Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603211F: *Aerospace Technology Dev/Demo*							
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	41.748	88.226	53.588	0.000	53.588	56.480	58.124	58.384	60.306	Continuing	Continuing
63486U: *Advanced Aerospace Structures*	1.197	11.700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
634920: *Flight Vehicle Tech Integration*	40.551	76.526	53.588	0.000	53.588	56.480	58.124	58.384	60.306	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program demonstrates advanced aerospace vehicle technologies. Advanced aerospace structures are demonstrated to sustain and enhance the capability of current and future aerospace vehicles. Aerospace vehicle technology integration is accomplished through integration of various technologies to include avionics, advanced propulsion, and weapon systems for demonstration in near-realistic operational environments.

This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing aerospace vehicle system upgrades and/or new system developments that have military utility and address warfighter needs.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	45.990	76.844	0.000	0.000	0.000
Current President's Budget	41.748	88.226	53.588	0.000	53.588
Total Adjustments	-4.242	11.382	53.588	0.000	53.588
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.368			
• Congressional Adds		11.750			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-4.242	0.000	53.588	0.000	53.588

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603211F: *Aerospace Technology Dev/Demo*

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2009**	**FY 2010**
Project: 63486U: *Advanced Aerospace Structures*		
Congressional Add: *Big Antennas Small Structures Efficient Tactical (BASSET) Unmanned Air Vehicles.*	1.197	1.593
Congressional Add: *3D Bias Woven Preform Development*	0.000	2.390
Congressional Add: *Long-Loiter, Load Bearing Antenna Platform for Pervasive Airborne Intelligence*	0.000	3.983
Congressional Add: *Program Increase*	0.000	3.734
Congressional Add Subtotals for Project: 63486U	1.197	11.700
Congressional Add Totals for all Projects	1.197	11.700

Change Summary Explanation

Note 1: The FY 2010 President's Budget submittal did not reflect FY 2011 through FY 2015 funding. A detailed explanation of changes between the two budget positions is not provided because it cannot be made in a relevant manner.

Note 2: In FY 2010, Congress added $1.59 million for Big Antennas Small Structures Efficient Tactical Unmanned Air Vehicles, $2.39 million for 3D Bias Woven Preform Development, $1.59 million for Long-Loiter, Load Bearing Antenna Platform for Pervasive Airborne Intelligence, and $3.73 million for Program Increase.

(U) C. Performance Metrics
Under Development

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603211F: *Aerospace Technology Dev/ Demo*	PROJECT 63486U: *Advanced Aerospace Structures*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
63486U: *Advanced Aerospace Structures*	1.197	11.700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops and demonstrates affordable aerospace vehicle technologies to sustain the existing fleet, reduce the cost of aircraft ownership, and enhance the capability of current and future aerospace vehicles. Demonstration of these technologies will restore structural integrity, extend structural life, enhance capability, and reduce life cycle costs of fielded aircraft.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Big Antennas Small Structures Efficient Tactical (BASSET) Unmanned Air Vehicles. *FY 2009 Accomplishments:* In FY 2009: Conducted Congressionally directed effort in big antennas small structures efficient tactical unmanned air vehicles. *FY 2010 Plans:* In FY 2010: Conduct Congressionally directed effort in big antennas small structures efficient tactical unmanned air vehicles.	1.197	1.593
Congressional Add: 3D Bias Woven Preform Development *FY 2009 Accomplishments:* In FY 2009: Not Applicable.	0.000	2.390

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: In FY 2010: Conduct Congressionally directed effort in 3D bais woven preform development.		
Congressional Add: Long-Loiter, Load Bearing Antenna Platform for Pervasive Airborne Intelligence *FY 2009 Accomplishments:* In FY 2009: Not Applicable. *FY 2010 Plans:* In FY 2010: Conduct Congressionally directed effort in long-loiter, load bearing antenna platform for pervasive airborne intelligence.	0.000	3.983
Congressional Add: Program Increase *FY 2009 Accomplishments:* In FY 2009: Not Applicable. *FY 2010 Plans:* In FY 2010: Conduct Congressionally directed effort in program increase.	0.000	3.734
Congressional Adds Subtotals	1.197	11.700

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE Not Provided (2888): *Activity Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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 2011 Air Force			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603211F: *Aerospace Technology Dev/ Demo*	PROJECT 634920: *Flight Vehicle Tech Integration*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
634920: *Flight Vehicle Tech Integration*	40.551	76.526	53.588	0.000	53.588	56.480	58.124	58.384	60.306	Continuing	Continuing

Note

Note: Increased funding in FY 2010 is due to FY 2008 emphasis being placed on flight demonstration efforts of an X-type composite cargo aircraft. Decreased funding in FY 2011 is due to higher Air Force priorities.

A. Mission Description and Budget Item Justification

This project integrates and demonstrates advanced flight vehicle technologies that will improve the performance and supportability of existing and future manned and unmanned aerospace vehicles. System level integration brings together aerospace vehicle technologies along with avionics, propulsion, and weapon systems for demonstration in a near-realistic operational environment. Integration and technology demonstrations reduce the risk and time required to transition technologies into operational aircraft. This program provides proven aerospace vehicle technologies for all-weather, day/night operations with improved performance and affordability.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MAJOR THRUST: Develop autonomous flight controls for safe flight and cooperative operations between manned and unmanned air platforms.	6.485	8.573	13.197	0.000	13.197
FY 2009 Accomplishments: In FY 2009: Conducted ground demonstrations of situational awareness and control technologies for unmanned air vehicles operating in and around air bases. Developed and demonstrated cooperative teaming of small unmanned air vehicles in complex, low altitude environments. Conducted evaluation of validation and verification tools and process for affordable certification of autonomous unmanned air vehicle flight control software.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603211F: *Aerospace Technology Dev/ Demo*	PROJECT 634920: *Flight Vehicle Tech Integration*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: In FY 2010: Further the development and demonstration of situational awareness, autonomous control, and survivability technologies for manned and unmanned air vehicles. Continue development and demonstration of cooperative teaming of small unmanned air vehicles in complex, low altitude environments. Continue development of autonomous launch, recovery, and safe airspace interoperability technologies for unmanned systems. Extend adaptive guidance, navigation, and control technology for use in reusable launch systems. *FY 2011 Base Plans:* In FY 2011: Further the development and demonstration process for situational awareness, autonomous control, and survivability technologies for manned and unmanned air vehicles. Continue development and demonstration of cooperative teaming of small unmanned air vehicles in complex, low altitude environments. Continue development of autonomous launch and safe airspace interoperability technologies for multiple unmanned systems. Continue development of adaptive guidance, navigation, and control technology for use in reusable launch systems. *FY 2011 OCO Plans:* In FY 2011 OCO: N/A					
MAJOR THRUST: Develop, simulate, and demonstrate integrated technologies to improve the performance of manned and unmanned platforms. *FY 2009 Accomplishments:* In FY 2009: Completed flight demonstration of extensive laminar flow on swept wing test article. Conducted and completed flight demonstration of an X-type aircraft comprised of advanced materials for weight reduction, surface smoothness, corrosion, and fatigue elimination. Continued development of a simulation environment to enable evaluation of network centric technologies for improved capabilities for high speed operational concepts.	12.772	32.108	0.567	0.000	0.567

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: In FY 2010: Continue work to develop and demonstrate flow control for reducing acoustic loading and enhancing weapon separation from future strike platforms. Continue development of a simulation environment to enable evaluation of network centric technologies for improved capabilities for high speed operational concepts. Conduct flight demonstration efforts of an X-type cargo aircraft with all composite wings. *FY 2011 Base Plans:* In FY 2011: Continue work to develop and demonstrate flow control for reducing acoustic loading and enhancing weapon separation from future strike platforms. *FY 2011 OCO Plans:* In FY 2011 OCO: N/A					
MAJOR THRUST: Develop aircraft structures that have embedded components, which have previously been separate components that were attached to the air platforms. *FY 2009 Accomplishments:* In FY 2009: Completed and assessed test results from the flight demonstration of the large X-band electronically scanned antenna array embedded in a load-bearing structure. *FY 2010 Plans:* In FY 2010: Complete assessment of test results from the flight demonstration of the large X-band electronically scanned antenna array embedded in a load-bearing structure. Demonstrate and assess results of ultra lightweight multi-functional airframes. Demonstrate key high altitude persistent Intelligence, Surveillance, and Reconnaissance technologies.	13.160	15.349	21.204	0.000	21.204

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Continue assessment of test results from the ground demonstration of the electronically scanned antenna array embedded in a load-bearing structure. Continue the development, evaluation, assessment, and ground testing of antenna integration into load-bearing structures to create multi-function structures that provide for increased Intelligence, Surveillance, and Reconnaissance capability and reduced system size, weight, and power requirements. Continue flight test experimentation efforts for antenna integration into load-bearing structures. Initiate demonstration efforts for reliability of unitized multi-role structures. Demonstrate key high altitude persistent Intelligence, Surveillance, and Reconnaissance technologies. *FY 2011 OCO Plans:* In FY 2011 OCO: N/A					
MAJOR THRUST: Develop adaptive structures to provide in-flight modifications offering improved performance over a wide range of flight conditions and mission profiles. *FY 2009 Accomplishments:* In FY 2009: Demonstrated passive and active thermal protection systems for leading edge of high-speed vehicle components. Assessed results from demonstrations of advanced efficient wings concepts integrating active aeroelastic design concepts and adaptive structures. *FY 2010 Plans:* In FY 2010: Demonstrate passive and active thermal protection systems for leading edge of high-speed vehicle components. Continue assessment of results from demonstrations of advanced efficient wing concepts integrating active aeroelastic design concepts and adaptive structures. Demonstrate and assess rapid operability, maintainability, and support capabilities of conceptual reusable hypersonic vehicles. Demonstrate and assess integrated structural health management for load bearing composite tanks and wing structures. Demonstrate the characterization of high energy laser concepts for flight class, weight, and performance.	8.134	16.264	11.064	0.000	11.064

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Further demonstrate passive and active thermal protection systems for leading edge of high-speed vehicle components. Demonstrate and assess rapid operability, maintainability and support capabilities of conceptual reusable hypersonic vehicles. Demonstrate and assess integrated structural health management for lightweight unmanned air vehicles from subsonic to hypersonic speeds. Demonstrate and assess integrated structural health management for load bearing composite tanks and wing structures. Develop and assess detailed integrated flight and ground systems concepts for operationally responsive space lift. *FY 2011 OCO Plans:* In FY 2011 OCO: N/A					
MAJOR THRUST: Develop, simulate, and demonstrate integrated technologies to enable, and improve the performance of high-speed and hypersonic manned and unmanned air vehicles. *FY 2009 Accomplishments:* In FY 2009: Not Applicable. *FY 2010 Plans:* In FY 2010: Develop and demonstrate hypersonic ablation shape-change measurement and prediction capabilities for carbon/carbon materials and low-temperature material analogues and apply these methods to understand shape change for upcoming high-speed tests and other current prompt global reach concepts under development. Conduct risk reduction research in the areas of aeromechanics, propulsion integration, controls, and hot structures for the high-speed combined-cycle propulsion demonstration program. *FY 2011 Base Plans:* In FY 2011: Continue efforts to develop and demonstrate hypersonic ablation /shape-change measurement and prediction capabilities for carbon/carbon materials and low-temperature material	0.000	4.232	7.556	0.000	7.556

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
analogues and apply these methods to understand shape change for high-speed flight test and other prompt global reach concepts under development. Continue risk reduction research in the areas of aeromechanics, propulsion integration, controls and hot structures for a high-speed combined-cycle propulsion demonstration program. Initiate work to develop, demonstrate and validate measurement/ prediction methods for hypersonic boundary layer transition and aerodynamic heating for current/future prompt global reach concepts, as well as expendable and reusable hypersonic air-breathing concepts. Conduct hypersonic flight experiments to explore aeromechanics, propulsion, materials/structures, and controls research issues that can only be uniquely resolved through flight testing (boundary layer transition, shock boundary layer interaction, combustor flame holding, lean blowout, etc). *FY 2011 OCO Plans:* In FY 2011 OCO: N/A					
Accomplishments/Planned Programs Subtotals	40.551	76.526	53.588	0.000	53.588

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0602201F: *Aerospace Vehicle Technologies.*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0604015F: *Next Generation Bomber.*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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.