Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	187.212	136.135	120.953	-	120.953	113.398	118.245	126.823	128.907	Continuing	Continuing
632480: *Aerospace Fuels*	27.254	9.393	6.770	-	6.770	6.619	7.539	7.828	7.956	Continuing	Continuing
633035: *Aerospace Power Technology*	13.829	5.556	5.747	-	5.747	5.670	8.379	10.048	10.213	Continuing	Continuing
634921: *Aircraft Propulsion Subsystems Int*	38.383	41.403	17.713	-	17.713	17.874	17.567	19.144	19.458	Continuing	Continuing
634922: *Space & Missile Rocket Propulsion*	28.535	31.840	27.603	-	27.603	31.395	39.196	40.894	41.566	Continuing	Continuing
635098: *Advanced Aerospace Propulsion*	23.043	13.177	30.124	-	30.124	17.661	18.304	20.006	20.336	Continuing	Continuing
63681B: *Advanced Turbine Engine Gas Generator*	56.168	34.766	32.996	-	32.996	34.179	27.260	28.903	29.378	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program develops and demonstrates technologies to achieve enabling and revolutionary advances in turbine, advanced cycle, and rocket propulsion, as well as electrical power thermal management, and fuels. The program has six projects, each focusing on technologies with a high potential to enhance the performance of existing and future Air Force weapons systems. The Aerospace Fuels project develops and demonstrates improved hydrocarbon fuels and advanced propulsion systems for high-speed/hypersonic flight. The Aerospace Power Technology project develops and demonstrates power and thermal management systems for weapons and aircraft as part of energy optimized aircraft development. The Aerospace Propulsion Subsystems Integration project integrates the engine cores demonstrated in the Advanced Turbine Engine Gas Generator project with low-pressure components into demonstrator engines. The Space and Missile Rocket Propulsion project develops and demonstrates innovative rocket propulsion technologies, propellants, manufacturing techniques. The Advanced Aerospace Propulsion project develops the scramjet propulsion cycle to a technology readiness level appropriate for in-flight demonstration and for full integration with other engine cycles (including turbine and rocket based). The Advanced Turbine Engine Gas Generator project develops and demonstrates core turbine engine technologies for current and future aircraft propulsion systems. Portions of the Aerospace Fuels, Advanced Turbine Engine Gas Generator, and Aerospace Propulsion Subsystems Integration projects support adaptive cycle technology demonstrations which develop component technology for an adaptive cycle engine architecture that provides optimized performance, fuel efficiency, and durability for widely varying mission needs. Efforts in this program have been coordinated through the Reliance 21 process to harmonize efforts and eliminate duplication. This program is in Budget Activity 3, Advanced Technology Development, since it enables and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603216F: *Aerospace Propulsion and Power Technology*

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	192.241	136.135	112.786	-	112.786
Current President's Budget	187.212	136.135	120.953	-	120.953
Total Adjustments	-5.029	-	8.167	-	8.167
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-0.006	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-0.797	-			
• SBIR/STTR Transfer	-4.226	-			
• Other Adjustments	-	-	8.167	-	8.167

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Project: 632480: *Aerospace Fuels*		
Congressional Add: *Algal Biofuels for Aviation.*	2.390	-
Congressional Add: *Algal-Derived Jet Fuel for Air Force Applications.*	2.689	-
Congressional Add: *Bio-JP8 Fuel Development.*	3.983	-
Congressional Add: *Hawaii Microalgae Biofuel Project.*	3.505	-
Congressional Add: *Renewable Hydrocarbon Fuels for Military Applications.*	1.992	-
Congressional Add Subtotals for Project: 632480	14.559	-
Project: 633035: *Aerospace Power Technology*		
Congressional Add: *Methanol Fuel Cell Development for USAF Battlefield Integrated Tactical Energy System (BRITES).*	2.390	-
Congressional Add: *Silicon Carbide Power Modules for the F-35 Joint Strike Fighter.*	2.390	-
Congressional Add: *Texas Research Institute for Environmental Studies.*	0.797	-
Congressional Add Subtotals for Project: 633035	5.577	-
Project: 634921: *Aircraft Propulsion Subsystems Int*		
Congressional Add: *Small Turbofan Versatile Affordable Advanced Turbine Engine Program.*	3.187	-
	3.187	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603216F: *Aerospace Propulsion and Power Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Congressional Add Subtotals for Project: 634921		
Congressional Add Totals for all Projects	23.323	-

Change Summary Explanation

Note: Increase in funding in FY 2012 is to complete scramjet engine flight demonstrations in the Advanced Aerospace Propulsion project.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 632480: *Aerospace Fuels*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
632480: *Aerospace Fuels*	27.254	9.393	6.770	-	6.770	6.619	7.539	7.828	7.956	Continuing	Continuing

Note

Note: The funding in this project has decreases in FY 2011 and beyond due to planned taper of turbine engine technologies.

A. Mission Description and Budget Item Justification

This project evaluates and demonstrates improved hydrocarbon fuels, unique/alternate fuels and advanced, novel aerospace propulsion technologies for Air Force applications; including high-speed/hypersonic flight and technologies to increase turbine engine operational reliability, durability, mission flexibility, and performance while reducing weight, fuel consumption, and cost of ownership. The advanced fuel emphasis is on demonstrating new thermally stable, high-heat sink, and controlled chemically reacting fuels for a conventional turbine engine, turbine-based combined cycle engines, and other advanced propulsion systems. The project also evaluates and demonstrates fuel system components that minimize cost, reduce maintenance, and improve performance of future aerospace systems. The advanced propulsion emphasis is on demonstrating concepts for combined cycle, ramjet, and scramjet engines. A portion of this project supports the demonstration of adaptive cycle technologies. This project develops component technology for an adaptive cycle engine architecture that provides optimized performance, fuel efficiency, and durability for widely varying mission needs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	3.183	2.866	1.000	-	1.000
Description: Demonstrate thermally stable fuels and fuel system hardware concepts to enhance cooling capacity (performance), minimize fuel coking, and reduce fuel system maintenance.					
FY 2010 Accomplishments: Demonstrated adaptive engine cycles for high efficiency and ultra efficient turbine engine technologies integrated power/thermal management systems that include cooled cooling air systems, as well as approaches to deoxygenate fuel to improve thermal stability.					
FY 2011 Plans: Demonstrate adaptive engine cycles for high efficiency and ultra efficient turbine engine technologies integrated power/thermal management systems that include cooled cooling air systems, as well as approaches to deoxygenate fuel to improve thermal stability.					
FY 2012 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 632480: *Aerospace Fuels*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Demonstrate advanced fuel-based turbine engine cooling approaches. Note: In FY 2012, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2. ***Description:*** Develop and demonstrate efficacy of low-cost, environmentally friendly fuel approaches to assess and reduce soot/particulate emissions from gas turbine engines. ***FY 2010 Accomplishments:*** Assessed fuel structure/combustion performance relationship in high pressure combustor. Demonstrated advanced particulate measurement diagnostics suitable for full-scale engine testing. Assessed effectiveness of chemical kinetic models for jet fuels to match high pressure combustor flame data. ***FY 2011 Plans:*** Assess fuel structure/combustion performance relationship in high pressure combustor. Assess effectiveness of chemical kinetic models for jet fuels to match high pressure combustor flame data. ***FY 2012 Base Plans:*** Demonstrate state-of-the-art soot/particulate diagnostics in full scale engine testing. ***FY 2012 OCO Plans:***	1.592	1.196	1.000	-	1.000
Title: Major Thrust 3. ***Description:*** Develop and demonstrate enhancements to fuel system technology. ***FY 2010 Accomplishments:*** Demonstrated extended duration operation of combined cycle engine regenerative cooling systems with 2nd-generation endothermic fuels. Evaluated supersonic combustion of 2nd-generation endothermic fuels. ***FY 2011 Plans:*** Develop advanced fuel catalyst and composition approaches to achieve 2nd-generation endothermic fuel heat sink goals. ***FY 2012 Base Plans:***	1.592	1.043	1.000	-	1.000

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 632480: *Aerospace Fuels*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Demonstrate effective structural cooling of 2nd generation endothermic fuels for hypersonic vehicles. ***FY 2012 OCO Plans:***					
Title: Major Thrust 4. ***Description:*** Identify, develop, and demonstrate low-cost approaches to reducing the fuel logistics footprint for the Expeditionary Air Force. ***FY 2010 Accomplishments:*** Modeled spread of biological materials (fungus, bacteria, etc.) through fuel handling systems. Demonstrated advanced additives for mitigation of biological growth. ***FY 2011 Plans:*** Model spread of biological materials (fungus, bacteria, etc.) through fuel handling systems. Demonstrate advanced additives for mitigation of biological growth. ***FY 2012 Base Plans:*** Evaluate fuel compositional relationship to biological growth. ***FY 2012 OCO Plans:***	1.081	1.097	0.770	-	0.770
Title: Major Thrust 5. ***Description:*** Characterize and demonstrate the use of alternative hydrocarbon jet fuel to comply with Air Force certifications and standards for jet fuels. ***FY 2010 Accomplishments:*** Investigated biomass-derived fuel and specification requirements. Studied elastomer swell agents for 100 percent synthetic paraffinic kerosene fuels. Initiated study of greenhouse gas footprint assessment for alternative aviation fuels. ***FY 2011 Plans:*** Demonstrate biomass-derived fuel and specification requirements, focusing on yield potential from varying feedstocks. Study greenhouse gas footprint assessment for alternative aviation fuels. Note: In FY 2011, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 Base Plans:***	5.247	3.191	3.000	-	3.000

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 632480: *Aerospace Fuels*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Demonstrate improved alternative fuel combustion evaluation process to enable more rapid certification. Evaluate fully-synthetic biofuels in "fit-for-purpose" and rig testing to demonstrate durability. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	12.695	9.393	6.770	-	6.770

	FY 2010	FY 2011
Congressional Add: Algal Biofuels for Aviation. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	2.390	-
Congressional Add: Algal-Derived Jet Fuel for Air Force Applications. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	2.689	-
Congressional Add: Bio-JP8 Fuel Development. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	3.983	-
Congressional Add: Hawaii Microalgae Biofuel Project. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	3.505	-
Congressional Add: Renewable Hydrocarbon Fuels for Military Applications. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	1.992	-
Congressional Adds Subtotals	14.559	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603216F: *Aerospace Propulsion and Power Technology*	**PROJECT** 632480: *Aerospace Fuels*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

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 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 633035: *Aerospace Power Technology*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
633035: *Aerospace Power Technology*	13.829	5.556	5.747	-	5.747	5.670	8.379	10.048	10.213	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops and demonstrates electrical power, thermal management, and distribution for aerospace applications. This technology enhances reliability and survivability, and reduces vulnerability, weight, and life cycle costs for manned and remotely piloted aircraft. The electrical power system components developed are projected to provide a two- to five-fold improvement in aircraft reliability and maintainability, and a reduction in power system weight. This project is integrated into energy optimized aircraft efforts and power and thermal programs. This project also develops and demonstrates electrical power and thermal management technologies to enable solid state high power density sources for directed energy weapons.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1. ***Description:*** Develop electrical power and thermal management component subsystem technologies for integration with directed energy weapons (DEW) to deliver high power for DEW operation. ***FY 2010 Accomplishments:*** Initiated development of high energy laser flight demonstration power and thermal management systems. ***FY 2011 Plans:*** Support development of energy storage, power conditioning, and thermal management subsystems to support flight demonstration of a high energy laser. ***FY 2012 Base Plans:*** Support integration of power and thermal management subsystems for flight demonstration of a high energy laser. ***FY 2012 OCO Plans:***	0.207	0.250	0.200	-	0.200
Title: Major Thrust 2. ***Description:*** Develop power generation/conditioning/distribution component, energy storage, and thermal management components and subsystem technologies for integration into high power aircraft. ***FY 2010 Accomplishments:***	7.699	4.822	5.056	-	5.056

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 633035: *Aerospace Power Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Completed detailed design of high temperature, energy optimized demonstrator and initiated fabrication of power and thermal management components. Fabricated rugged/robust power electronics, motor controls, high performance electric actuators, and adaptive power and thermal management subsystems. Developed subsystems modifications to support integrated subsystems testing. ***FY 2011 Plans:*** Integrate, fabricate, and modify high temperature, energy optimized power and thermal management components. Integrate subsystems (including rugged/robust power electronics, motor controls, high performance electric actuators, and adaptive power and thermal management technologies) and perform integrated system level evaluation testing. Perform system modifications as necessary to demonstrate that integrated subsystems meet design criteria and performance objectives. Note: In FY 2011, decrease in funding is due to the movement of technologies to PE 0602203F, Aerospace Propulsion. ***FY 2012 Base Plans:*** Demonstrate robust, high power, high temperature power and thermal management subsystems as part of hardware in the loop validation and verification of system level energy optimized air platform models. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3. ***Description:*** Develop hybrid electrical power and thermal management components and subsystem technologies for special purpose applications, enabling long endurance small remotely piloted aircraft (RPA). ***FY 2010 Accomplishments:*** Investigated optimization of advanced hybrid fuel cell/battery subsystem designs to achieve minimum volume/ weight, maximum power/energy density, and increased battery/fuel cell ruggedness, efficiency, and reliability. Assessed hybrid energy management systems for expanded special purpose applications to address needed strike, intelligence, surveillance, and reconnaissance capabilities. Integrated hybridized energy electrical power, and thermal management components with end-user operational subsystems such as sensors and communication devices. ***FY 2011 Plans:***	0.346	0.484	0.491	-	0.491

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 633035: *Aerospace Power Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Develop and fabricate energy optimized, lightweight, hybrid electrical power and thermal management subsystems for increased endurance RPA and ground based special purpose applications. ***FY 2012 Base Plans:*** Demonstrate high endurance small RPA hybrid energy harvesting power and thermal management subsystems. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	8.252	5.556	5.747	-	5.747

	FY 2010	FY 2011
Congressional Add: Methanol Fuel Cell Development for USAF Battlefield Integrated Tactical Energy System (BRITES). ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	2.390	-
Congressional Add: Silicon Carbide Power Modules for the F-35 Joint Strike Fighter. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	2.390	-
Congressional Add: Texas Research Institute for Environmental Studies. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Adds Subtotals	5.577	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 633035: *Aerospace Power Technology*

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 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 634921: *Aircraft Propulsion Subsystems Int*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
634921: *Aircraft Propulsion Subsystems Int*	38.383	41.403	17.713	-	17.713	17.874	17.567	19.144	19.458	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops and demonstrates technology to increase turbine engine operational reliability, durability, mission flexibility, and performance while reducing weight, fuel consumption, and cost of ownership. The Aerospace Propulsion Subsystems Integration (APSI) project includes demonstrator engines for manned systems and concept and efficient small scale propulsion for remotely piloted aircraft and cruise missile applications. The demonstrator engines integrate the core (high-pressure spool) technology developed under the Advanced Turbine Engine Gas Generator project with the engine (low-pressure spool) technology such as fans, turbines, engine controls, mechanical systems, exhaust nozzles, and augmentors. Additionally, this project includes activities to improve propulsion safety and readiness. This project also focuses on integration of inlets, nozzles, engine/airframe compatibility, and power and thermal management subsystems technologies. The APSI project provides aircraft with potential for longer range and higher cruise speeds with lower specific fuel consumption, surge power for successful engagements, high sortie rates with reduced maintenance, reduced life cycle cost, and improved survivability, resulting in increased mission effectiveness. Technologies developed are applicable to sustained high-speed vehicles and responsive space launch. The APSI project is focused on improving propulsion capabilities while at the same time reducing the cost of ownership. Anticipated technology advances include turbine engine improvements providing approximately twice the range for a sustained supersonic combat aircraft, doubling the time on station with 10 times the power output for surveillance aircraft and propulsion for a high speed supersonic missile with double the range for time sensitive targets. A portion of this project supports the demonstration of adaptive cycle technologies, which develop component technology for an adaptive cycle engine architecture that provides optimized performance, fuel efficiency, and durability for widely varying mission needs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	2.625	7.267	1.800	-	1.800
Description: Design, fabricate, and demonstrate durability and integration technologies for turbofan/turbojet engines to improve durability, supportability, and affordability of AF aircraft. ***FY 2010 Accomplishments:*** Completed preliminary design and began detailed design of advanced features for durable fans, turbines, mechanical systems, interactions between the inlet and fan, and controls/accessories, to include advanced cooling design for low pressure turbine blades, health monitoring, light weight externals, and repair validation. ***FY 2011 Plans:*** Complete detailed design and begin fabricate hardware for advanced features for durable fans, turbines, mechanical systems, interactions between the inlet and fan, and controls/accessories, to include advanced cooling design for low pressure turbine blades, health monitoring, light weight externals, and repair validation.					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 634921: *Aircraft Propulsion Subsystems Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Note: In FY 2011, funding is increased due to shift in emphasis from preliminary design to detailed design of durable turbine engines. ***FY 2012 Base Plans:*** Continue fabrication of low spool engine components. Investigate inlet and exhaust interactions. Continue to develop controls and accessories, health monitoring technologies, and light weight external components. Continue to assess and validate repair techniques. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2. ***Description:*** Design, fabricate, and test advanced component technologies for improved performance and fuel consumption of turbofan/turbojet engines. ***FY 2010 Accomplishments:*** Initiated assembly testing of engine designs for a supersonic and subsonic engine using variable cycle features, an advanced fan, improved turbine using cooled metal and ceramic matrix composites, advanced augmentor, and lightweight organic matrix composite cases and ducts. Began to fabricate advanced adaptive cycle (third air stream) engine technologies, including an advanced fan, high work variable low turbine for long dwell time, controls, inlet integration, and advanced exhaust nozzle for subsonic to sustained supersonic flight. Initiated preliminary design for a high bypass/high overall pressure ratio engine for improved fuel consumption. ***FY 2011 Plans:*** Continue fabrication and begin assembly of advanced adaptive cycle (third air stream) engine technologies, including an advanced fan, high work variable low turbine for long dwell time, controls, inlet integration, and advanced exhaust nozzle for subsonic to sustained supersonic flight. Continue preliminary design for a high bypass/high overall pressure ratio engine technologies for improved fuel consumption. ***FY 2012 Base Plans:*** Complete assembly and instrumentation of advanced adaptive cycle (third air stream) engine technologies, including an advanced fan, high work variable low turbine for long dwell time, controls, inlet integration, and advanced exhaust nozzle for subsonic to sustained supersonic flight. Conduct experimental testing of engine technologies. Complete preliminary design and initiate detailed design for high bypass/high overall pressure ratio	27.577	26.142	14.713	-	14.713

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
engine technologies for improved fuel consumption. Note: In FY 2012, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3. ***Description:*** Design, fabricate, and test component technologies for limited life engines to improve the performance, durability, and affordability of missile and remotely piloted aircraft engines. ***FY 2010 Accomplishments:*** Conducted preliminary design of a higher specific thrust, low cost expendable turbine engine for improved fuel efficiency to significantly improve range. Conducted preliminary design of advanced fan, advanced low spool turbine, and advanced engine components for improved fuel efficient subsonic unmanned turbofan engines. Conducted durability testing of advanced efficient small scale propulsion demonstrator engine. ***FY 2011 Plans:*** Conduct detailed design of a higher specific thrust, low cost expendable turbine engine for improved fuel efficiency to significantly improve range. Conduct detailed design of advanced fan, advanced low spool turbine spool, and advanced engine components for fuel efficient subsonic unmanned turbofan engines. ***FY 2012 Base Plans:*** Complete detailed design and initiate fabrication of components of a higher specific thrust, low cost expendable turbine engine for improved fuel efficiency to significantly improve range. Complete detailed design of advanced fan, advanced low spool turbine spool, and advanced engine components for fuel efficient subsonic unmanned turbofan engines. Note: In FY 2012, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 OCO Plans:***	4.994	7.994	1.200	-	1.200
Accomplishments/Planned Programs Subtotals	35.196	41.403	17.713	-	17.713

	FY 2010	FY 2011
Congressional Add: Small Turbofan Versatile Affordable Advanced Turbine Engine Program.	3.187	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603216F: *Aerospace Propulsion and Power Technology*	**PROJECT** 634921: *Aircraft Propulsion Subsystems Int*

	FY 2010	FY 2011
FY 2010 Accomplishments: Conducted Congressionally-directed effort.		
FY 2011 Plans:		
Congressional Adds Subtotals	3.187	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

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 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 634922: *Space & Missile Rocket Propulsion*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
634922: *Space & Missile Rocket Propulsion*	28.535	31.840	27.603	-	27.603	31.395	39.196	40.894	41.566	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced and innovative low-cost rocket turbo-machinery and components, low-cost space launch propulsion technologies, and advanced propellants for launch and orbit transfer propulsion. Additionally, this project develops technologies for the sustainment of strategic systems (including solid boost/missile propulsion, post boost control, and aging and surveillance efforts) and tactical rockets. Characteristics such as environmental acceptability, affordability, reliability, responsiveness, reduced weight, and reduced operation and launch costs are emphasized. Increased life and performance of propulsion systems are key goals. This project also develops chemical, electrical, and solar rocket propulsion technologies for station-keeping and on-orbit maneuvering applications. Technology areas investigated include ground demonstrations of compact, lightweight, advanced propulsion technologies, higher efficiency energy conversion systems (derived from an improved understanding of combustion fundamentals), and high-energy propellants. Technological advances developed in this program could improve the performance of expendable payload capabilities by approximately 20-50 percent and reduce launch, operations, and support costs by approximately 30 percent. Responsiveness and operability of propulsion systems will be enhanced for reusable launch systems. Technology advances could also lead to seven-year increase in satellite on-orbit time, a 50 percent increase in satellite maneuvering capability, a 25 percent reduction in orbit transfer operational costs, and a 15 percent increase in satellite payload. Aging and surveillance efforts for solid rocket motors could reduce lifetime prediction uncertainties for individual motors by 50 percent, enabling motor replacement for cause. The efforts in this project contribute to the sustainment of the rocket propulsion industry, providing rocket propulsion technology for the entire Department of Defense and often NASA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	18.596	26.421	20.499	-	20.499
Description: Develop liquid rocket propulsion technology for current and future space launch vehicles. ***FY 2010 Accomplishments:*** Demonstrated through hot fire testing advanced cryogenic upper stage hardware to validate and verify modeling and simulation tools developed. Continued development of hydrocarbon engine components for integration and demonstration in advanced hydrocarbon engine concepts for future reusable launch vehicles. Initiated sub-scale component testing to demonstrate hydrocarbon boost technologies. Continued material manufacturing scale-up effort to support hydrocarbon boost demonstration program. ***FY 2011 Plans:*** Continue, through hot fire testing, the validation and verification of modeling and simulation tools developed for advanced cryogenic upper stage technologies. Continue development of hydrocarbon engine components for					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 634922: *Space & Missile Rocket Propulsion*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
integration and demonstration in an advanced hydrocarbon engine concept for future reusable launch vehicles. Continue sub-scale component testing to demonstrate hydrocarbon boost technologies. Continue material manufacturing scale-up effort to support hydrocarbon boost demonstration program. Note: In FY 2011, efforts in this thrust are increased due to higher AF priorities. ***FY 2012 Base Plans:*** Complete the validation and verification of modeling and simulation tools developed for advanced cryogenic upper stage technologies. Continue development of hydrocarbon engine components for integration and demonstration in an advanced hydrocarbon engine concept for future reusable launch vehicles. Continue sub-scale preburner and turbine component testing to demonstrate hydrocarbon boost technologies. Continue ox-rich material manufacturing scale-up effort to support hydrocarbon boost demonstration program. Conduct component scale-up and characterization for advanced hydrocarbon engine technologies using fuels other than kerosene. Note: In FY 2012, funding is decreased due to higher Air Force priorities. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2. ***Description:*** Develop solar electric, electric, and monopropellant propulsion technologies for existing and future satellites, upper stages, orbit transfer vehicles, and satellite maneuvering. ***FY 2010 Accomplishments:*** Continued hardware scale-up for an advanced multi-mode (high thrust or high efficiency) propulsion system for satellites. Completed demonstration of advanced chemical propulsion system for satellites. Completed development and demonstration of monopropellant thruster technologies for spacecraft. ***FY 2011 Plans:*** Initiate scale-up of micro propulsion technologies for spacecraft with the need for high mobility on orbit. Continue hardware scale-up and prepare to conduct testing of hardware for an advanced multi-mode (high thrust or high efficiency) propulsion system for satellites. Scale-up of next generation of chemical thrusters for spacecraft propulsion systems. Note: In FY 2011, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 Base Plans:*** Conduct scale-up of propulsion technologies for spacecraft with the need for high mobility on orbit. Complete hardware scale-up and conduct testing of hardware for an advanced multi-mode (high thrust or high efficiency)	6.435	3.388	3.953	-	3.953

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 634922: *Space & Missile Rocket Propulsion*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
propulsion system for satellites. Build components for integration and demonstration of next generation of chemical thrusters for spacecraft propulsion systems. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3. ***Description:*** Develop and demonstrate missile propulsion and Post Boost Control Systems technologies for ballistic missiles. ***FY 2010 Accomplishments:*** Developed advanced missile propulsion technologies. Conducted sub-scale component developments providing sub-scale validation of modeling and simulation tools. ***FY 2011 Plans:*** Continue development of advanced missile propulsion technologies. Continue sub-scale component developments providing sub-scale validation of modeling and simulation tools. Note: In FY 2011, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 Base Plans:*** Continue development of advanced missile case, insulation, and nozzle technologies. Continue sub-scale component developments providing sub-scale validation of modeling and simulation tools. Complete propellant component development and transition into next generation integrated motor demonstration. ***FY 2012 OCO Plans:***	2.686	1.263	1.762	-	1.762
Title: Major Thrust 4. ***Description:*** Develop and demonstrate aging and surveillance technologies for strategic systems to reduce lifetime prediction uncertainty for individual motors, enabling motor replacement for cause. ***FY 2010 Accomplishments:*** Conducted full-scale demonstration of advanced aging and surveillance tools for solid rocket motors to validate and verify modeling and simulation tools and component technologies. ***FY 2011 Plans:***	0.818	0.768	1.389	-	1.389

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 634922: *Space & Missile Rocket Propulsion*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Continue integration and full-scale demonstration of advanced aging and surveillance tools for solid rocket motors to validate and verify modeling and simulation tools and component technologies. Complete assessment of effort modeling critical defects in solid rocket motors. ***FY 2012 Base Plans:*** Continue integration and full-scale demonstration of advanced aging and surveillance tools for solid rocket motors to validate and verify modeling and simulation tools and component technologies. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	28.535	31.840	27.603	-	27.603

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

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 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 635098: *Advanced Aerospace Propulsion*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
635098: *Advanced Aerospace Propulsion*	23.043	13.177	30.124	-	30.124	17.661	18.304	20.006	20.336	Continuing	Continuing

Note

Note: In FY 2012, funding in this project is increased to complete scramjet engine flight demonstrations.

A. Mission Description and Budget Item Justification

This project develops and demonstrates, via ground and flight tests, the scramjet propulsion cycle to a technology readiness level appropriate for full integration with other engine cycles (including turbine and rocket-based) to provide the Air Force with transformational military capabilities. The primary focus is on the hydrocarbon-fueled, scramjet engine. Multi-cycle engines will provide the propulsion systems for possible application to support aircraft and weapon platforms operating over the range of Mach 0 to 8+. Efforts include scramjet flow-path optimization to enable operation over the widest possible range of Mach numbers, active combustion control to assure continuous positive thrust (even during mode transition), robust flame-holding to maintain stability through flow distortions, and maximized volume-to-surface area to minimize the thermal load imposed by the high-speed engine. Thermal management plays a vital role in scramjet and combined cycle engines, including considerations for protecting low speed propulsion systems (e.g., turbine engines) during hypersonic flight.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	23.043	13.177	30.124	-	30.124
Description: Develop and demonstrate technologies for a hydrocarbon-fueled scramjet with robust operation over a range of Mach 4 to 8. ***FY 2010 Accomplishments:*** Completed first integrated air vehicle/propulsion flight tests. Conducted post test data reduction. ***FY 2011 Plans:*** Continue flight testing of a scramjet engine demonstrator. Analyze flight test data and begin preparing a final report. Demonstrate small scale scramjet engine to technology readiness level 6. Note: In FY 2011, efforts in this thrust are decreased due to higher AF priorities. ***FY 2012 Base Plans:*** Complete flight testing of a scramjet engine demonstrator. Analyze flight test data and complete a final report. Develop and demonstrate tactically compliant subsystems, including scramjet engine start system, fuel system,					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 635098: *Advanced Aerospace Propulsion*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
and engine controls. Note: In FY 2012, efforts in this thrust are increased to complete scramjet engine flight demonstrations.					
FY 2012 OCO Plans:					
Accomplishments/Planned Programs Subtotals	23.043	13.177	30.124	-	30.124

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

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 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 63681B: *Advanced Turbine Engine Gas Generator*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
63681B: *Advanced Turbine Engine Gas Generator*	56.168	34.766	32.996	-	32.996	34.179	27.260	28.903	29.378	Continuing	Continuing

Note

Note: The funding in this project decreases in FY 2011 due to planned taper of turbine engine technologies.

A. Mission Description and Budget Item Justification

This project develops and demonstrates technology to increase turbine engine operational reliability, durability, mission flexibility, and performance while reducing weight, fuel consumption, and cost of ownership. The objective is to provide the continued evolution of technologies into an advanced gas generator in which the performance, cost, durability, reparability, and maintainability can be assessed in a realistic engine environment. The gas generator, or core, is the basic building block of the engine and nominally consists of a compressor, a combustor, a high-pressure turbine, mechanical systems, and core subsystems. Experimental core engine demonstration validates engineering design tools and enhances rapid, low-risk transition of key engine technologies into engineering development, where they can be applied to derivative and/or new systems. These technologies are applicable to a wide range of military and commercial systems including aircraft, missiles, land combat vehicles, ships, and responsive space launch. Component technologies are demonstrated in a core (sub-engine). This project also assesses the impact of low spool components (such as inlet systems, fans, low pressure turbines, and exhaust systems) and system level technologies (such as integrated power generators and thermal management systems) on core engine performance and durability in "core-centric engine" demonstration. The core performances of this project are validated on demonstrator engines in Project 4921 of this Program Element. A portion of this project supports the demonstration of adaptive cycle technologies, which develop component technology for an adaptive cycle engine architecture that provides optimized performance, fuel efficiency, and durability for widely varying mission needs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	45.298	21.410	19.798	-	19.798
Description: Design, fabricate, and demonstrate performance predictions in core engines, using innovative engine cycles and advanced materials for turbofan/turbojet engines. ***FY 2010 Accomplishments:*** Completed detailed design and initiated hardware fabrication of high temperature capable, durable compressor, combustor, and turbine for adaptive core engine. Completed preliminary design and initiated detailed design of component technologies for a core-centric durability engine demonstration. Conducted detailed design of component technologies for increased reliability, maintainability, and affordability for potential transition to fielded systems. Conducted analysis and conceptual design of system-level technologies and weapon systems					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 63681B: *Advanced Turbine Engine Gas Generator*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
integration on core engine performance. Note: In FY 2010, efforts in this thrust are increased to complete hardware fabrication and conduct engine demonstrations. ***FY 2011 Plans:*** Continue hardware fabrication and initiate assembly of high temperature capable, durable compressor, combustor, and turbine for adaptive core engine. Complete detailed design and initiate fabrication of component technologies for a core-centric durability engine demonstration. Conduct fabrication of component technologies for increased reliability, maintainability, and affordability for potential transition to fielded systems. Conduct preliminary design and initiate detailed design of system-level technologies and weapon systems integration on core engine performance. Note: In FY 2011, efforts in this thrust are decreased due to completion of hardware fabrication and engine demonstrations. ***FY 2012 Base Plans:*** Complete hardware fabrication, assembly and experimental demonstration of high temperature capable, durable compressor, combustor, and turbine for adaptive core engine. Complete fabrication of component technologies and initiate assembly for a core-centric durability engine demonstration. Continue fabrication of component technologies for increased reliability, maintainability, and affordability for potential transition to fielded systems. Conduct detailed design of system-level technologies and weapon systems integration on core engine performance. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2. ***Description:*** Design, fabricate, and demonstrate high overall pressure ratio cores to provide increased durability and affordability with lower fuel consumption for turbofan/turboshaft engines. ***FY 2010 Accomplishments:*** Continued preliminary design and initiated long lead fabrication of core for efficient core engine concept with advanced core technologies including high efficiency, high pressure ratio, high temperature capability compressor, high efficiency, high heat release combustor, and high work, high cooling effectiveness turbine with an integrated thermal management system and advanced mechanical systems. Completed hardware fabrication, and continued selective risk reduction experimental demonstrations of remotely piloted aircraft (RPA) small versatile affordable advanced core engine technologies including a high heat release combustor, durable high performance turbine, and systems for thermal management and advanced power extraction. Completed	10.870	13.356	13.198	-	13.198

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 63681B: *Advanced Turbine Engine Gas Generator*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
preliminary design and initiate long lead fabrication of efficient small engine component technologies for use in RPA applications. ***FY 2011 Plans:*** Complete preliminary design of core for efficient core engine concept with advanced core technologies including high efficiency, high pressure ratio, high temperature capability compressor, high efficiency, high heat release combustor, and high work, high cooling effectiveness turbine with an integrated thermal management system and advanced mechanical systems. Continue selective risk reduction experimental demonstrations of RPA small versatile affordable advanced core engine. Continue detailed design and initiate fabrication of efficient small engine component technologies including high efficiency, high pressure ratio, high temperature capability compressor, high efficiency, high heat release combustor, and high work, high cooling effectiveness or uncooled turbine for use in RPA applications. ***FY 2012 Base Plans:*** Initiate detailed design, fabrication and begin assembly and instrumentation of core for efficient core engine concept with advanced core technologies including high efficiency, high pressure ratio, high temperature capability compressor, high efficiency, high heat release combustor, and high work, high cooling effectiveness turbine with an integrated thermal management system and advanced mechanical systems. Continue selective risk reduction experimental demonstrations of RPA small versatile affordable advanced core engine. Complete fabrication of efficient small engine component technologies including high efficiency, high pressure ratio, high temperature capability compressor, high efficiency, high heat release combustor, and high work, high cooling effectiveness or uncooled turbine for use in RPA applications. Initiate conceptual design for advanced very efficient and very high pressure ratio core engine. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	56.168	34.766	32.996	-	32.996

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603216F: *Aerospace Propulsion and Power Technology*	PROJECT 63681B: *Advanced Turbine Engine Gas Generator*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

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.