ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2007

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603003A - AVIATION ADVANCED TECHNOLOGY**

	COST (In Thousands)	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
	Total Program Element (PE) Cost	100095	96575	53890	57615	70049	66545	78004	82986
313	ADV ROTARYWING VEH TECH	27144	31173	42475	45726	56412	51866	57271	59476
435	AIRCRAFT WEAPONS	2765	3298	2908	3201	3744	2672		
436	ROTARYWING MEP INTEG	1868	2691				1745	10245	12792
447	ACFT DEMO ENGINES	7356	8284	8507	8688	9893	10262	10488	10718
BA7	AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)	57607	47915						
BA8	VECTORED THRUST DUCTED PROPELLER (CA)	3355	3214						

A. Mission Description and Budget Item Justification: The Aviation Advanced Technology Development program element (PE) matures and demonstrates manned and unmanned rotary wing vehicle (RWV) technologies and systems in support of the Future Force and, where feasible, exploits opportunities to enhance Current Force capabilities. Within this PE, aviation technologies will be matured and integrated into realistic and robust demonstrations. Work will involve maturing manned and unmanned teaming in combat and combat support operations for attack, reconnaissance, air assault, and command and control missions. Integrated unmanned operations will be advanced through autonomous collaboration and maturation of advanced unmanned technologies. Components and subsystems that enable increased system survivability and crew protection, platform lift, maneuverability, agility and endurance, autonomous flight, common mission equipment architecture, team-based intelligent mission operations, manned / unmanned battle space integration, and/or improved operational availability and reduced maintenance will be demonstrated. Major efforts within this PE include component maturation and flight demonstrations; manned-unmanned system teaming demonstrations; operating and support cost reduction applications; joint concept exploration including multi-role rotorcraft and integrated full-spectrum aircraft survivability. This PE also supports the maturation and demonstration of major aviation subsystems in propulsion, drive-trains, aeromechanics and flight controls for future force manned and unmanned aviation systems in accordance with the Army Aviation Transformation Plan. This PE also matures manned and unmanned rotorcraft sensor and weaponization technologies for air-to-air and air-to-ground application. Projects BA7 and BA8 fund congressional interest items. Department of Defense (DoD) systems such as the US Army AH-64 Apache, UH-60 Black Hawk, CH-47 Chinook, Armed Reconnaissance Helicopter, Light Utility Helicopter; the US Navy SH-60 Seahawk; and the US Marine Corps V-22 Osprey, AH-1 Cobra, and CH-53 Super Stallion benefit and are supported directly or indirectly by this PE. Related applied research is conducted under PE 0602211A (Aviation Technology). Aircraft survivability efforts in this PE are coordinated with PE 0603313A (Missile and Rocket Advanced Technology) and PE 0603270A (Electronic Warfare Technology). Efforts under this PE transition to programs supported by PE 0603801A (Aviation - Advanced Development), PE 0604801A (Aviation - Engineering Development), and PE 0604270A (Electronic Warfare Development). This PE does not duplicate any efforts within the Military Departments and supports Project Reliance for which the Army is the lead service for the maturation of rotorcraft science and technology. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this PE is performed by the Aviation and Missile Research, Development, and Engineering Center with facilities located at Redstone Arsenal, AL; Fort Eustis, VA; and Moffett Field, CA.

B. Program Change Summary	FY 2006	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2007)	106577	64654	80406	90682
Current BES/President's Budget (FY 2008/2009)	100095	96575	53890	57615
Total Adjustments	-6482	31921	-26516	-33067
Congressional Program Reductions		-19069		
Congressional Rescissions				
Congressional Increases		51700		
Reprogrammings	-6482	-710		
SBIR/STTR Transfer				
Adjustments to Budget Years			-26516	-33067

FY08 and FY09 funds decreased to provide additional funding to 6.2 efforts (622211) and to fund higher priority projects.

Twenty-three FY07 congressional adds totaling $49553 (after adjustment for Congressional Undistributed Reductions) were added to this PE.

($2157) Unmanned Aerial Vehicle - Resupply
($1726) Locust USA Heavy Fuel Burning Engines for UAVs
($958) Reconfiguration Tooling System
($6230) Excaliber Tact UCAV
($4601) Process Tech for Replacement Part Production
($958) Fuel Cells for Mobile Robotic System Projects
($958) Nanocrystaline Diamond Rotor Blade Protection
($2492) Improved VAROC/UAV Compression System Dev
($3738) Mission Execution Technology Impementation
($2875) Universal-Full Authority Digital Engine Control
($1535) Versatile Affordable Adv Turbine Engine (VAATE)
($1294) Vertical Takeoff & Landing UAV
($958) Alternate Payload Munition (APL-BU)
($1246) CompositeTail for Armed Reconnaissance Helicopter
($479) Directed Energy Systems for UAV Payloads
($1917) Drive Sys Composite Structual Component Reduction
($1869) Helmet Mounted Display/Visor Projection
($1869) Integrated Aircraft Test Bed
($958) Lgtwt Sapphire Transparent Armor for Rotorcraft

($1054) Quick Materiel Express Delivery System
($4697) Rapid Prototyping for Special Projects
($1869) Rapid Tactical Integration and Fielding of Systems
($3115) Vectored Thrust Ducted Propeller Compound Helo

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February 2007

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603003A - AVIATION ADVANCED TECHNOLOGY**	**313**

COST (In Thousands)	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
313 ADV ROTARYWING VEH TECH	27144	31173	42475	45726	56412	51866	57271	59476

A. Mission Description and Budget Item Justification: The Advanced Rotary Wing Vehicle (RWV) Technology project matures and demonstrates rotary wing manned and unmanned platform technologies for the Future Force and, where feasible, exploits opportunities to enhance Current Force capabilities. The Army Aviation Transformation Plan requires rotorcraft systems that have significantly increased / improved lift, range, survivability, and mission capability with an overall reduction in logistics and cost of operation. The critical technologies to support these capabilities will be matured through the demonstration of key subsystems such as rotors, active controls, structures, drive-train, integrated threat protection technologies, as well as prototype UAVs. The near-term demonstration of Vertical Take Off and Landing (VTOL) UAVs will focus on the A-160 Hummingbird for Reconnaissance, Surveillance, and Target Acquisition (RSTA) and communications relay capabilities. The integration of technology into UAV and manned teaming operations involves the merging of a common operating architecture and incorporates team survivability. The Enhanced Rotorcraft Drive System program provides a 40 percent increase in power-to-weight ratio, 30 percent reduction in both production and Operating and Support (O&S) costs and a 15 decibel (dB) reduction in noise for the drive-systems of both manned and unmanned rotorcraft. These technologies are a significant contributor to Future Force capability and enable a 40 percent increase in payload for the AH-64 Apache, a 20 percent increase in range for the UH-60 Black Hawk, and over a 25 percent increase in range for the CH-47 Chinook over their respective baselines. The Survivable, Affordable, Reparable Airframe Program (SARAP) reduces weight and increase the survivability for both manned and unmanned systems. This technology is a significant contributor to Future Force capability and enables an increase in range for the UH-60 Black Hawk. The Rotorcraft Survivability program reduces Infra-Red (IR) signatures by up to 50 percent, incorporates innovative directional IR jamming, small arms and Rocket Propelled Grenades (RPG) hostile fire warning, threat location cueing and eye-safe visual dazzler components to improve aircraft survivability by at least 50 percent against small arms, RPG and Man-Portable Air Defense Systems (MANPADS) threats. This project also supports Concept Exploration of a Joint Heavy Lift rotorcraft platform. This effort assesses the technologies and system design trades to enable vertical mounted maneuver and Naval sea-basing. The Capability-Based Operations and Support Technologies (COST) program improves operational availability and reduces maintenance time by providing detection of 75 percent of the critical mechanical/electrical component failures, and 40 percent prognostic capability for long lead-time airframe and propulsion components, resulting in timely delivery of flight-critical parts. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center located at Fort Eustis, VA.

Accomplishments/Planned Program:	FY 2006	FY 2007	FY 2008	FY 2009
UAV Technology Demonstration: In FY06, continued engineering and ground testing to resolve unexpected technical problems with the vehicle internal combustion engine driveline. Began integrating into the test vehicle a Commercial Off-The-Shelf turboshaft engine with new 2-speed transmission to provide reliable power for high rotor RPM, high gross weight, and endurance flight testing. Continued to upgrade vehicle systems for reliability. In FY07, fly UAV testbed with turboshaft engine installed. Continue to use full-power in a safer ground testing environment to increase operational hours and experience in order to mitigate risk during flight operations. Conduct flight tests (involving approximately 20 flights of varying duration) to demonstrate envelope for range, endurance (up to 20 hours), altitude (up to 30,000 ft.) and gross weight (up to 5000 lbs.).	10000	14407		
Robotics Collaboration: In FY06, completed systems integration, checkout, and preliminary flight validation of Unmanned Autonomous	4635	2860		

Collaborative Operations (UACO) architecture on the RMAX UAV platform. Demonstrated UACO tactical behaviors using two RMAX UAVs collaborating to execute tasks assigned by a single operator. Completed integration of Soldier-Machine Interface software capable of high-level tasking by the operator from the vehicle mounted Tactical Control Unit or the Soldier-borne Tablet-based Control Unit. Integration and preparation of UGVs for UACO testing is ongoing. In FY07, conduct demonstration system testing and trial runs with three RMAX UAVs and two UGVs using a HMMWV-mounted Control Unit. Conclude program with final demonstration of Air-Ground Cooperative Engagement using Soldiers commanding and assessing multiple autonomous UAVs and UGVs at the McKenna MOUT Range at Ft. Benning, GA. Work on this effort is also being accomplished under PE/project: 62716/H70; PE/project: 62211/47A; PE/project: 63005/497 and PE/project: 63005/515.				
Rotorcraft Survivability: In FY06, began development of a low-cost aircraft self-protection suite to detect, disrupt, and defeat small arms fire, rocket-propelled grenades (RPGs), and current and next-generation Man Portable Air Defense System (MANPADS) threats. Integrated an adaptive Infra-red (IR) engine exhaust suppressor, super-lightweight thermal insulation, and multi-spectral coatings. Demonstrated up to 50% reduction in total aircraft IR signature in flight, which yields a 25% to 30% reduction in IR MANPADS lock-on range. In FY07, continue the maturation, evaluation, and integration of a hostile fire indicator, visual cues to threat location, and a visual targeting disruption system. In FY08, will integrate a suite of candidate survivability technologies on a Black Hawk helicopter and perform flight tests to quantify the increase in threat detection range as well as the reduction in the threats' lock-on range and targeting accuracy. Will begin developing a fully-integrated team-based aircraft self-protection suite for defeating current MANPADS threats, small arms and RPGs, anti-tank guided missiles, and radar threats, utilizing the concept of distributed survivability. Distributed survivability is where the team can share detection and countering information and effects (such as where one platform does not have a working piece of equipment or where a UAV might not have the capability to fly with the added weight of the detection and countering devices). Will develop UAV passive signature reduction technologies and integrate advanced countermeasures and threat warning systems. In FY09, will integrate cognitive decision aiding technologies (developed earlier under the Survivability Planner Associate Rerouter/Manned-Unmanned Rotorcraft Enhanced Survivability effort) into multiple manned and unmanned aircraft and complete the team-based self-protection suite. Work on this effort is also being accomplished under PE/project: 62270/442 and PE/project: 63270/K16.	4509	7784	8777	7311
Rotorcraft Structures: In FY06, fabricated virtual prototype (full digital definition and simulations/models) validation hardware for ballistic, static, and crash testing and transitioned Survivable, Affordable, Repairable Airframe Program structural technologies, concepts, and methodologies to PEO Aviation and the US Navy in support of current and developmental manned and unmanned rotary wing systems such as UH-60 Black Hawk, CH-47 Chinook, and CH-53 Super Stallion.	1000			
Enhanced Rotorcraft Drive System (ERDS): In FY06, refined the design of ERDS (composite housing and helical face gears) applicable for upgrades to the Armed Reconnaissance Helicopter, UH-60 Black Hawk, the Mission Enhanced Little Bird and scaleable to Joint Heavy Lift aircraft. Initiated the development of drive train diagnostic algorithms for use in the Army's Health and Usage Monitoring System. In FY07, complete design, analysis, and fabrication for the composite gearbox housing; complete analytical tools for helical face-gear manufacturing and profile/mesh development; start surface durability testing of advanced gear materials in helical face-gear configuration; begin fabrication of support system components for the demonstrator transmission; generate failure mode analysis and diagnostic algorithms for face-gear applications; fabricate investment cast housing for gearbox; perform 200 hour testing of investment cast gearbox housing; and conduct detailed design and fabrication of tooling for integral composite coupling/shaft. In FY08, will begin fabrication of the helical face gears, gears for the enhanced power density tail rotor gearbox, and composite shafts. Will conduct demonstration testing of the composite gearbox housing. In FY09, will complete fabrication of components; will conduct endurance testing of the helical face gear design; will perform demonstration tests of the composite shaft/coupling, composite main rotor drive shaft, and tail rotor enhanced power density gears. Will validate diagnostic algorithms as part of the demonstration tests.	1000	2243	4190	5000

Joint Heavy Lift (JHL): In FY06, advanced the five competing concept designs and assessed their performance characteristics as part of the ongoing joint requirements refinement. Completed an initial Map Exercise, three iterations on the baseline designs, and initiated survivability and downwash analyses. The Map Exercise allowed contractors to participate with soldier/planner/tacticians at Fort Rucker in a simulated exercise that utilized their design concepts in several typical scenarios. Both contractor and Government participants gained understanding of the merits and demerits of their design concepts to enable adjustments in their plans. In FY07, complete the final Concept Refinement Design Review; complete Concept Design and Analysis including an Independent Government performance and risk assessment; initiate and complete a preliminary Joint Concept Analysis of Alternatives; and develop a draft Capabilities Development Document.	6000	3065		
High Altitude Long Endurance (HALE) Platforms: In FY08, will conduct first flight and begin expansion of envelope to demonstrate endurance, durability, maintainability, and structural life. Will evaluate manning schemes to determine optimum personnel requirements. In FY09, will refine flight characteristics and demonstrate air vehicle endurance, foot-print and turn time (time to prepare vehicle for next mission). Will demonstrate payload performance and data assimilation and storage. Will validate military utility of air vehicle in concert with ground control station and military operators.			5000	5000
Rotor Design & Capabilities: In FY08, will mature passive and active control methods for improving rotorcraft performance in a heavy vibration environment. Will initiate investigation to determine benefit, design implications and limitations of the Optimum Speed Rotor applied to rotorcraft of different classes and mission types. Will evaluate high lift technologies to provide rotor systems with improved aero performance, while enhancing damage tolerance. Will characterize advanced main rotor hub concepts compatible with on-blade rotor control systems leading to increased rotorcraft performance. Will evaluate applicability of candidate technologies to current airframes. In FY09, will characterize rotor system performance across the flight envelope, under a wide variety of flight conditions and mission types through rigorous flight testing. Will initiate the design of lightweight active rotor technology intended to improved aerodynamic efficiencies and maximize air vehicle performance. Will demonstrate enhanced rotor durability and performance technologies to assess contribution to aircraft maintenance and performance. Will mature leading concepts in passive and active technology arena to provide enhanced aerodynamic performance with optimized active and passive technology implementation.			17700	19708
Capability-Based Operations and Sustainment Technologies (COST): In FY08, will expand the existing engine diagnostic models to include continuous on-board power availability calculations, prognostic models, and advanced control models to allow the pilot to continuously know the engine power available for flight operations; to allow calculation of engine component efficiencies during flight to predict remaining life of components and scheduling of maintenance; and to enable the modification of the engine control laws to optimize performance based on the efficiencies of various engine modules/components. Will refine state-awareness algorithms for aircraft Center of Gravity (CG) and operating weight to enable accurate usage monitoring, thus preventing early retirement of components (as current component life is determined by an assumed worse-case application of CG and operating weight). Will integrate rotor/swash-plate bearing and hanger bearing algorithms into a health monitoring system. Will demonstrate fusion of sensor-based load and damage detection with prognostic algorithms to determine structural integrity. In FY09, will validate and refine engine algorithms by testing a turboshaft engine in a controlled, instrumented test cell. Will perform full-scale rig testing of rotor head and bearings to verify/validate the newly developed algorithms. Will initiate regression testing of software (which is when, during a bench test, the algorithms' functionality and interoperability with other software and sensor inputs is evaluated using simulated flight test data) in preparation for flight testing. Will demonstrate prognostication of remaining service life in damage tolerant airframe components.			6808	8707
Small Business Innovative Research/Small Business Technology Transfer Programs		814		
Total	27144	31173	42475	45726

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3 - Advanced technology development	**0603003A - AVIATION ADVANCED TECHNOLOGY**	**435**

COST (In Thousands)	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
435 AIRCRAFT WEAPONS	2765	3298	2908	3201	3744	2672		

A. Mission Description and Budget Item Justification: The Aircraft Weapons project matures and integrates manned and unmanned rotorcraft sensor and weaponization technologies for Future Force air-to-air and air-to-ground application and, where feasible, exploits opportunities to enhance Current Force capabilities. This project provides mature technologies to focus combat power on multiple targets. The technologies provide precision engagement capabilities to meet the demands of Military Operations in Urban Terrain (MOUT), force protection, and other asymmetrical threats. This project includes integration of advanced missiles, rockets, guns, fire control, advanced target acquisition and pilotage sensors, and directed energy weapons, including non-lethal capabilities onto existing and developing airframes. These capabilities are evaluated to assure compatibility and demonstrate timely, precision engagement capabilities and the full spectrum effectiveness of the manned and unmanned team. Technology integration issues concerning on-board systems, vehicle flight characteristics and weapon systems will be matured and demonstrated. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center located at Fort Eustis, VA.

Accomplishments/Planned Program:	FY 2006	FY 2007	FY 2008	FY 2009
Weapons Integration: In FY06, matured Aerial Delivery of Effects from Lightweight Aircraft (ADELA) unmanned teaming and cueing efforts for collaborative engagements and participated in the Counter-Rockets, Artillery, and Mortar (C-RAM) demonstration using the Unmanned Little Bird (ULB) to acquire threats, send video imagery, and precise target coordinates into the force protection network to engage and destroy hostile forces. Demonstrated the integration of low cost sensors and weapons (0.338 cal rifle) on a Class III UAV to provide a precision engagement capability. In FY07, ADELA concludes with a tactical fire control, human-in-the-loop protocols and collaborative, team-based weapons and precision targeting demonstration to show how small UAVs can provide an airborne sniper capability in support of ground troops in a Military Operations in Urban Terrain (MOUT) environment. Address the application of directed energy (e.g., laser, radio frequency, acoustics) non-lethal weapons concepts to manned and unmanned aviation assets by maturing two contracts for concept refinement and platform integration analysis. In FY08, will complete system integration of the Directed Energy Non-Lethal effort. Will begin validating that weapons can provide sufficient vision dazzling effects, electronics, and optics disruption/destruction and/or generation of physical discomfort to be combat effective. In FY09, will refine system development and laboratory characterization. Will demonstrate a directed energy weapon to show that it is capable of providing platform defense and force protection by dispersing or incapacitating enemy personnel to the extent that the enemy cannot make an effective engagement. Will complete ground based field exercises to fully evaluate effects and range performance and to fully characterize the system. Will refine plans to integrate system onto a combat aviation platform.	2765	3217	2908	3201
Small Business Innovative Research/Small Business Technology Transfer Programs		81		
Total	2765	3298	2908	3201

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3 - Advanced technology development	**0603003A - AVIATION ADVANCED TECHNOLOGY**	**447**

COST (In Thousands)	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
447 ACFT DEMO ENGINES	7356	8284	8507	8688	9893	10262	10488	10718

A. Mission Description and Budget Item Justification: The Aircraft Demonstration Engines project matures and demonstrates power system technologies for use in the Future Force through competitively performed design, fabrication, and test of advanced material technologies, engines, and integrated components, and, wherever feasible, exploits opportunities to enhance Current Force turbine engines. This project supports the Future Force by providing mature technologies for lighter turbine engines that provide more power, can go farther, and are easier for the warfighter to maintain and sustain. These attributes improve tactical mobility, reduce the logistics footprint, and increase survivability for rotary wing vehicles. The Small Heavy Fuel Engine (SHFE) and Advanced Affordable Turbine Engine (AATE) efforts are fully aligned with the goals of the Department of Defense (DoD) Versatile Affordable Advanced Turbine Engine (VAATE) program. VAATE goals focus on reducing specific fuel consumption (SFC) and increasing the power-to-weight (P/W) ratio of turboshaft engines while decreasing production and maintenance costs. SHFE and AATE provide significantly increased range and payload capabilities for future manned and unmanned rotorcraft and sustainment upgrades for current engines. This includes significant Operation and Support cost savings and a significantly reduced logistics footprint. The SHFE effort focuses on maturing and demonstrating advanced, affordable turbine engine technology in the 700 horsepower (HP) class engine and AATE addresses needs in the 3000 HP class. The SHFE will result in significant improvements in SFC and P/W ratio that will enable a heavy fuel (JP-8) engine capability for applications such as the UAV Testbed, Armed Reconnaissance Helicopter (ARH), AH/MH-6 Mission Enhanced Little Bird, and other future ground and aerial vehicles. The AATE effort enables enhanced operational capability that is applicable to UH-60 Black hawk and AH-64 Apache. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center located at Fort Eustis, VA.

Accomplishments/Planned Program:	FY 2006	FY 2007	FY 2008	FY 2009
UAV Technology Demonstrations - Small Heavy Fuel (Turbine) Engine (SHFE): In FY06, completed Build 1A core and Build 1B engine testing; incorporated design improvements of the compressor, combustor, turbines, mechanical components, and control and accessories into Builds 2 and 3; completed the fabrication of redesigned components for engine Build 2; and conducted rig test on redesigned combustor and mechanical systems. In FY07, complete engine testing of Build 2 and rig test optimized components consisting of a combustor, controls, and associated mechanical systems; complete the fabrication of components for engine Build 3; and conduct final engine ground stand test for Build 3 to demonstrate program goal achievement.	7356	8073		
Advanced Affordable Turbine Engine (AATE) Tech: In FY08, will complete preliminary design, detailed design, and component fabrication of the initial build of an advanced 3000 horsepower-class turboshaft engine demonstrator, building on knowledge gained in the Small Heavy Fuel Engine effort, and the DOD Versatile Affordable Advanced Turbine engine effort. Design activity will include 2-D and 3-D mechanical and aerothermal efforts to evaluate the inlet particle separator, compressor, combustor, gas generator turbine, power turbine, bearings, seals, shafts, controls, and accessories. Fabrication efforts will include component hardware and rig support hardware for initial component rig tests. In FY09, will complete initial rig-tests for several engine components (e.g. compressor, turbine, combustor, mechanical systems) to validate design aerodynamic performance and mechanical integrity prior to integrating these technologies into a gas generator for a full engine test. Will use results from initial component rig-tests to complete / refine hardware fabrication efforts as appropriate for first engine build. Will analyze component rig-test results to support redesign efforts as required for			8507	8688

future engine builds.				
Small Business Innovative Research/Small Business Technology Transfer Programs		211		
Total	7356	8284	8507	8688