

**UNCLASSIFIED**

PE NUMBER: 0603211F  
 PE TITLE: Aerospace Technology Dev/Demo

<b>Exhibit R-2, RDT&amp;E Budget Item Justification</b>	<b>DATE</b> <b>February 2008</b>
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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>	<b>PE NUMBER AND TITLE</b> <b>0603211F Aerospace Technology Dev/Demo</b>
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Cost (\$ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	45.443	66.884	44.918	83.204	69.231	86.163	99.803	Continuing	TBD
486U Advanced Aerospace Structures	7.188	2.384	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4920 Flight Vehicle Tech Integration	35.569	64.500	44.918	83.204	69.231	86.163	99.803	Continuing	TBD
99SP Advanced Structures Space Vehicles	2.686	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD

Note: In FY 2007, Project 6399SP, Advanced Structures for Space Vehicles, efforts were transferred from PE 0603500F, Multidisciplinary Advanced Space Technology, Project 635062, Advanced Structures for Space Vehicles, order to effectively manage and provide oversight of the efforts. Funds for the FY 2007 Congressionally-directed Short Take Off and Landing Herk 1 Continuation in the amount of \$1.594 were moved into PE 0603211F, Aerospace Technology Dev/Demo, from PE 0401115F, C-130 Airlift Squadron, for execution.

**(U) 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 weapons systems for demonstration in near-realistic operational environments. Note: In FY 2008, Congress added \$0.8 million for Big Antennas Small Structures Efficient Tactical (BASSET) unmanned air vehicle, and \$1.6 million for Titanium Structures Initiative.

This program is in the 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.

**(U) B. Program Change Summary (\$ in Millions)**

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Previous President's Budget	36.286	64.922	56.345
(U) Current PBR/President's Budget	45.443	66.884	44.918
(U) Total Adjustments	9.157	1.962	
(U) Congressional Program Reductions			
Congressional Rescissions		-0.438	
Congressional Increases		2.400	
Reprogrammings	10.064		
SBIR/STTR Transfer	-0.907		
(U) <u>Significant Program Changes:</u>			
(U) C. Performance Metrics			
Under Development			

**Exhibit R-2a, RDT&E Project Justification**

DATE  
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BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>				PE NUMBER AND TITLE <b>0603211F Aerospace Technology Dev/Demo</b>			PROJECT NUMBER AND TITLE <b>486U Advanced Aerospace Structures</b>		
Cost (\$ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
486U Advanced Aerospace Structures	7.188	2.384	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

**(U) 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. Sustainment of the existing fleet through extended operational service life with innovative technology application will lead to reduced operations and support costs, and increased operational readiness. Analytical certification will reduce the cost associated with component replacement by allowing and certifying new designs under reduced test requirements. Development of capability enhancing technologies will expand the operational envelope and increase survivability in high threat environments. Demonstration of these technologies will restore structural integrity, extend structural life, enhance the capability, and reduce the life cycle costs of fielded aircraft.

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

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) CONGRESSIONAL ADD: Design Manual for Titanium Honeycomb Sandwich Composite Structure.	1.065	0.000	0.000
(U) In FY 2007: Conducted Congressionally-directed effort to design manual for titanium honeycomb sandwich composite structure.			
(U) In FY 2008: Not Applicable.			
(U) In FY 2009: Not Applicable.			
(U) CONGRESSIONAL ADD: Wright Brothers Institute - Capabilities Analysis Phase 2.	1.647	0.000	0.000
(U) In FY 2007: Conducted Congressionally-directed effort for capabilities planning support.			
(U) In FY 2008: Not Applicable.			
(U) In FY 2009: Not Applicable.			
(U) CONGRESSIONAL ADD: 3-D Woven/Braided Composites.	0.980	0.000	0.000
(U) In FY 2007: Conducted Congressionally-directed effort for 3-D woven/braided composites.			
(U) In FY 2008: Not Applicable.			
(U) In FY 2009: Not Applicable.			
(U) CONGRESSIONAL ADD: Advanced Aerospace Titanium Structures (AATS) Initiative.	0.980	1.589	0.000
(U) In FY 2007: Conducted Congressionally-directed AATS effort.			
(U) In FY 2008: Conduct Congressionally-directed AATS effort.			
(U) In FY 2009: Not Applicable.			

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BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>	PE NUMBER AND TITLE <b>0603211F Aerospace Technology Dev/Demo</b>	PROJECT NUMBER AND TITLE <b>486U Advanced Aerospace Structures</b>
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(U) <b><u>B. Accomplishments/Planned Program (\$ in Millions)</u></b>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U)			
(U) CONGRESSIONAL ADD: Advanced Aluminum Aerostructures (A3I) Initiative.	1.258	0.000	0.000
(U) In FY 2007: Conducted Congressionally-directed A3I effort, last funded by Congress in FY 2005.			
(U) In FY 2008: Not Applicable.			
(U) In FY 2009: Not Applicable.			
(U)			
(U) CONGRESSIONAL ADD: Large Scale Affordable Composite Structures.	1.258	0.000	0.000
(U) In FY 2007: Conducted Congressionally-directed effort for large-scale affordable composite structures.			
(U) In FY 2008: Not Applicable.			
(U) In FY 2009: Not Applicable.			
(U)			
(U) CONGRESSIONAL ADD: Big Antennas Small Structures Efficient Tactical (BASSET) Unmanned Aerial Vehicles.	0.000	0.795	0.000
(U) In FY 2007: Not Applicable.			
(U) In FY 2008: Conduct Congressionally-directed effort for big antennas small structures efficient tactical unmanned aerial vehicles.			
(U) In FY 2009: Not Applicable.			
(U) Total Cost	7.188	2.384	0.000

(U) <b><u>C. Other Program Funding Summary (\$ in Millions)</u></b>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>Cost to Complete</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>		
(U) Related Activities:									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									
(U) <b><u>D. Acquisition Strategy</u></b>									
Not Applicable.									

**Exhibit R-2a, RDT&E Project Justification**

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BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>				PE NUMBER AND TITLE <b>0603211F Aerospace Technology Dev/Demo</b>			PROJECT NUMBER AND TITLE <b>4920 Flight Vehicle Tech Integration</b>			
Cost (\$ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total	
4920 Flight Vehicle Tech Integration	35.569	64.500	44.918	83.204	69.231	86.163	99.803	Continuing	TBD	
Quantity of RDT&E Articles	0	0	0	0	0	0	0			

**(U) 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 the 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.

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

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) MAJOR THRUST: Develop autonomous flight controls for safe flight and cooperative operations between manned and unmanned air platforms.	5.239	6.299	6.485
(U) In FY 2007: Completed ground simulation and flight demonstration of key hardware and software systems for adaptive, fault tolerant, autonomous unmanned air vehicle airborne control. Initiated development of situational awareness and control technologies for automated air base ground operations for unmanned air vehicles.			
(U) In FY 2008: Further develop situational awareness and control technologies for automated air base ground operations for unmanned air vehicles. Initiated electromagnetic threat tolerant control systems technologies for air base ground operations for unmanned air vehicles.			
(U) In FY 2009: Conduct ground demonstrations of situational awareness and control technologies for unmanned air vehicles operating in and around air bases. Develop and demonstrate cooperative teaming of small unmanned air vehicles in complex, low altitude environments. Conduct evaluation of validation and verification tools and process for affordable certification of autonomous unmanned air vehicle flight control software.			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop, simulate, and demonstrate integrated technologies to improve the performance of manned and unmanned platforms. In FY 2008, increased emphasis being placed on demonstration efforts related to the composite affordability initiative.	12.481	41.149	17.139
(U) In FY 2007: Initiated development of a simulation environment to enable evaluation of network centric technologies for improved capabilities for high speed operational concepts. Conducted Congressionally-directed efforts for STOL Herk 1.			
(U) In FY 2008: Conduct flight demonstration of extensive laminar flow on swept wing test article. Complete wind tunnel testing of gust load alleviation and body freedom flutter suppression of high altitude, long endurance platforms. Complete integration of data streams and analysis tools; graphical user interfaces; database/model			

Exhibit R-2a, RDT&E Project Justification		DATE <b>February 2008</b>		
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE		
<b>03 Advanced Technology Development (ATD)</b>	<b>0603211F Aerospace Technology Dev/Demo</b>	<b>4920 Flight Vehicle Tech Integration</b>		
		<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) <b>B. Accomplishments/Planned Program (\$ in Millions)</b>				
updates; validation of model and selection criteria; and identification of model correction factors. Develop and integrate aircraft components that capitalize upon unitized advanced materials that are lightweight and affordable into an X-type cargo aircraft. Develop approaches that would reduce the tooling required to fabricate aircraft components. Begin flight demonstration efforts for an X-type cargo aircraft.				
(U) In FY 2009: Complete flight demonstration of extensive laminar flow on swept wing test article. Conduct and complete flight demonstration of an X-type aircraft comprised of advanced materials for weight reduction, surface smoothness, corrosion, and fatigue elimination. Continue development of a simulation environment to enable evaluation of network centric technologies for improved capabilities for high speed operational concepts.				
(U)				
(U) MAJOR THRUST: Develop analytical certification methods and capability to reduce the need for physical testing in the certification of structural components resulting in reduced acquisition cost for new systems and reduced support costs for future and legacy systems. Demonstrate reduced support costs for future systems by incorporation of advanced monitoring capabilities. Note: In FY 2008, the demonstration efforts real-time diagnostic and prognostics health monitoring demonstration efforts suspended because of the need for additional Applied Research efforts.		8.614	0.000	0.000
(U) In FY 2007: Continued demonstration of improved sustainment technologies for existing aging aircraft and future aerospace vehicle structures to reduce operations and support costs and extend usable structural lives. Continued demonstration of real-time diagnostic and prognostics health monitoring tools for thermal protected systems, tanks, structures, and subsystems to enable rapid turn around and high temperature operations.				
(U) In FY 2008: Not Applicable.				
(U) In FY 2009: Not Applicable.				
(U)				
(U) MAJOR THRUST: Develop aircraft structures that have embedded components, which have previously been separate components that were attached to the air platforms. Note: The FY 2008 and out year increase in funding is due to the demonstration efforts related to flight testing of large X band antenna embedded in a load bearing airframe structure.		6.170	14.003	13.160
(U) In FY 2007: Assessed results from flight demonstration of concepts with high multi-element antenna arrays embedded in load-bearing structure to increase antenna performance improvement and reduced vehicle weight, cost, and volume. Continued demonstration of concepts for very large, low frequency antenna arrays embedded in load-bearing structure to enable new antenna capabilities and increased performance, while reducing vehicle weight, cost, and volume.				
(U) In FY 2008: Complete structural demonstration of low band antenna structure. Asses and refine development of				

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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>	<b>PE NUMBER AND TITLE</b> <b>0603211F Aerospace Technology Dev/Demo</b>	<b>PROJECT NUMBER AND TITLE</b> <b>4920 Flight Vehicle Tech Integration</b>
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<b>(U) <u>B. Accomplishments/Planned Program (\$ in Millions)</u></b>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
multi-functional integrated structures to reduce cost, weight, while improving performance of future air platforms. Complete fabrication and flight test a large X band electronically-scanned antenna array embedded in a load-bearing structure.			
(U) In FY 2009: Complete and assess test results from the flight demonstration of the large X band electronically scanned antenna array embedded in a load-bearing structure.			
(U) MAJOR THRUST: Develop adaptive structures to provide in-flight modifications offering improved performance over a wide range of flight conditions and mission profiles.	3.065	3.049	8.134
(U) In FY 2007: Further refined integrated thermal airframe structures including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high-speed vehicle applications. Continued development and demonstration of highly efficient wing concepts integrating active aero elastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable viable long range and long endurance air vehicle concepts.			
(U) In FY 2008: Develop passive and active leading edge cooling systems for ultra, high-speed vehicles. Develop and validate integration methodologies for component level leading edge test articles. Complete development and demonstration of highly efficient wing concepts integrating active aero elastic design concepts.			
(U) In FY 2009: Demonstrate passive and active thermal protection systems for leading edge of high-speed vehicle components. Assess results from demonstrations of advanced efficient wings concepts integrating active aeroelastic design concepts and adaptive structures. Note: The FY 2008 and out year increase in funding is due to the demonstration efforts related to integrated airframe and structural health management for high speed vehicle applications.			
(U) Total Cost	35.569	64.500	44.918

<b>(U) <u>C. Other Program Funding Summary (\$ in Millions)</u></b>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) Related Activities:									
(U) PE 0602201F, Aerospace Vehicle Technologies.									
(U) PE 0604015F, Next Generation Bomber.									

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BUDGET ACTIVITY

**03 Advanced Technology Development (ATD)**

PE NUMBER AND TITLE

**0603211F Aerospace Technology  
Dev/Demo**

PROJECT NUMBER AND TITLE

**4920 Flight Vehicle Tech Integration****(U) C. Other Program Funding Summary (\$ in Millions)**

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

**(U) D. Acquisition Strategy**

Not Applicable.

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**February 2008**

BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>				PE NUMBER AND TITLE <b>0603211F Aerospace Technology Dev/Demo</b>			PROJECT NUMBER AND TITLE <b>99SP Advanced Structures Space Vehicles</b>		
Cost (\$ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
99SP Advanced Structures Space Vehicles	2.686	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2007, Project 6399SP, Advanced Structures for Space Vehicles, efforts were transferred from PE 0603500F, Multidisciplinary Advanced Space Technologies, Project 635062, Advanced Structures for Space Vehicles, in order to effectively manage and provide oversight of the efforts. In FY 2008, the remaining efforts in Project 6399SP were transferred into Project 4920 within this PE, as the planned efforts were not space unique.

**(U) A. Mission Description and Budget Item Justification**

This project identifies, develops, and demonstrates the technologies to enable advanced access-to-space aerospace vehicles that deliver revolutionary capability, operability, responsiveness, and cost-effectiveness. Enabling technologies include thermal protection, structures, vehicle systems, configurations, aerodynamics, and controls. Technology demonstration includes multi-disciplinary system level integration of the enabling technologies.

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

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) MAJOR THRUST: Develop the airframe and payload technologies required to enable horizontal launch of reusable high altitude aerospace vehicles.	2.686	0.000	0.000
(U) In FY 2007: Continued developing the airframe and payload technologies required to enable next generation reusable access to space systems including the thermal protection, structural, configuration, and vehicle and payload system technologies that enable aerospace vehicles to exhibit revolutionary capability, operability, responsiveness, and cost-effectiveness.			
(U) In FY 2008: Not Applicable.			
(U) In FY 2009: Not Applicable.			
(U) Total Cost	2.686	0.000	0.000

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

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

**(U) D. Acquisition Strategy**

Not Applicable.