

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 3: Advanced Technology Development (ATD)					<b>R-1 Program Element (Number/Name)</b> PE 0603601F I Conventional Weapons Technology							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	41.385	43.036	102.009	0.000	102.009	155.804	180.370	259.366	204.802	Continuing	Continuing
63670A: <i>Weapon Technology Development</i>	-	41.385	43.036	60.509	0.000	60.509	74.604	76.470	47.366	53.002	Continuing	Continuing
63670B: <i>Weapon Concept Development</i>	-	0.000	0.000	41.500	0.000	41.500	81.200	103.900	212.000	151.800	Continuing	Continuing

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

This program develops, integrates, and demonstrates advanced ordnance and guidance technologies for air-launched conventional weapons. The program focuses on conventional ordnance component technologies such as warheads, fuzes, and explosives, as well as munition guidance component technologies such as navigation and control systems and seekers. Technologies to be developed, demonstrated, and integrated into system concepts will address blast, fragmentation, penetration, low-collateral damage, variable depth/location fuzing, precise guidance, and high performance and insensitive explosives. This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and integration of these subsystems and components into system concepts for field experiments and/or tests in a simulated environment. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
Previous President's Budget	42.046	48.536	45.401	0.000	45.401
Current President's Budget	41.385	43.036	102.009	0.000	102.009
Total Adjustments	-0.661	-5.500	56.608	0.000	56.608
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-5.500			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.025	0.000			
• SBIR/STTR Transfer	-0.686	0.000			
• Other Adjustments	0.000	0.000	56.608	0.000	56.608

**Change Summary Explanation**

Decrease in FY 2016 due to Congressional Directed Reduction for improving funds management: forward financing.

Increase in FY 2017 due to increased emphasis on distributed fuzing technologies, long range strike weapon technology demonstrations, and missile technology demonstrations.

**UNCLASSIFIED**

**Exhibit R-2A, RDT&E Project Justification:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603601F / <i>Conventional Weapons Technology</i>	<b>Project (Number/Name)</b> 63670A / <i>Weapon Technology Development</i>
--	--	---

COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
63670A: <i>Weapon Technology Development</i>	-	41.385	43.036	60.509	0.000	60.509	74.604	76.470	47.366	53.002	Continuing	Continuing

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

This project develops, matures, assesses, and demonstrates advanced/innovative ordnance and guidance component and subsystem technologies for air-launched conventional weapons. The project focuses on maturation of advanced explosives, fuzes, warheads, submunitions, and weapon airframes, carriage and dispensing; as well as innovative munition seekers, weapon aerodynamics, navigation and control, and guidance subsystem integration/simulation.

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

	FY 2015	FY 2016	FY 2017
<p><b>Title:</b> Ordnance Technologies</p> <p><b>Description:</b> Develop advanced ordnance technologies for conventional, air-delivered munitions. Specific technical areas of focus include fuzes, energetic materials, and warheads.</p> <p><b>FY 2015 Accomplishments:</b> Demonstrated precision height-of-burst technologies for tailored fragmentation thereby limiting collateral damage. Quantified lethality through near field barriers, i.e., within a flight vehicle for fragmenting weapons. Developed embedded fuze components to withstand the shock occurring as a result of weapon impact into hardened targets. Developed and assessed ordnance technologies that enable high-speed strike weapon concepts. Designed innovative compartmented weapon to allow directional control of weapon fragments.</p> <p><b>FY 2016 Plans:</b> Continue to mature alternate fuzing technologies to increase the reliability of penetrating weapons. Continue to develop and assess ordnance technologies that enable high-speed strike weapon concepts. Develop ordnance technologies that enable general purpose warheads that are lethal across an ever increasing spectrum of targets with the aim of a simplified family of warheads.</p> <p><b>FY 2017 Plans:</b> Increase emphasis in maturing distributed fuzing concepts for close-controlled strike, area attack, and penetration applications, including assessing long term safety, survivability and functionality over time. Continue to advance ordnance technologies to allow tailored lethality by controlling weapon fragmentation. Increase emphasis in developing and demonstrating ordnance technologies that enable high-speed strike weapon concepts. Develop test capabilities and analysis tools to evaluate ordnance technologies in relevant environments. Develop ordnance technologies for survivability at high speed impacts.</p>	9.418	8.252	34.000
<p><b>Title:</b> Guidance Technologies</p>	7.956	11.051	26.509

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603601F / <i>Conventional Weapons Technology</i>	<b>Project (Number/Name)</b> 63670A / <i>Weapon Technology Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p><b>Description:</b> Develop guidance technologies to improve the precision, controlled lethality and flexibility of conventional, air-delivered munitions. Specific technical areas include precision navigation and terminal seekers.</p> <p><b>FY 2015 Accomplishments:</b> Completed the initial trade study for low cost non-gimbaled seeker for agile engagements of platform threats. Conducted wind tunnel testing to characterize propulsion systems for next generation air-to-air weapons. Applied new in-house developed aero- and structural-thermal tools to high speed conceptual weapon design and assessment. Built government-industry consortium and created beta architecture for open design of weapons that will allow software defined weapons, rapid tech refresh of weapons, and increased innovation. Developed the preliminary concept, interface definition, and performance specifications for a tri-mode scene generation capability which will support the design, development, and analysis of advanced weapon concepts in representative environments.</p> <p><b>FY 2016 Plans:</b> Continue to develop and assess technologies capable of guiding a high-speed strike weapon characterized by very high terminal speed and high end-game maneuverability. Continue to explore alternative guidance and control concepts that enable an improved air-to-air missile. Continue design and development of seeker subsystem prototypes for platform self-defense.</p> <p><b>FY 2017 Plans:</b> Conduct wind-tunnel and limited flight experiments to characterize air-to-air guidance and control. Increase emphasis on integrated hardware and software-in-the-loop demonstrations of high speed weapon technologies. Increase emphasis in developing advanced modular and service oriented weapon architectures. Continue design and development of seeker subsystem prototypes for platform self-defense. Develop projector and common scene generator technologies for design, development, and analysis of advanced weapon concepts in representative environments for assets networked and operating in future battle spaces. Develop technologies for precision navigation of weapons.</p>			
<p><b>Title:</b> Advanced Munition Concept Technologies</p> <p><b>Description:</b> Demonstrate advanced conventional munitions concepts. These innovative concepts integrate ordnance, guidance, and carriage and release technologies to demonstrate warfighter capability.</p> <p><b>FY 2015 Accomplishments:</b> Conducted System Requirements Reviews for the demonstration of hypersonic airbreathing and boost-glide weapon concepts. Updated Modeling, Simulation and Analysis tools for guidance, control, and endgame maneuver in hypersonic flight regimes. Developed innovative warhead concepts for hypersonic airframes and initiated structural and lethality analyses. Continued development of concepts for cooperative control of small weapons to increase the capacity and capability of fifth-generation aircraft. Began development of a simulation test bed to validate Open System Architecture interfaces and system designs.</p>	24.011	23.733	0.000

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603601F / <i>Conventional Weapons Technology</i>	<b>Project (Number/Name)</b> 63670A / <i>Weapon Technology Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>Created high-fidelity network simulation for an affordable, compact, and secure weapon data link. Initiated development of testbed for experimentation with cooperative control algorithms. Tested additively manufactured steel fragment flexible weapon warhead liners and warheads to evaluate improvements in fragmentation lethality. Completed analysis (engagement, mission, and campaign-level, as well as lethality, survivability, and logistics) to inform technology development of small weapons concepts.</p> <p><b>FY 2016 Plans:</b> Continue to conduct relevant long range strike weapon technology demonstration to reduce risk for a potential follow on acquisition program. Continue the development of a munition concept to incorporate technologies for carriage and terminal impact at high speed. Continue investigating concepts for cooperative control of small weapons to produce scalable effects to increase the capacity and capability of fifth generation aircraft. Continue to demonstrate the ability to articulate the trades and synergies of kinetic energy and directed energy weapons by incorporating higher fidelity methodologies into systems level analysis, including joint weapons effectiveness. Demonstrate weapon integration concept for air target engagement.</p> <p><b>FY 2017 Plans:</b> Starting in FY 2017 and beyond, work accomplished under this effort will be reported in Project 63670B, Weapon Concept Development.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	41.385	43.036	60.509

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**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-2A, RDT&E Project Justification:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603601F / <i>Conventional Weapons Technology</i>	<b>Project (Number/Name)</b> 63670B / <i>Weapon Concept Development</i>
--	--	--

COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
63670B: <i>Weapon Concept Development</i>	-	0.000	0.000	41.500	0.000	41.500	81.200	103.900	212.000	151.800	Continuing	Continuing

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

Starting in FY 2017, Project 63670B, Weapon Concept Development, was created and activities were re-aligned from Project 63670A, Conventional Weapons Development, under the effort, Advanced Munition Concept Technologies. In order to further focus this new Project, two efforts were created under it: Air-to-Air Concept Development and Air-to-Ground Concept Development. This project will develop, refine, and integrate ordnance and guidance technologies into demonstrations to reduce risk for potential air-launched conventional weapons acquisitions.

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

	FY 2015	FY 2016	FY 2017
<p><b>Title:</b> Air-to-Air Concept Development</p> <p><b>Description:</b> Mature, integrate, and demonstrate air-to-air weapon components and systems (ordnance, guidance, and carriage and release technologies) to demonstrate warfighter capability.</p> <p><b>FY 2015 Accomplishments:</b> N/A</p> <p><b>FY 2016 Plans:</b> N/A</p> <p><b>FY 2017 Plans:</b> For FY 2015 and FY 2016, the work for this effort originally was performed under Project 63670A, Weapon Technology Development, in the effort, Advanced Munition Concept Technologies.</p> <p>Continue to demonstrate weapon integration concept for air target engagement. Continue planning and technology risk reduction for weapon concepts responsive to the 2030 timeframe threat environment (including, air-to-air weapons for both offensive and defensive purposes). Continue to mature simulation architectures to assess the trades and synergies between kinetic and directed energy weapons. Continue to incorporate higher fidelity methodologies into systems level analysis including joint weapons effectiveness.</p>	0.000	0.000	5.000
<p><b>Title:</b> Air-to-Ground Concept Development</p> <p><b>Description:</b> Mature, integrate, and demonstrate air-to-ground weapon components and systems (ordnance, guidance, and carriage and release technologies) to demonstrate warfighter capability.</p>	0.000	0.000	36.500

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603601F / <i>Conventional Weapons Technology</i>	<b>Project (Number/Name)</b> 63670B / <i>Weapon Concept Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p><b><i>FY 2015 Accomplishments:</i></b> N/A</p> <p><b><i>FY 2016 Plans:</i></b> N/A</p> <p><b><i>FY 2017 Plans:</i></b> For FY 2015 and FY 2016, the work for this effort originally was performed under Project 63670A, Weapon Technology Development, in the effort, Advanced Munition Concept Technologies.</p> <p>Increase emphasis in conducting relevant long range strike weapon technology demonstrations to reduce risk for potential follow on acquisition programs. Continue the development of munition concepts to incorporate technologies for carriage and terminal impact at high speed. Increase emphasis in investigating concepts for cooperative control of small weapons to produce scalable effects to increase the capacity and capability of fifth generation aircraft. Continue planning and technology risk reduction including demonstration and initial flight testing for weapons concepts responsive to the 2030 timeframe threat environment (including hypersonic and cooperative/collaborative concepts). Continue to mature simulation architectures to assess the trades and synergies between kinetic and directed energy weapons. Continue to incorporate higher fidelity methodologies into systems level analysis including joint weapons effectiveness.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	41.500

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**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.