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

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2005

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

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

	Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	44.828	38.602	25.133	24.345	56.245	112.431	114.805	116.907	Continuing	TBD
486U	Advanced Aerospace Structures	15.469	13.363	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4920	Flight Vehicle Tech Integration	29.359	25.239	25.133	24.345	56.245	112.431	114.805	116.907	Continuing	TBD

Note: In FY 2006, efforts from Project 486U transfer into Project 4920 within this PE.

(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, such as a next generation bomber. Flight 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. Note: In FY 2005, Congress added $2.0 million for Bias Woven Preforms, $6.8 million for Capabilities Planning Support, and $1.0 million for Haleakala Laser Communications Testbed. 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)

		FY 2004	FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	47.610	29.145	27.199	26.019
(U)	Current PBR/President's Budget	44.828	38.602	25.133	24.345
(U)	Total Adjustments	-2.782	9.457		
(U)	Congressional Program Reductions				
	Congressional Rescissions		-0.343		
	Congressional Increases		9.800		
	Reprogrammings	-0.787			
	SBIR/STTR Transfer	-1.995			
(U)	Significant Program Changes:				

Not Applicable.

(U) C. Performance Metrics

Under Development

Exhibit R-2a, RDT&E Project Justification

DATE: February 2005

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

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

PROJECT NUMBER AND TITLE: 486U Advanced Aerospace Structures

Cost ($ in Millions)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
486U	Advanced Aerospace Structures	15.469	13.363	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	0		

Note: In FY 2006, efforts from Project 486U transfer into Project 4920 within this PE.

(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)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop technologies to improve traditional sustainment methods of current and future aircraft.	3.097	0.000	0.000	0.000
(U) In FY 2004: Developed improvements in sustainment technologies for existing aging aircraft and future air vehicle structures for reduced operations and support costs and to extend the usable structural lives. Developed new analytical methods and techniques to extend bonded composite repair capability to thick and complex geometry structures enabling repairs in lieu of replacement of primary load carrying structural components.				
(U) In FY 2005: Not Applicable.				
(U) In FY 2006: Not Applicable.				
(U) In FY 2007: Not Applicable.				
(U)				
(U) MAJOR THRUST: Develop non-traditional sustainment methods and diagnostic/prognostic monitoring capabilities for future aircraft.	2.411	0.000	0.000	0.000
(U) In FY 2004: Developed innovative non-traditional sustainment technologies that will extend aircraft life, increase aircraft availability, and reduce operations and support costs. Completed development of unitized composite structures concepts for repair or replacement of mechanically fastened built up components that are highly susceptible to loose fasteners and fastner hole damage from dynamic in-service usage, thereby providing a reduction in maintenance actions.				
(U) In FY 2005: Not Applicable.				
(U) In FY 2006: Not Applicable.				

Exhibit R-2a, RDT&E Project Justification			DATE: February 2005
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603211F Aerospace Technology Dev/Demo	PROJECT NUMBER AND TITLE: 486U Advanced Aerospace Structures	

(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate technologies related to improved munitions separation enhancement and acoustic reduction in current and future aircraft. Note: Prior to FY 2005, this effort was funded in Project 4920 in the improved performance of unmanned platform thrust. In FY 2005, this effort was moved to Project 486U to address aerospace structure elements of the effort. In FY 2006, this effort was the only remaining effort in Project 486U and was transferred back to Project 4920 within this PE.	0.000	3.650	0.000	0.000
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Develop active flow control devices to significantly increase and expand the separation envelope for miniature munitions and reduce weapon bay acoustics to minimize damage at speeds in excess of Mach 1.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)	CONGRESSIONAL ADD: Advanced Aluminum Aerostructures Initiatives (A3I). Note: In FY 2004, two Congressional Adds were made for this effort; both are being managed as a single effort.	6.189	0.000	0.000	0.000
(U)	In FY 2004: Continued Congressionally-directed effort for advanced aluminum aerostructures.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	CONGRESSIONAL ADD: Composites.	1.354	0.000	0.000	0.000
(U)	In FY 2004: Continued Congressionally-directed effort for unmanned aerial vehicle (UAV) composites.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	CONGRESSIONAL ADD: Three-Dimensional Bias Woven Preforms Development Program.	2.418	1.982	0.000	0.000
(U)	In FY 2004: Continued Congressionally-directed effort for Three-Dimensional Bias Woven Preforms Development Program begun with FY 2002 Congressional Add.				
(U)	In FY 2005: Continued Congressionally-directed effort for Three-Dimensional Bias Woven Preforms Development Program.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603211F Aerospace Technology Dev/Demo	PROJECT NUMBER AND TITLE 486U Advanced Aerospace Structures

(U)					
(U)	CONGRESSIONAL ADD: Capabilities Planning Support. Note: In FY 2005, two Congressional Adds were made for this effort; both are being managed as a single effort.	0.000	6.740	0.000	0.000
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Initiated Congressionally-directed effort for capabilities planning support.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	CONGRESSIONAL ADD: Haleakala Laser Communications Testbed.	0.000	0.991	0.000	0.000
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Initiated Congressionally-directed effort for Haleakala laser communication testbed.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)	Total Cost	15.469	13.363	0.000	0.000

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

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost

(U) Related Activities:

(U) PE 0602201F, Aerospace Vehicle Technologies.

(U) PE 0604015F, Next Generation Bomber.

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

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2005

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

Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
4920 Flight Vehicle Tech Integration	29.359	25.239	25.133	24.345	56.245	112.431	114.805	116.907	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

Note: In FY 2006, efforts from Project 486U transfer into Project 4920 within this PE.

(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)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop autonomous flight controls for safe flight operations between manned and unmanned air platforms.	11.890	9.192	7.312	5.160

(U) In FY 2004: Developed and demonstrated key control automation techniques and algorithms to enable the safe and interoperable application of unmanned vehicle systems. Developed elements of an integrated control technology suite combining compact, low-cost hardware with adaptive, fault tolerant inner-loop control and autonomous, trajectory-generating outer-loop control to provide significantly increased reliability and mission effectiveness for unmanned vehicle systems. Developed and demonstrated control component technologies for systems integration. Developed automated aerial refueling algorithms and system design concepts for unmanned and manned systems to eliminate need for forward staging areas, extend range, shorten response time, and enable in-theater force projection with fewer assets.

(U) In FY 2005: Continue development and demonstration of control automation techniques, components, and algorithms to enable the safe and inter operable application of unmanned vehicle systems. Complete the integration and test of key autonomous control component technologies. Demonstrate fully integrated, adaptive, fault tolerant, autonomous control system suite to provide significantly increased reliability and mission effectiveness for unmanned vehicle systems. Demonstrate key photonic sensing and control elements for flight critical control.

(U) In FY 2006: Complete hardware-in-the-loop simulation assessments of integrated, adaptive, fault tolerant, autonomous control system suite to verify significantly increased reliability and mission effectiveness for unmanned vehicle systems. Complete environmental testing of key photonic sensing and control elements for flight critical control. Prepare key photonic sensing and control elements for flight-testing. Flight demonstrate automated see and avoid capability for unmanned air vehicles.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2005
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)	In FY 2007: Complete ground simulation and flight demonstration of key hardware and software systems for adaptive, fault tolerant, autonomous unmanned air vehicle airborne control. Initiate development of situational awareness and control technologies for automated airbase ground operations for unmanned air vehicles.				
(U)					
(U)	MAJOR THRUST: Develop an Automated Aerial Refueling capability for unmanned and manned air platforms. Note: In FY 2005, Automated Aerial Refueling efforts described in the autonomous flight controls thrust area were broken out to allow for increased visibility for this effort.	0.000	5.233	0.000	0.000
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Complete development of automated aerial refueling sensing, communication, and control algorithm components. Complete integration, simulation, and analysis verifying safe autonomous operation in proximity of manned tankers. Begin flight demonstrations of initial automated aerial refueling capability for unmanned aerial vehicles using existing fleet tankers, operational procedures, and unmanned combat air vehicles.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Develop, simulate, and demonstrate integrated technologies to improve the performance of manned and unmanned platforms. Note: The FY 2006 increase in funding is the direct result of incorporating the remaining effort from Project 486U into this thrust. The FY 2007 decrease is due to completion of a majority of the thrust objectives in FY 2006.	2.800	3.464	6.242	1.343
(U)	In FY 2004: Developed advanced aerodynamic/structural integration concepts to enable increased system performance at reduced cost. Continued development and producibility demonstration of system hardware for an actively controlled conformal inlet system enabling increased installed propulsion system performance at reduced weight and size. Developed and demonstrated active flow control devices to increase and enhance the separation envelope for miniature munitions and reduce weapon bay acoustics to minimize damage susceptibility of sensitive commercial subsystem electronics.				
(U)	In FY 2005: Develop advanced aerodynamic/structural integration concepts to enable increased system performance at reduced cost. Demonstrate an actively controlled conformal inlet system for increased propulsion system performance for unmanned air vehicles.				
(U)	In FY 2006: Complete initial demonstration of an actively controlled conformal inlet system for increased propulsion system performance for unmanned air vehicles. Continue demonstration of active flow control devices to significantly increase and expand the separation envelope for miniature munitions and reduce weapon bay acoustics to minimize damage to the aircraft at speeds in excess of Mach 1.				

Exhibit R-2a, RDT&E Project Justification		DATE: February 2005
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) In FY 2007: 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: Funding increase is due to increased emphasis being placed on diagnostic and prognostic health monitoring tool development for future aircraft systems.	1.535	0.577	3.520	8.704

(U) In FY 2004: Developed advanced structural concepts and design methods for future aerospace vehicle airframes for enhanced affordability and higher performance. Completed demonstration of advanced of low-cost bonded composite structures concepts enabled by new analysis, manufacturing, and assembly processes, which will reduce life cycle costs of current and future aerospace vehicles by maximizing the use of composite structures. Developed approaches to reliably use virtual and analytical methods to substantially 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 legacy systems.

(U) In FY 2005: Develop improved sustainment technologies for existing aging aircraft and future aerospace vehicle structures to reduce operations and support costs and extend usable structural lives. Develop real-time diagnostic and prognostics health monitoring tools of thermal protection systems, tanks, structures, and subsystems to enable rapid turn around and high temperature operations. Complete the demonstration of approaches to reliably use virtual and analytical methods to substantially 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 legacy systems.

(U) In FY 2006: Continue development and initiate 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. Continue development and initiate 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 of high-speed aircraft.

(U) In FY 2007: Continue 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. Continue 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)

Exhibit R-2a, RDT&E Project Justification			DATE February 2005
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)	MAJOR THRUST: Develop aircraft structures that have embedded components, which have previously been separate components that were attached to the air platforms.	3.705	4.175	4.442	6.173
(U)	In FY 2004: Developed multi-functional integrated structures to reduce acquisition cost, support costs, weight, and volume and increase performance of air vehicles. Developed concepts with embedded high and low frequency multi-element antenna arrays in load bearing structure for antenna performance improvement and reduced vehicle weight and volume. Developed highly efficient and durable 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)	In FY 2005: Continue development of multi-functional integrated structures to reduce acquisition and support costs, weight, and volume and increase performance of air vehicles. Complete 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. Continue development of concepts of 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 2006: Continue development of multi-functional integrated structures to reduce acquisition and support costs, weight, and volume and increase performance of air vehicles. Initiate 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. Continue development and initiate demonstration of concepts for very large, low frequency antenna arrays embedded in the aircraft load-bearing structure to enable new antenna capabilities and increased performance, while reducing vehicle weight, cost, and volume.				
(U)	In FY 2007: Continue and assess 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. Continue 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)					
(U)	MAJOR THRUST: Develop adaptive structures to provide in-flight modifications offering improved performance over a wide range of flight conditions and mission profiles.	3.047	2.598	3.617	2.965
(U)	In FY 2004: Developed advanced aero-structural concepts and design methods for enhanced affordability, higher performance, and survivability for future aerospace vehicles. Completed flight test demonstrating increased high-speed control authority enable by an active aeroelastic wing. Completed demonstration of reconfigurable continuous moldline structure concepts to reduce aerodynamic drag and electromagnetic signature to enable platform adaptation as mission requirements change and thus				

Exhibit R-2a, RDT&E Project Justification		DATE February 2005	
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	

	maximize its versatility. Developed elements for highly efficient wing concepts integrating active aeroelastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable viable long-range and long-endurance air vehicle concepts				
(U)	In FY 2005: Develop integrated thermal airframe structures, including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high speed vehicle applications.				
(U)	In FY 2006: Continue development and initiate demonstration of integrated thermal airframe structures including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high speed vehicle applications. Continue development and initiate demonstration of highly efficient wing concepts integrating active aeroelastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable viable long range and long endurance air vehicle concepts.				
(U)	In FY 2007: Further refine integrated thermal airframe structures including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high-speed vehicle applications. Continue development and demonstration of highly efficient wing concepts integrating active aeroelastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable viable long range and long endurance air vehicle concepts.				
(U)					
(U)	CONGRESSIONAL ADD: Sensorcraft.	3.384	0.000	0.000	0.000
(U)	In FY 2004: Continued Congressionally-directed effort for sensorcraft unmanned aerial vehicle.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	CONGRESSIONAL ADD: Fly-by-light Avionics for Unmanned Combat Air Vehicle (UCAV).	2.031	0.000	0.000	0.000
(U)	In FY 2004: Initiated Congressionally-directed effort for fly-by-light Avionics for UCAV.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	CONGRESSIONAL ADD Add: Medlink Global Response.	0.967	0.000	0.000	0.000
(U)	In FY 2004: Initiated Congressionally-directed effort for establishing round the clock in-flight telemedicine access to emergency physicians for assistance in managing in-flight medical emergencies.				
(U)	In FY 2005: Not Applicable.				

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
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) In FY 2006: Not Applicable.
(U) In FY 2007: Not Applicable.
(U)

(U) Total Cost	29.359	25.239	25.133	24.345

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

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost

(U) Related Activities:
(U) PE 0602201F, Aerospace Vehicle Technologies.
(U) PE 0604015F, Next Generation Bomber.
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy
Not Applicable.