Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Air Force											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*					R-1 ITEM NOMENCLATURE PE 0602602F: *Conventional Munitions*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	60.725	77.175	81.521	-	81.521	84.722	86.942	91.146	93.448	Continuing	Continuing
622068: *Advanced Guidance Technology*	-	20.732	32.955	32.801	-	32.801	33.261	35.741	37.065	38.297	Continuing	Continuing
622502: *Ordnance Technology*	-	39.993	44.220	48.720	-	48.720	51.461	51.201	54.081	55.151	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This program investigates, develops, and establishes the technical feasibility and military utility of guidance and ordnance technologies for conventional air-launched munitions. Program supports core technical competencies of fuze technology; energetic materials; damage mechanisms; munitions aerodynamics and guidance, navigation, and control; terminal seeker sciences; and munition systems effects. Technologies to be developed include blast, fragmentation, penetrating and low-collateral damage warheads, hard target fuzing, precise terminal guidance, and high performance and insensitive explosives. 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. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary technologies

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	60.656	77.175	84.162	-	84.162
Current President's Budget	60.725	77.175	81.521	-	81.521
Total Adjustments	0.069	0.000	-2.641	-	-2.641
• Congressional General Reductions	-	0.000			
• Congressional Directed Reductions	-	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	-	0.000			
• Congressional Directed Transfers	-	0.000			
• Reprogrammings	0.704	0.000			
• SBIR/STTR Transfer	-0.635	0.000			
• Other Adjustments	0.000	0.000	-2.641	-	-2.641

Change Summary Explanation

Decrease in FY 2014 is due to higher DoD priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
622068: *Advanced Guidance Technology*	-	20.732	32.955	32.801	-	32.801	33.261	35.741	37.065	38.297	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project investigates, develops, and evaluates conventional munitions guidance technologies to establish technical feasibility and military utility of innovative munition seekers, weapon aerodynamics, navigation and control, and guidance subsystem integration/simulation. Project payoffs include adverse-weather, networked, and autonomous precision munition guidance capability, increased number of kills per sortie, increased aerospace vehicle survivability, improved reliability and affordability, and improved survivability and effectiveness of conventional weapons.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Seeker Technologies	2.016	3.500	6.800
Description: Develop seeker technologies for air-delivered munitions to provide high confidence target discrimination and classification, precise target location, and robust terminal tracking. ***FY 2012 Accomplishments:*** Continued laboratory development and evaluation of test components for laser ranging, improved multi-mode, adverse weather synthetic aperture and high resolution radar modes seekers. Began technology development of very low-cost, adverse weather capable, radar seeker for small weapons. Developed theory for seeker sensor fusion and autonomous target recognition, and studied multi-weapon and conformal apertures for enhanced resolution and beam forming on small cooperative weapons. Continued applying the neurophysiology of insects to guide small vehicles to moving targets, investigated guidance technologies that optimize delivery of selectable effects munitions through countermeasures and developed dual mode seeker for hypersonic environments and discriminating tunnels and surface aimpoints for boosted/high-speed penetrators. ***FY 2013 Plans:*** Develop technologies that simplify, increase the flexibility, and reduce the cost of passive and active electro-optical, infrared, and radar munition seekers, with focus on combat operations in adverse weather and in high-speed engagements. Increase emphasis on seeker technologies that provide enhanced mission capability for fifth-generation aircraft, specifically as it applies to success in denied or anti-access environments. Continue developing algorithms and processing technologies to acquire and track targets			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602602F: *Conventional Munitions*	PROJECT 622068: *Advanced Guidance Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
with and without an operator in the loop. Continue pursuing revolutionary bio-inspired seeker technologies to increase immunity to countermeasures, to exploit multi-discriminant signatures, and to reduce the size and cost of detectors. ***FY 2014 Plans:*** Increase emphasis in developing technologies that simplify, increase the flexibility, and reduce the cost of passive and active electro-optical, infrared, and radar munition seekers, with focus on combat operations in adverse weather and in high-speed engagements. Continue to emphasize development of seeker technologies that provide enhanced mission capability for fifth-generation aircraft, specifically as it applies to success in denied or anti-access environments. Develop algorithms and processing technologies to acquire and track targets with and without an operator in the loop. Increase emphasis on revolutionary bio-inspired seeker technologies to increase immunity to countermeasures, to exploit multi-discriminant signatures, and to reduce the size and cost of detectors. Increase emphasis on high-resolution wide field of view sensors, particularly with bio-inspired and high rate processing characteristics.			
Title: Aerodynamics, Navigation and Control Technologies	9.298	20.000	19.000
Description: Develop advanced weapon aerodynamic, control, navigation, and networking technologies for air-delivered munitions to provide precise, agile flight, networked effects, and immunity to countermeasures. ***FY 2012 Accomplishments:*** Continued developing weapon airframe and control concepts to achieve high levels of agility and maneuverability, developing multi-functional structures, and evaluating navigation mode with other systems. Continued developing nonlinear, robust control methodologies for future weapons, such as high-speed terminal guidance on long-range strike weapons and control and actuation technologies for boosted penetrator systems within Global Positioning System (GPS) jamming environments. Continued development of algorithms to use wide field-of-view optical imager data, enabling navigation under GPS-denied conditions. Developed highly compact, high throughput avionics processors, and continued maturing technologies allowing weapons to communicate and exploit information in a secure, low probability of detection. ***FY 2013 Plans:*** Continue developing technologies that achieve precision navigation under GPS-degraded and GPS-denied conditions. Identify and pursue additional weapon navigation and control networking technologies that provide enhanced mission capability in denied or anti-access environments. These technologies facilitate agile and maneuverable weapons, foster autonomy, trust, and networking, and enable precise munition control and actuation, especially for boosted penetrating munitions or during high-speed engagements. Increase emphasis in trusted terminal guidance and targeting flexibility/autonomy after long ingress & high attrition. ***FY 2014 Plans:*** Further develop technologies that achieve precision navigation under GPS-degraded and GPS denied conditions. Develop weapon navigation and control networking technologies that provide enhanced mission capability in denied or anti-access			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
environments, facilitate agile and maneuverable weapons, foster autonomy, trust, and networking, and enable precise munition control and actuation, especially for munitions during high speed engagements. Investigate multi-functional, multi-strategy weapon swarms to defeat enemy defenses.			
Title: Guidance Technologies ***Description:*** Develop guidance subsystem integration and evaluation technologies to provide open and closed loop ground testing, flight test risk reduction, and digital simulation of novel concepts. ***FY 2012 Accomplishments:*** Investigated precision guided munition integration technology issues and functionality in various flight environments and refined the set of interoperable simulations to evaluate emerging munitions technologies. Simulated inventive concepts and approaches in guidance and control technology. Developed capability to test and refine development programs and future weapon concepts in a realistic operational environment. Continued multi-weapon search and attack technologies on a time critical moving target. Began build-up of test technologies for evaluating higher speed weapon guidance subsystems. ***FY 2013 Plans:*** Develop precision guided munition integration technology issues and functionality. Expand efforts to develop the capability to simulate, test, and refine pioneering seeker concepts and navigation and control approaches in a realistic operational environment. Increase emphasis on guidance integration and evaluation technologies that provide enhanced mission capability for fifth-generation aircraft. Continue pursuing multiweapon search and attack technologies on a time critical moving target. Continue the build-up of test technologies for evaluating higher speed weapon guidance subsystems. ***FY 2014 Plans:*** Develop precision guided munition integration technology and functionality. Focus on capabilities to simulate, test, and refine seeker concepts and navigation and control approaches in a realistic operational environment. Continue emphasis on guidance integration and evaluation technologies that provide enhanced mission capability for fifth-generation aircraft. Develop modeling techniques and tools to evaluate integrated, multi-weapon, and swarming search and attack. Develop test technologies for evaluating higher speed weapon guidance subsystems.	9.418	9.455	7.001
Accomplishments/Planned Programs Subtotals	20.732	32.955	32.801

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
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D. Acquisition Strategy

Not Applicable.

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.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602602F: *Conventional Munitions*	PROJECT 622502: *Ordnance Technology*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
622502: *Ordnance Technology*	-	39.993	44.220	48.720	-	48.720	51.461	51.201	54.081	55.151	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project investigates, develops, and evaluates conventional ordnance technologies to establish technical feasibility and military utility for advanced explosives, fuzes, warheads, submunitions, and weapon airframes, carriage, and dispensing. The project also assesses the lethality and effectiveness of current and planned conventional weapons technology programs and assesses target vulnerability. The payoffs include improved storage capability and transportation safety of fully assembled weapons, improved warhead and fuze effectiveness, improved submunition dispensing, low-cost airframe/subsystem components and structures, and reduced aerospace vehicle and weapon drag.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Energetic Materials Technology	7.659	11.000	10.000
Description: Investigate and develop energetic materials technology that can maximize weapon lethality, while applying appropriate safety and security features. ***FY 2012 Accomplishments:*** Tested and modeled explosive fills that reduce pre-detonation during high "G" loading. Developed low-density energetic materials for micro-munitions applications. Investigated high-density case materials to tailor or improve warhead performance. ***FY 2013 Plans:*** Develop, model, and test explosive fills that reduce pre-detonation during high "G" loading. Continue developing low density energetic materials for small munition applications. Exploit new nanoenergetic materials to enhance and tailor explosive effects. Increase emphasis on developing energetic materials that enable increased capability and capacity for fifth-generation aircraft. ***FY 2014 Plans:*** Continue to develop, model, and test explosive fills that reduce pre-detonation during high "G" loading. Further develop low density energetic materials for small munition applications. Exploit new nanoenergetic materials to enhance and tailor explosive effects. Emphasize development of energetic materials that improve performance and reduce bomb and missile size to increase loadout.			
Title: Fuze Technologies	8.359	10.700	13.800

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: Investigate and develop fuzes for air-delivered weapon applications to develop novel energetic initiation concepts, penetration fuzing, point burst fuzes, and develop predictive models. ***FY 2012 Accomplishments:*** Investigated novel methods to initiate explosives, including new modeling and testing techniques. Continued to investigate and characterize the mechanical environment that a fuze must survive during hard target penetration events. Explored ground profiling imaging fuze technology and developed a hardened chip fuze that uses integrated logic. ***FY 2013 Plans:*** Expand effort to investigate novel methods to initiate explosives, including new modeling and testing techniques. Increase emphasis on fuze technologies that enable increased capacity and capability of fifth-generation aircraft, specifically as it facilitates success in denied or anti-access environments. Continue to investigate and characterize the mechanical environment that a fuze must survive during hard target penetration events. Continue to explore ground profiling imaging fuze technology, and develop a hardened chip fuze that uses integrated logic. ***FY 2014 Plans:*** Improve modeling and testing techniques to investigate novel methods to initiate explosives, to include distributed and embedded fuzing concepts. Emphasize development of fuze technologies that enable increased capacity and capability of fifth-generation aircraft, specifically as it facilitates success in denied or anti-access environments. Continue to investigate and characterize the mechanical environment that a fuze must survive during hard target penetration, and explore ground profiling imaging fuze technology.			
Title: Warhead Technologies ***Description:*** Investigate and develop innovative warhead kill mechanisms, such as adaptable warheads, directional-control fragmenting warheads, and reactive metals. ***FY 2012 Accomplishments:*** Developed compact lethality warhead technologies for use in urban terrain. Continued investigating directional warhead concepts employing reactive fragments to improve standoff kills for non-direct hit encounters. Continued developing numerical algorithms for material-to-material interface dynamics, loading, and vibration during high speed penetration. Investigated techniques to control, direct, and focus the energy release from explosives in real-time by means of applying small amounts of electromagnetic energy. Investigated novel warhead designs that provide warfighting capability to deliver selectable effects on targets ***FY 2013 Plans:***	11.182	13.000	13.900

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Continue developing novel warhead technologies, especially those that enable small, agile munitions or that provide the capability to deliver selectable effects on targets. Continue investigating directional warhead concepts to improve standoff kills for non-direct hit encounters by employing reactive fragments or by utilizing a forward focusing fragment capability. Continue developing tools to better predict material-to-material interface dynamics, loading, and vibration during high-speed penetration. ***FY 2014 Plans:*** Increase emphasis in developing warhead technologies, especially those that enable munition agility, variable effects, and improved energy coupling. Continue investigating directional warhead concepts to improve standoff kills for non-direct hit encounters by employing reactive fragments or by utilizing a forward focusing fragment capability. Continue developing tools to better predict material-to-material interface dynamics, loading, and vibration during high-speed penetration.			
Title: Ordnance Technologies ***Description:*** Using a system approach, investigate and develop ordnance concepts by making technology trades between fuzes, warheads, and explosives and by improving weapon carriage, release, and dispensing. ***FY 2012 Accomplishments:*** Investigated precision guided munition integration issues and functionality in various flight environments. Continued building and using interoperable simulations to evaluate emerging technologies. Continued developing and enhancing new models and improvements for micromunitions, penetrators, and counter-chemical, biological, radiological, and nuclear effects. ***FY 2013 Plans:*** Continue investigation of precision guided munition integration issues and functionality in various flight environments. Continue building and using interoperable simulations to evaluate emerging technologies. Continue developing and enhancing new models and improvements for small munitions, penetrators, and counter chemical, biological, radiological, and nuclear effects. Increase emphasis on ordnance concepts that increase the capacity and capability of fifth-generation aircraft. ***FY 2014 Plans:*** Continue to investigate precision guided munition integration issues and functionality in various flight environments, and continue building and using interoperable simulations to evaluate emerging technologies. Continue developing technologies to improve models for small munitions, penetrators, and counter chemical, biological, radiological, and nuclear effects. Develop ordnance concepts that increase the capacity and capability of fifth-generation aircraft.	12.793	9.520	11.020
Accomplishments/Planned Programs Subtotals	39.993	44.220	48.720

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
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C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

Not Applicable.

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.