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

DATE: June 2001

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603211F Aerospace Structures

	COST ($ in Thousands)	FY 2000 Actual	FY 2001 Estimate	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	16,576	18,291	26,269	22,469	25,684	28,767	29,371	29,993	Continuing	TBD
486U	Advanced Aerospace Structures	16,576	18,291	5,602	4,949	5,511	6,055	6,096	6,234	Continuing	TBD
4920	Flight Vehicle Tech Integration	0	0	20,667	17,520	20,173	22,712	23,275	23,759	0	0
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	Continuing	TBD

Note: Beginning in FY 2002, this Program Element (PE) in 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. FY 2003 - FY 2007 budget numbers do not reflect the DoD strategy review results.

(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 2001, Congress added $4.0 million for polymeric foam core technology and $1.5 million for three-dimensional woven preform composites.

(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.

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

		FY 2000	FY 2001	FY 2002	Total Cost
(U)	Previous President's Budget (FY 2001 PBR)	16,638	12,961	11,918	
(U)	Appropriated Value	16,749	18,461		
(U)	Adjustments to Appropriated Value				
	a. Congressional/General Reductions				
	b. Small Business Innovative Research				

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

		FY 2000	FY 2001	FY 2002	Total Cost
	c. Omnibus or Other Above Threshold Reprogram				
	d. Below Threshold Reprogram	-88			
	e. Rescissions	-85	-170		
(U)	Adjustments to Budget Years Since FY 2001 PBR			14,351	
(U)	Current Budget Submit/FY 2002 PBR	16,576	18,291	26,269	TBD

(U) Significant Program Changes:

Changes to this program since the previous President's Budget are due to program element realignment within the Science and Technology Program.

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DATE: June 2001

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603211F Aerospace Structures

PROJECT: 486U

COST ($ in Thousands)		FY 2000 Actual	FY 2001 Estimate	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	16,576	18,291	5,602	4,949	5,511	6,055	6,096	6,234	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 2001, Congress added $4.0 million for polymeric foam core technology and $1.5 million for three-dimensional woven preform composites.

(U) FY 2000 ($ in Thousands)

(U) $7,420 Improved durability and performance, affordability, and longevity of existing aging aircraft and future aerospace vehicle structures operating in extreme thermal and acoustic environments. Continued to fabricate an integrated aft fuselage and nozzle section.

(U) $8,671 Developed advanced structural concepts and design methods for future and existing aerospace vehicles to enhance durability and longevity of existing aircraft and future aerospace vehicle structures. Designed a full-scale structural component for demonstration of a flexible wing that twists to control flight. Evaluated polymeric foam technology for a wide variety of secondary structures (i.e., leading and trailing edges, flaps, doors, spoiler, etc.).

(U) $485 Developed and applied new analysis methods and design criteria to advanced composite structures for reduction in life cycle costs of current and future aerospace vehicles by maximizing the use of composite structures.

(U) $16,576 Total

(U) FY 2001 ($ in Thousands)

(U) $4,998 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. Develop advanced methods for predicting structural strength and life remaining due to effects of fatigue, corrosion, and damage. Develop and validate low-cost advanced methods to restore original structural integrity, reduce repair cost, reduce inspection cost, and increase aircraft availability.

(U) $1,003 Develop 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

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(U) A. Mission Description Continued

(U) FY 2001 ($ in Thousands) Continued

eliminating fatigue in weapons bay areas. Evaluate 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 Develop advanced structural concepts and design methods for future aerospace vehicles for enhanced affordability and higher performance. Demonstrate, 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 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. Continue to develop design concepts and structural criteria to implement lower cost manufacturing processes and materials in future airframes. Verify the structural integrity of affordable bonded unitized composite structure.

(U) $4,321 Reduce susceptibility and increase survivability of existing and planned aircraft through demonstration of lightweight and low-cost electromagnetic infrared signature suppression capability. Apply new structural design specifications that allow smaller and damage tolerant inlet and exhaust engine ducts. Design a full-scale structurally integrated airframe and turbine engine inlet and begin ground component testing.

(U) $4,000 Continue developing the processing and domestic production capability of constituent material for high strength polymeric foam for aerospace vehicles.

(U) $1,500 Initiate Congressionally directed efforts to accelerate development of three-dimensional woven preform composite technology to produce low weight, non-corroding structural components.

(U) $18,291 Total

(U) FY 2002 ($ in Thousands)

(U) $2,360 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

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(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

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) $5,602 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) 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: June 2001

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603211F Aerospace Structures

PROJECT: 4920

COST ($ in Thousands)		FY 2000 Actual	FY 2001 Estimate	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	0	20,667	17,520	20,173	22,712	23,275	23,759	Continuing	TBD

Note: Beginning in FY2002, 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 2000 ($ in Thousands)

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

(U) $0 Total

(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) $13,975 Develop and demonstrate technologies to support the joint Air Force/Defense Advanced Research Projects Agency unmanned combat air vehicle goals. Flight test unmanned combat air vehicle to demonstrate integration of critical technologies, autonomous ground operations, inter-vehicle communication, and multi-vehicle flight operations to complete an end-to-end technology demonstration of mission utility.

(U) $2,120 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

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(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

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 loadbearing structure for antenna performance improvement. Mature concepts with advanced aerodynamic technologies that enable structurally integrated highly survivable and maintainable inlet and exhaust systems.

(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) $20,667 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) 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.