/Contract Prep/Source Selection																												
CHOBS - Contract Award																												
CHOBS - Design, Build, Test, and Integration																												
Medium Caliber Ammunition: Assess, refine and develop medium caliber ammunition																												
JAGM-F - Contract Award																												
JAGM-F - Design, Build, Test, and Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Bombs and Fuzes</i>				
Munitions Materiel Handling Equipment (MMHE): design, prototype, test priority MMHE projects	1	2018	4	2024
Execute IMSP POAM	1	2018	4	2024
BLU-134/B ILW Mold Design, Build, Test	1	2018	3	2018
BLU-136/B- Warhead Design / Initial Prototype	1	2018	4	2019
CHOBS - RFP/Contract Prep/Source Selection	1	2018	2	2019
CHOBS - Contract Award	2	2019	2	2019
CHOBS - Design, Build, Test, and Integration	2	2019	2	2021
Medium Caliber Ammunition: Assess, refine and develop medium caliber ammunition	1	2018	4	2024
JAGM-F - Contract Award	2	2019	2	2019
JAGM-F - Design, Build, Test, and Integration	2	2019	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development				Project (Number/Name) 655361 / Stores-Aircraft Interface			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
655361: Stores-Aircraft Interface	-	5.489	4.898	8.989	0.000	8.989	5.075	5.181	5.275	5.370	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Stores-Aircraft Interface project conducts stores-aircraft interface upgrades and standards development to include the Universal Armament Interface (UAI). UAI is an Air Force initiative to develop standardized software interfaces in aircraft weapons and mission planning. The savings realized from this effort is on average 6 years of schedule and \$22M per aircraft/weapon combination. This is accomplished by enabling integration of weapons independent of aircraft Operational Flight Programs (OFP) cycles. UAI is currently implemented on the F-15E, F-16 Block 40/50 and European Participating Air Forces (EPAF) F-16 aircraft, Small Diameter Bomb (SDB) I and II, Joint Direct Attack Munition (JDAM), Laser JDAM, Joint Air-to-Surface Stand-off Missile (JASSM), and Precision Guided Munitions Planning Software (PGMPS). Planned implementation include Joint Strike Fighter (JSF/F-35), B-21, MQ-9, JASSM-Extended Range (JASSM-ER), F/A-18, Advanced Anti-Radiation Guided Missile - Extended Range (AARGM-ER), Combat Weapons Delivery Software (CWDS), SPEAR3, Joint Strike Missile (JSM), and the Turkish Stand Off Missile - Joint (SOM-J). The UAI program office is responsible for development and enhancement of the standard, support to coalition/allied/joint interoperability efforts for weapons-platform interface, provision of certification tools, and implementation support to aircraft and weapons.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Universal Armament Interface (UAI) Development	5.489	4.898	8.989	-	8.989
Description: Conduct stores-aircraft interface upgrades and standards development to the Universal Armament Interface (UAI); development and maintenance to the UAI; and facilitation of aircraft, stores, and mission planning program users in the UAI process.					
FY 2019 Plans: Continue development and configuration management of UAI standards in response to new users and evolving requirements including but not limited to F-35, JASSM-ER, CWDS, F/A-18, B-21, PGMPS, MQ-9, AARGM-ER and Army & Navy UAVs and stores. Support working group management, technical meetings and workshops, risk reduction assessments, common mission planning, and support platform-specific implementation of UAI. Continue maintenance of existing certification tools to meet F-35, SDB II, F/A-18, B-21, AARGM-ER, MQ-9, JSM, SPEAR3, SOM-J and other future user system integration lab test certification needs. These tools are shared among aircraft and weapons programs to reduce time and cost for UAI integration efforts. Support multinational Memorandum of Understanding including but not limited to Joint Strike Missile (JSM), SPEAR 3, and Stand Off Missile - Joint (SOM-J).					
FY 2020 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force				Date: February 2019		
Appropriation/Budget Activity 3600 / 5		R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>		Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>		
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue development and configuration management of UAI in response to evolving requirements including but not limited to F-35, JASSM-ER, SDB II, F/A-18, B-21, AARGM-ER, PGMPs, MQ-9 and Army & Navy UAVs and stores. Support working groups, technical meetings and workshops, risk reduction assessments, common mission planning, and platform-specific implementation of UAI. Maintain existing certification tools to meet current and future user system integration lab test certification needs. These tools are shared among aircraft and weapons programs to reduce time and cost for UAI integration efforts. Support multinational Memorandum of Understanding including but not limited to Joint Strike Missile (JSM), SPEAR 3, and Stand Off Missile - Joint (SOM-J). <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Increase in funding for FY20 will be used for ongoing efforts to address planned/required interface capabilities. This will enable UAI to be responsive to technology changes, staving off obsolescence, and enable the UAI PO/industry team to support programs (F-35 Blk 4, B-21, MQ-9, AARGM) during critical stages of implementation, minimizing potential schedule slips and increased costs.						
Accomplishments/Planned Programs Subtotals		5.489	4.898	8.989	-	8.989
C. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						
N/A						
D. Acquisition Strategy						
In December 2004, under the authority of a class Justification and Approval (J&A), the UAI program office awarded individual Cost Plus Fixed Fee (CPFF) contracts to Boeing, Lockheed Martin, Northrop Grumman, and Raytheon. Each Original Equipment Manufacturer is responsible for a different piece of the total UAI requirement based on its product-specific (platform/weapon) expertise. During FY10, these contracts expired. Under the authority of the class J&A, Cost Plus Incentive Fee (CPIF) contracts were awarded to the four UAI vendors in August 2010. Follow-on period of performance was awarded in March 2014 for 16 months to better align future contract awards with funding through the Future Years Defense Program. The period of performance was extended to 1 November 2015 to allow immediate start of the effort on F-35/JSF request for changes. A new J&A was approved in January 2015 for the follow-on sole source contracts to the original equipment manufacturers. These new sole-source contracts were awarded in November 2015 and will expire in November 2019. A new J&A was signed in December 2018 and the RFP for a follow-on sole source 5 year contract was released in February 2019.						

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development				Project (Number/Name) 655361 / Stores-Aircraft Interface					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Interface Control Document (ICD) Development/Updates/Maintenance	SS/ Various	Boeing Northrop Grumman Lockheed Martin Raytheon : Various	-	4.525	Nov 2017	4.698	Nov 2018	8.789	Nov 2019	-		8.789	Continuing	Continuing	-
Certification Tool	SS/CPFF	Boeing Northrop Grumman Lockheed Martin Raytheon : Various	-	0.764	Sep 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			-	5.289		4.698		8.789		-		8.789	Continuing	Continuing	N/A
Remarks New 5 year Follow-on contract will be awarded in November 2019.															
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Administration/Program Support	Various	Various : Various	-	0.200		0.200		0.200		-		0.200	Continuing	Continuing	-
Subtotal			-	0.200		0.200		0.200		-		0.200	Continuing	Continuing	N/A
Remarks PE Systems Contractor provides support to the Program Office for financial services.															
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	5.489		4.898		8.989		-		8.989	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
Appropriation/Budget Activity 3600 / 5		R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>			Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Stores-Aircraft Interface</i>																												
ICD Development/Governance (SJICWG)																												
Certification Tools (CTs) Dev / Update																												
UAI (Msn Plng) Common Component																												
F-16																												
JDAM, S/W Regression																												
JASSM-ER, Development Rev 4																												
SDB I & II, S/W Regression																												
F-35, Fielding Rev 4 (Program funded)																												
B-21, Development (Program funded)																												
MQ-9, Development																												
GW, Development																												
SiAW, Development																												
AARGMER, Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Stores-Aircraft Interface</i>				
ICD Development/Governance (SJICWG)	1	2018	4	2024
Certification Tools (CTs) Dev / Update	1	2018	4	2024
UAI (Msn Plng) Common Component	1	2018	4	2024
F-16	1	2018	4	2024
JDAM, S/W Regression	1	2018	4	2024
JASSM-ER, Development Rev 4	1	2018	4	2024
SDB I & II, S/W Regression	1	2018	4	2024
F-35, Fielding Rev 4 (Program funded)	1	2018	4	2024
B-21, Development (Program funded)	1	2018	4	2024
MQ-9, Development	1	2018	4	2024
GW, Development	1	2018	4	2024
SiAW, Development	1	2018	4	2024
AARGMER, Development	1	2018	4	2024