Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force		DATE: February 2011
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)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
Total Program Element	57.598	61.330	60.692	-	60.692	64.676	71.780	74.415	75.978	Continuing	Continuing
622068: *Advanced Guidance Technology*	17.622	20.039	20.832	-	20.832	22.093	24.351	25.446	25.970	Continuing	Continuing
622502: *Ordnance Technology*	39.976	41.291	39.860	-	39.860	42.583	47.429	48.969	50.008	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program investigates, develops, and establishes the technical feasibility and military utility of advanced guidance and ordnance technologies for conventional air-launched munitions. Program supports core technical competencies of target identification and tracking, guidance navigation and control, munition systems, explosives, fuzes, and warheads/damage mechanisms. Technologies to be developed include blast, fragmentation, penetrating and low-collateral damage warheads, variable height/depth fuzing, precise guidance, and high performance and insensitive explosives. Efforts in this program have been coordinated through the Reliance 21 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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	58.044	61.330	60.765	-	60.765
Current President's Budget	57.598	61.330	60.692	-	60.692
Total Adjustments	-0.446	-	-0.073	-	-0.073
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.448	-			
• Other Adjustments	0.002	-	-0.073	-	-0.073

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force			DATE: February 2011
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*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
622068: *Advanced Guidance Technology*	17.622	20.039	20.832	-	20.832	22.093	24.351	25.446	25.970	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project investigates, develops, and evaluates conventional munitions advanced guidance technologies to establish technical feasibility and military utility of advanced guidance seekers, weapon aerodynamics, navigation and control, and guidance subsystem integration/simulation. Project payoffs include: adverse-weather, networked, and autonomous precision 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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1	1.707	1.940	2.025	-	2.025
Description: Develop advanced seeker technologies for air-delivered munitions to provide high confidence target discrimination and classification, precise target location, and robust terminal tracking. ***FY 2010 Accomplishments:*** Continued laboratory demonstration of test components for laser ranging seeker and optical seeker that uses multi-discriminate signatures to improve targeting obscure targets. Continued development of multimode seeker that provides improved performance using two complimentary wavelength bands, verified polarization theory models through simulation, conducted tests on optical flow enhanced seeker, and applied the neuro-physiology of insects to guide small vehicles to moving targets in urban-like environments. ***FY 2011 Plans:*** Complete model verification and demonstration of optical seeker technologies to improve targeting of obscure targets. Continue development and evaluation of test components for laser ranging, multimode, and synthetic aperture and high resolution radar seeker technologies for guidance in adverse weather. Continue developing theory for seeker/sensor fusion, autonomous target recognition using differential geometry and topology, and application of neuro-physiology of insects to guide small vehicles to moving targets. Investigate guidance technologies that optimize delivery of selectable effects munitions through countermeasures. Begin development of seeker technology for adverse weather capability for small weapons, hypersonic environments, and discriminating tunnels and surface aimpoints for boosted/high speed penetrators. ***FY 2012 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Continue laboratory development and evaluation of test components for laser ranging, improved multimode, adverse weather synthetic aperture and high resolution radar modes seekers. Begin technology development of very low cost, adverse weather capable, radar seeker for small weapons. Develop theory for seeker sensor fusion and autonomous target recognition, and study multi weapon and conformal apertures for enhanced resolution and beam forming on small cooperative weapons. Continue applying the neuro-physiology of insects to guide small vehicles to moving targets, investigate guidance technologies that optimize delivery of selectable effects munitions through countermeasures and develop dual mode seeker for hypersonic environments and discriminating tunnels and surface aimpoints for boosted/high speed penetrators. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2 ***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 2010 Accomplishments:*** Continued evaluating navigation systems within Global Positioning System (GPS) jamming environments. Developed algorithms to use wide field of view optical imager data to augment map-matching techniques, enabling navigation under GPS-denied conditions. Continued maturing technologies allowing weapons to communicate in a secure, low probability of detection mode with launch platforms, submunitions, and/or ground elements. ***FY 2011 Plans:*** Continue developing and evaluating advanced weapon airframe and control concepts to achieve high levels of agility and maneuverability, developing multi functional structures, and evaluating navigation systems within GPS jamming environments. Continue development of algorithms to use wide field of view optical imager data, enabling navigation under GPS-denied conditions. Determine feasibility of highly compact, high throughput avionics processors and mature technologies allowing weapons to communicate and exploit information in a secure, low probability of detection mode with launch platforms, other weapons, and/or ground elements. Begin developing robust control methodologies for terminal guidance and control and actuation technologies for future weapon concepts. ***FY 2012 Base Plans:***	7.909	8.990	9.343	-	9.343

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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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Continue development of advanced weapon airframe and control concepts to achieve high levels of agility and maneuverability, development of multi functional structures, and evaluating navigation systems within GPS jamming environments. Continue development of algorithms to use wide field of view optical imager data, enabling navigation under GPS-denied conditions. Develop highly compact, high throughput avionics processors, and continue maturing technologies allowing weapons to communicate and exploit information in a secure, low probability of detection mode with other systems. Continue 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 penetrators. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3 ***Description:*** Develop guidance subsystem integration and evaluation technologies to provide open and closed loop ground testing, flight test risk reduction, and digital simulation of advanced concepts. ***FY 2010 Accomplishments:*** For precision guided munitions, investigated issues of integrating miniaturized components and functionality in various flight environments, and refined the set of interoperable simulations to evaluate emerging munitions guidance technologies. Simulated different highly innovative concepts and approaches in guidance and control technology. Began integrated multi-weapon search and attack demonstration on a time critical moving target. ***FY 2011 Plans:*** Continue investigating precision guided munition integration technology issues and functionality in various flight environments and refining the set of interoperable simulations to evaluate emerging munitions guidance technologies. Continue evaluating multi-weapon search and attack technologies on a time critical moving target. Simulate highly innovative concepts and approaches in guidance and control technology, and develop capability to test and refine development programs and future weapon concepts in a realistic operational environment. Begin development of seeker scene projection technologies and dynamic simulation technologies for terminally guided weapons. ***FY 2012 Base Plans:*** Investigate precision guided munition integration technology issues and functionality in various flight environments and refine the set of interoperable simulations to evaluate emerging munitions technologies. Simulate highly innovative concepts and approaches in guidance and control technology. Develop capability	8.006	9.109	9.464	-	9.464

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
to test and refine development programs and future weapon concepts in a realistic operational environment. Continue multi-weapon search and attack technologies on a time critical moving target. Begin build-up of test technologies for evaluating higher speed weapon guidance subsystem. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	17.622	20.039	20.832	-	20.832

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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 2012 Air Force			DATE: February 2011
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)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
622502: *Ordnance Technology*	39.976	41.291	39.860	-	39.860	42.583	47.429	48.969	50.008	Continuing	Continuing

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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	5.622	5.810	5.589	-	5.589
Description: Investigate and develop energetic materials technology that can maximize weapon lethality, while applying appropriate safety and security features. ***FY 2010 Accomplishments:*** Continued developing the materials properties database to develop system-level models for predicting initiation. Continued development of explosive fills that reduce pre-detonation during high "G" loading. Investigated low-density energetic materials for use in micro-munitions. Investigated high-density case materials capable of tailoring or enhancing warhead performance. ***FY 2011 Plans:*** Complete the materials properties data base to develop system level models for predicting initiation. Test and model explosive fills that reduce pre-detonation during high "G" loading. Develop low-density energetic materials for micro-munitions applications. Investigate high-density case materials to tailor or improve warhead performance. ***FY 2012 Base Plans:*** Test and model explosive fills that reduce pre-detonation during high "G" loading. Develop low-density energetic materials for micro-munitions applications. Investigate high-density case materials to tailor or improve warhead performance. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2.	6.103	6.300	6.072	-	6.072

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
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 2010 Accomplishments:*** Continued investigation of novel methods to initiate explosives, including new modeling and testing techniques. Investigated the mechanical environment that a fuze must survive during hard target penetration events. Explored ground profiling imaging fuze technology. Began investigating a hardened chip fuze that uses integrated logic. ***FY 2011 Plans:*** Continue investigating novel methods to initiate explosives, including new modeling and testing techniques. 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. Continue development of a hardened chip fuze that uses integrated logic. ***FY 2012 Base Plans:*** Continue investigating novel methods to initiate explosives, including new modeling and testing techniques. 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. Continue development of a hardened chip fuze that uses integrated logic. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3. ***Description:*** Investigate and develop advanced warhead kill mechanisms, such as adaptable warheads, directional control, fragmenting warheads, and application of reactive metals. ***FY 2010 Accomplishments:*** Continued investigation of high strength next generation warhead cases with the eventual goal of terradynamic steering. Continued evaluation of shaped charges to defeat medium and heavy armor. Continued investigation of micro-damage technologies to neutralize electronics with air delivered small robotic weapons. Explored compact lethality warhead technologies for use in urban terrain. Began investigating directional warhead concepts employing reactive fragments to improve standoff kills for non-direct hit encounters. Developed numerical algorithms for material-to-material interface dynamics, loading, and vibration during high speed	6.817	7.040	6.791	-	6.791

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
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. ***FY 2011 Plans:*** Develop compact lethality warhead technologies for use in urban terrain. Continue investigating directional warhead concepts employing reactive fragments to improve standoff kills for non-direct hit encounters. Continue developing numerical algorithms for material-to-material interface dynamics, loading, and vibration during high speed penetration. Continue investigating techniques to control, direct, and focus the energy release from explosives in real-time by means of applying small amounts of electromagnetic energy. Investigate novel warhead designs that provide warfighting capability to deliver selectable effects on targets. ***FY 2012 Base Plans:*** Develop compact lethality warhead technologies for use in urban terrain. Continue investigating directional warhead concepts employing reactive fragments to improve standoff kills for non-direct hit encounters. Continue developing numerical algorithms for material-to-material interface dynamics, loading, and vibration during high speed penetration. Continue investigating techniques to control, direct, and focus the energy release from explosives in real-time by means of applying small amounts of electromagnetic energy. Investigate novel warhead designs that provide warfighting capability to deliver selectable effects on targets. ***FY 2012 OCO Plans:***					
Title: Major Thrust 4. ***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 2010 Accomplishments:*** Completed investigation of reaction jet control for dual role missile technology. For precision guided munitions, investigated issues of integrating miniaturized components and functionality in various flight environments. Developed and used a set of interoperable simulations to evaluate emerging munition technologies. Developed and enhanced models for micromunitions, penetrators, and counter-chemical, biological, radiological, and nuclear effects. ***FY 2011 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.	21.434	22.141	21.408	-	21.408

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Continue developing and enhancing new models and improvements for micromunitions, penetrators, and counter-chemical, biological, radiological, and nuclear effects. ***FY 2012 Base 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 micromunitions, penetrators, and counter-chemical, biological, radiological, and nuclear effects. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	39.976	41.291	39.860	-	39.860

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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.