RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

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

	COST ($ in Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
	Total Program Element (PE) Cost	17,675	22,945	22,315	25,455	28,445	28,992	29,541	Continuing	TBD
486U	Advanced Aerospace Structures	17,675	6,538	4,937	5,478	6,003	6,033	6,156	Continuing	TBD
4920	Flight Vehicle Tech Integration	0	16,407	17,378	19,977	22,442	22,959	23,385	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	Continuing	TBD

Note: Beginning in FY 2002, Project 4920 contains the ongoing technical efforts from PE 0603205F, Project 2978, and PE 0603245F, Project 2568, in order to align projects with the Air Force Research Laboratory organization.

(U) A. Mission Description

The demonstration and transition of advanced aerospace vehicle technologies are accomplished in this program. The two project areas are advanced aerospace structures and flight vehicle technology integration. Advanced aerospace structures are demonstrated to sustain and enhance the capability of current and future aerospace vehicles. Flight vehicle technology integration is accomplished through system level integration of various technologies to include avionics, propulsion, and weapon systems for demonstration in near-realistic operational environments. Note: In FY 2002, Congress added $1.0 million for three-dimensional woven preform composites, $1.4 million for Access-to-Space Joint Systems Program Office, $4.9 million for Aeronautical Systems Center, and $1.5 million for affordable combat avionics initiative.

(U) B. Budget Activity Justification

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.

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(U) C. Program Change Summary ($ in Thousands)

		FY 2001	FY 2002	FY 2003	Total Cost
(U)	Previous President's Budget	18,291	26,269	22,469	
(U)	Appropriated Value	18,461	23,169		
(U)	Adjustments to Appropriated Value				
	a. Congressional/General Reductions		-224		
	b. Small Business Innovative Research	-433			
	c. Omnibus or Other Above Threshold Reprogram				
	d. Below Threshold Reprogram	-183			
	e. Rescissions	-170			
(U)	Adjustments to Budget Years Since FY 2002 PBR			-154	
(U)	Current Budget Submit/FY 2003 PBR	17,675	22,945	22,315	TBD

(U) Significant Program Changes:
Not Applicable.

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DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

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

PROJECT: 486U

COST ($ in Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
486U	Advanced Aerospace Structures	17,675	6,538	4,937	5,478	6,003	6,033	6,156	Continuing	TBD

(U) A. Mission Description

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 their 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. Note: In FY 2002, Congress added $1.0 million for three-dimensional woven preform composites.

(U) FY 2001 ($ in Thousands)

(U) $4,382 Continued improvement in durability and affordability of existing aging aircraft and future aerospace vehicle structures for reduced operations and support costs and extend usable structural lives. Developed advanced methods for predicting structural strength and life remaining due to effects of fatigue, corrosion, and damage. Developed and validate low-cost advanced methods to restore original structural integrity, reduce repair cost, reduce inspection cost, and increase aircraft availability.

(U) $1,003 Developed advanced design concepts and methods to suppress aero-acoustic noise and vibration in advanced aircraft weapons bays to expand weapons employment envelope and reduce fatigue related failures. Investigate concepts to reduce life cycle cost of aircraft by reducing or eliminating fatigue in weapons bay areas. Evaluated aerodynamic airflow control devices to improve weapons system performance by expanding aircraft store (fuel tanks, weapons, space, etc.) and aircraft release envelope.

(U) $1,069 Developed advanced structural concepts and design methods for future aerospace vehicles for enhanced affordability and higher performance. Demonstrated, through flight test, the increased control authority of an active aeroelastic wing and, thereby, transition of technology to reduce airframe cost and weight for future air vehicles.

(U) $1,400 Demonstrated new analysis methods and design criteria for advanced composite structures to reduce life cycle costs of current and future aerospace vehicles by maximizing the use of composite structures. Continued to develop design concepts and structural criteria to implement lower cost manufacturing processes and materials in future airframes. Verified the structural integrity of affordable bonded unitized composite structure.

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BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603211F Aerospace Technology Dev/Demo
	PROJECT: 486U

(U) A. Mission Description Continued

(U) FY 2001 ($ in Thousands) Continued

(U)	$4,321	Reduced susceptibility and increase survivability of existing and planned aircraft through demonstration of lightweight and low-cost electromagnetic infrared signature suppression capability. Applied new structural design specifications that allow smaller and damage tolerant inlet and exhaust engine ducts. Designed a full-scale structurally integrated airframe and turbine engine inlet and begin ground component testing.
(U)	$4,000	Continued developing the processing and domestic production capability of constituent material for high strength polymeric foam for aerospace vehicles.
(U)	$1,500	Initiated Congressionally directed efforts to accelerate development of three-dimensional woven preform composite technology to produce low weight, non-corroding structural components.
(U)	$17,675	Total

(U) FY 2002 ($ in Thousands)

(U)	$2,305	Complete the development of analysis methods to accurately predict the impact of corrosion on the onset of cracking, crack progression, and structural failure. Improve the ability to predict the effect of corrosion and corrosion treatments on structural integrity to greatly reduce instances and levels of repair/replacement.
(U)	$2,197	Continue improvement in durability and affordability of existing aging aircraft and future aerospace vehicle structures for reduced operations and support costs and extend usable structural lives. Continue the development of technology required for full implementation of bonded repair technology. While bonded repair is being applied more frequently, several technical challenges must be met so that this technology can be fully implemented on a larger class of problems. Bonded repair can be used to reduce the frequency of crack nucleation and also used to slow or stop crack growth allowing for a decrease in the frequency and magnitude for repair or replacement.
(U)	$1,045	Develop technologies that will extend aircraft life, increase aircraft availability, and reduce operations and support costs. Concepts and methods will be developed to reduce dynamic loads. This will result in the capability to cost-effectively and safely utilize aircraft longer than originally intended. It will also result in decreased maintenance actions due to damage in dynamically loaded structure.
(U)	$991	Continue Congressionally directed efforts to accelerate development of three-dimensional woven preform composite technology to produce low weight, non-corroding structural components.
(U)	$6,538	Total

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603211F Aerospace Technology Dev/Demo	486U

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands)

(U)	$2,165	Continue improvements in sustainment technologies for existing aging aircraft and future aerospace vehicle structures for reduced operations and support costs and extend usable structural lives. Continue the development of technology required for full implementation of bonded composite repair of thick and complex structures. Continue development of new analytical methods and techniques to expand bonded composite repair capability to thick and complex geometry structures enabling repair in lieu of replacement of primary load carrying structural components.
(U)	$2,772	Develop innovative new non-traditional sustainment technologies that will extend aircraft life, increase aircraft availability, and reduce operation and support costs. Continue development of unitized composite structures to replace mechanically fastened built up components that are highly susceptible to damage from dynamic in-service usage resulting in elimination of maintenance actions due to loose fasteners and fastener hole damage.
(U)	$4,937	Total

(U) B. Project Change Summary

Not Applicable.

(U) C. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:
(U) PE 0602201F, Aerospace Vehicle Technologies
(U) PE 0603333F, Unmanned Air Vehicle Dev/Demo
(U) PE 0604731F, Unmanned Combat Air Vehicle
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

(U) Not Applicable.

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DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

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

PROJECT: 4920

COST ($ in Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
4920	Flight Vehicle Tech Integration	0	16,407	17,378	19,977	22,442	22,959	23,385	Continuing	TBD

Note: Beginning in FY 2002, this project contains the ongoing technical efforts from PE 0603205F, Project 2978, and PE 0603245F, Project 2568, in order to align projects with the Air Force Research Laboratory organization.

(U) A. Mission Description

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 significantly improved performance and affordability.

(U) FY 2001 ($ in Thousands)

(U) $0 Efforts were performed in PE 0603205F, Project 2978, and PE 0603245F, Project 2568.

(U) $0 Total

(U) FY 2002 ($ in Thousands)

(U) $4,110 Develop and validate novel control automation techniques and algorithms to enable the safe and interoperable application of unmanned vehicle systems while providing mission responsiveness and adaptability for improved operational effectiveness of manned and unmanned systems. Complete the simulation assessment of intelligent-agent-based algorithms and modular software system architecture for cooperative control of unmanned vehicles. Integrate unmanned vehicle software with photonic vehicle management system hardware.

(U) $848 Demonstrate and validate advanced control mechanization technologies to provide highly reliable operation for manned and unmanned systems at significantly reduced size, weight, and cost. Complete advanced development and demonstration of direct optical control and interfacing of vehicle management and more-electric subsystems. Transfer technology to unmanned air vehicle control integration efforts. Assess benefits of applying photonic technologies to vehicle and health management for military space access systems.

(U) $1,515 Develop multifunctional integrated structures to reduce acquisition and support costs weight and volume. Develop concepts for embedding high frequency multi-element antenna arrays in load bearing structure for antenna performance improvement. Mature concepts with advanced aerodynamic technologies that enable structurally integrated highly survivable and maintainable inlet and exhaust systems.

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(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

(U)	$1,768	Demonstrate new analysis methods and design criteria for advanced composite structures to reduce life cycle costs of current and future aerospace vehicles by maximizing the use of composite structures. Develop design concepts and methods to allow more widespread use of low-cost bonded structure with particular attention to verification of analyses methods through test articles.
(U)	$441	Develop advanced structural concepts and design methods for future aerospace vehicles for enhanced affordability and higher performance. Complete flight test demonstration of the increased control authority of an active aeroelastic wing, and transition technology to reduce airframe cost and weight for future air vehicles.
(U)	$1,387	Initiate Congressional directed efforts to establish an Access-to-Space Joint System Program Office.
(U)	$4,853	Initiate Congressional directed efforts with Aeronautical Systems Center.
(U)	$1,485	Initiate Congressional directed efforts for affordable combat avionics initiatives.
(U)	$16,407	Total

(U) FY 2003 ($ in Thousands)

(U)	$5,320	Develop and demonstrate key control automation techniques and algorithms to enable the safe and interoperable application of unmanned aerial vehicle systems. Continue development and demonstrate hardware and algorithms for automated air collision avoidance. Flight demonstrate intelligent-agent based algorithms and modular software system architecture for cooperative control of unmanned aerospace vehicles systems.
(U)	$4,193	Develop an integrated control technology suite to provide significantly increased reliability and mission effectiveness for air vehicle systems. Complete baseline systems architecture combining compact, low-cost hardware with adaptive, fault tolerant inner-loop control and autonomous, trajectory-generating outer-loop control. Develop, test, and verify component technologies for systems integration.
(U)	$362	Demonstrate and validate advanced control mechanization technologies to provide highly reliable operations for manned and unmanned systems at significantly reduced size, weight, and cost. Complete advanced development and demonstration of direct optical control and interfacing of vehicle management and more-electric subsystems.
(U)	$1,886	Develop multi-functional integrated structures to reduce acquisition costs, support costs, weight, and volume while increasing the performance of air vehicles. Continue development of concepts with embedded high frequency multi-element antenna arrays in load bearing structures to enable increased antenna performance and new capabilities at reduced cost, weight, and volume. Develop highly efficient and durable multifunction structures with embedded electrical conductors and data cabling, health monitoring networks, fuel handling and sensing, and thermal management to minimize vehicle weight, volume, and acquisition and support costs.
(U)	$1,997	Develop integral airframe technologies to enable increased propulsion system performance. Complete demonstration of inlet duct concepts

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603211F Aerospace Technology Dev/Demo	4920

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands) Continued

with advanced aerodynamic technologies that enable structural integration, enhanced performance, survivability, and increased propulsion system performance. Develop conformal inlet concepts with advanced aerodynamic technologies that enable higher efficiency propulsion systems.

(U) $2,106 Develop advanced structural concepts and design methods to significantly enhance the affordability and increase the performance of current and future aerospace vehicles. Continue development of new analysis methods, design concepts, and design criteria to enable low-cost unitized composite structures. Continue development of demonstration articles for test verification of analyses methods, design concepts, and design criteria.

(U) $1,514 Develop affordable advanced aero-structural concepts and design methods to enable new performance capabilities for future aerospace vehicles. Continue flight test demonstration of the increased high speed control authority of an active aeroelastic wing. Develop concepts applying continuous moldline technologies to reduce aerodynamic drag and electromagnetic signature for reconfigurable structures to enable maximum warfighting capability an d versatility in a single platform. Develop highly efficient wing concepts integrating active aeroelastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable new capabilities for long-range air vehicles and long endurance vehicles.

(U) $17,378 Total

(U) B. Project Change Summary

Not Applicable.

(U) C. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:

(U) PE 0602201F, Aerospace Flight Dynamics.

(U) PE 0603333F, Unmanned Air Vehicle Dev/Demo.

(U) PE 0604731F, Unmanned Combat Air Vehicle.

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

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

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(U) E. Schedule Profile Continued

(U) Not Applicable.