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Exhibit R-2, PB 2011 Army RDT&E Budget Item Justification									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE							
2040: Research, Development, Test & Evaluation, Army BA 3: Advanced Technology Development (ATD)				PE 0603003A: AVIATION ADVANCED TECHNOLOGY							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	102.207	112.388	57.454	0.000	57.454	59.983	67.439	79.575	90.804	0	627.304
313: ADV ROTARYWING VEH TECH	41.701	39.252	42.149	0.000	42.149	42.729	47.556	55.825	62.624	Continuing	Continuing
435: AIRCRAFT WEAPONS	2.620	2.690	2.608	0.000	2.608	0.000	0.000	0.000	0.000	Continuing	Continuing
436: ROTARYWING MEP INTEG	0.000	0.000	1.754	0.000	1.754	7.619	10.070	13.752	18.013	Continuing	Continuing
447: ACFT DEMO ENGINES	11.281	17.842	10.943	0.000	10.943	9.635	9.813	9.998	10.167	Continuing	Continuing
BA7: AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)	46.605	47.630	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
BA8: VECTORED THRUST DUCTED PROPELLER (CA)	0.000	4.974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates manned and unmanned rotary wing vehicle (RWV) technologies to enable Army transformation. Within this PE, aviation technologies are matured and integrated into realistic and robust demonstrations. The PE supports the maturation and demonstration of enabling component and subsystems for rotorcraft in the following areas: rotors, drive trains, structures and survivability (project 313), weapons integration (project 435), mission equipment packages to enable control of unmanned systems (project 436) and affordable and efficient engines (project 447). Projects BA7 and BA8 fund congressional special interest items. Work in this PE is related to and fully coordinated with PE 0602211A (Aviation Technology), 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). The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan. Work in this PE is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) with facilities located at Redstone Arsenal, AL; Fort Eustis, VA; and Moffett Field, CA.

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B. Program Change Summary (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	106.285	60.097	59.703	0.000	59.703
Current President's Budget	102.207	112.388	57.454	0.000	57.454
Total Adjustments	-4.078	52.291	-2.249	0.000	-2.249
• Congressional General Reductions		-0.589			
• Congressional Directed Reductions					
• Congressional Rescissions		0.000			
• Congressional Adds		52.880			
• Congressional Directed Transfers					
• Reprogrammings	-1.214	0.000			
• SBIR/STTR Transfer	-2.864	0.000			
• Adjustments to Budget Years	0.000	0.000	-2.249	0.000	-2.249
Change Summary Explanation					
FY10 Congressionally directed increases.					

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
313: <i>ADV ROTARYWING VEH TECH</i>	41.701	39.252	42.149	0.000	42.149	42.729	47.556	55.825	62.624	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates systems/subsystems for manned/unmanned rotorcraft that provide, improved survivability, greater performance or lessen the operational costs and required maintenance. Systems demonstrated include rotors, drivetrains, robust airframe structures and integrated threat protection systems. The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan. Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Fort Eustis, VA., and the System Simulation Development Directorate, AMRDEC, Redstone Arsenal, AL.

B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Rotorcraft Survivability: These efforts increase rotorcraft survivability by reducing platform signatures as well as providing the means to more efficiently jam enemy detection and tracking systems. This effort also enhances situational awareness allowing manned/unmanned aircraft to avoid enemy air threats. In FY09, developed a modular pod-based system for housing a laser jammer turret and hostile fire indication (HFI) sensors to collectively provide a universal B-kit for rotary wing platforms. In FY10, complete development of a lightweight, multi-function laser to counter MANPADS, small arms, RPG, and laser designated threats through multi-band, infra-red and eye-safe visual energy. In FY11, will integrate a lightweight, multi-function laser on an Apache platform and demonstrate improved countermeasures effectiveness through flight testing on a threat range. Will demonstrate an aircraft survivability software adapter to allow "plug & play" capability for legacy and future aircraft survivability equipment (ASE) components and software products through hardware-in-the-loop lab testing. Work on this effort is also being accomplished under PE 0602270A, project 442 and PE 0603270A, project K16.	6.491	9.435	12.306	0.000	12.306

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009						
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #2 Rotorcraft Drive Systems: This effort demonstrates advanced rotorcraft drive technologies that increase the horsepower-to-weight ratio, reduce drive system noise, reduce production, operating and support costs, and provide automatic component impending failure detection. In FY09, completed fabrication of helical face gear components. Conducted demonstration testing of the helical face gear design. Began demonstration tests of the composite shaft/coupling, composite main rotor drive shaft and tail rotor enhanced power density gears. Validated diagnostic algorithms as part of the demonstration tests. In FY10, conduct over-torque fatigue testing of the tail rotor enhanced power density gears. Complete endurance and over-torque testing of the helical face gears. Complete demonstration testing of the composite housings and composite shaft/coupling. In FY11, will mature material technologies through bench testing to validate materials for lightweight housings, new bearings and ultra-highly loaded gears. Will initiate preliminary and detailed design of the demonstrator drive system and will evaluate these technologies relative to conventional single-speed transmissions and proposed multi-speed drive configurations. FY 2009 Accomplishments: FY 2009		4.752	3.483	3.278	0.000	3.278

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #3		7.500	0.000	0.000	0.000	0.000
High Altitude Long Endurance (HALE) Platforms: This effort represents the Army's contribution to an Air Force managed Joint Capabilities Technology Demonstration (JCTD) to demonstrate an unmanned, high altitude, long endurance surveillance system. In FY09, refined flight characteristics and demonstrated air vehicle endurance, foot-print, and turn time (time to prepare vehicle for next mission). Demonstrated payload performance and data assimilation and storage. Validated military utility of air vehicle in concert with ground control station and military operators. Work on this effort is performed in coordination with PE's 1160401BB, 1160428BB, 0604857F, 0603160BR, and 0207434F during execution of the Global Observer JCTD.						
FY 2009 Accomplishments: FY 2009						
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
OCO FY 2011 Plans: FY 2011 OCO						
Program #4 Rotor Design and Capabilities: This effort determines the performance benefits of advanced rotors through the evaluation of alternative designs aimed to satisfy future force capability needs for increased system durability, speed, range and payload. In FY09, demonstrated high lift technologies that provide rotor systems with improved aero-performance, reduced vibrations and noise. Utilized impact models and component tests to select rotor durability solutions for demonstration and fielding. Designed and demonstrated a rotor system for reliable transfer of data and power across the rotating and non-rotating interface for applications such as de-icing, on-blade controls and health and usage monitoring systems. Characterized Optimum Speed Rotor (OSR) system performance through rigorous flight testing. In FY10, begin to characterize acoustic properties of Optimum Speed Rotor through flight testing and demonstrate full flight envelope. Conduct component testing for rotor durability technologies. Conduct whirl stand and wind tunnel testing on full-scale rotor blades to demonstrate high performance rotor technologies that improve aeromechanical performance, reduce acoustic detection and reduce vibration.In FY11, will demonstrate enhanced integrated rotor durability to assess benefit to aircraft maintenance. Will demonstrate permanent erosion protection, reliable icing protection and battle damage assessment and repair technologies on full-scale rotor blades while also demonstrating improved hover performance. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base		15.986	14.098	12.017	0.000	12.017

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
OCO FY 2011 Plans: FY 2011 OCO						
Program #5 Capability-Based Operations and Sustainment Technologies (COST): Mature and demonstrate technologies that improve the operational availability of rotorcraft while reducing operating and support (maintenance) costs. In FY09, matured and refined engine prognostic/diagnostic algorithms by testing a turboshaft engine in a controlled, instrumented test cell. Performed full-scale testing (on a rotor test stand) of rotor head, flight controls and bearings to verify/validate the newly developed algorithms. Performed regression testing of software (evaluating the algorithms' functionality and interoperability with other software and sensor inputs using simulated flight test data) in preparation for system integration and flight testing. Demonstrated prognostication of remaining service life of damage tolerant airframe components. In FY10, integrate engine, flight control, electrical and rotor technologies to demonstrate the feasibility of implementing the technologies as a single solution. Apply system level data fusion techniques to increase accuracy and reduce false alarms. Conduct a system integration demonstration in an avionics systems integration laboratory. In FY11, will mature technologies to predict failures and remaining useful life of engine accessories such as fuel controls, pumps and generators. Will begin demonstration of on-board automatic adjustments for in-flight rotor smoothing/balance capability. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base		6.972	6.695	5.852	0.000	5.852

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
OCO FY 2011 Plans: FY 2011 OCO						
Program #6 Adaptive Vehicle Management System (AVMS): The AVMS integrates advanced flight controls with real-time aircraft state information to enable safe and low-effort maneuvering and real-time adaptation to aircraft state changes (degradations, damage, mission, etc.). The AVMS demonstrates technology that enables Level 1 (most acceptable) handling qualities in the entire flight envelope, reduce flight control line replaceable unit counts by over 20% and reduce flight control system weight. In FY10, compile and identify technologies, including emerging applied research, and analyze the technology status and risk assessment of each for inclusion in the AVMS flight demonstration. Generate a preliminary design of a baseline AVMS system for flight demonstration. In FY11, will complete preliminary design of required AVMS hardware and software. Will prioritize technologies to be flight demonstrated; will conduct a risk/reward assessment of each technology. Will generate several candidate systems to analyze in simulation to support a planned flight demonstration. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		0.000	1.183	1.402	0.000	1.402
Program #7		0.000	1.893	3.392	0.000	3.392

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Integrated Aircraft and Crew Protection: This effort demonstrates combined rotorcraft platform durability and survivability improvements through a fully optimized and integrated structure, vehicle management system (VMS), and rotors/subsystems technology integration program. In FY10, conduct a series of platform system trade studies to identify the sensitivities of technology contributions to battlefield and operational survivability from structures, rotors, subsystems, and vehicle management systems areas. In FY11, will finalize the platform system trade studies. Will conduct hardware refinement and validation to mature system level solutions, of structures, rotors, subsystems and VMS technologies. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #8 Real-time Airspace Collision-Avoidance and Teaming (REACT): This program evaluates, integrates, and demonstrates through flight testing, real-time airspace de-confliction and collision avoidance technologies. In FY10, mature the Army tactical airspace model for systems engineering analysis of potential airspace de-confliction and collision avoidance methods, and demonstrate and evaluate improved airborne and ground control station based real-time situational awareness displays. In FY11, will evaluate and demonstrate airspace/ battlespace integration technologies, including real-time situational awareness display concepts and collision avoidance technology concepts, and evaluate effectiveness.		0.000	1.433	3.902	0.000	3.902

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009					
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #9 Small Business Innovative Research/Small Business Technology Transfer Programs	0.000	1.032	0.000	0.000	0.000
FY 2009 Accomplishments: FY 2009					
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	41.701	39.252	42.149	0.000	42.149

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<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A		
<u>D. Acquisition Strategy</u> N/A		
<u>E. Performance Metrics</u> Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.		

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
435: <i>AIRCRAFT WEAPONS</i>	2.620	2.690	2.608	0.000	2.608	0.000	0.000	0.000	0.000	Continuing	Continuing
<u>A. Mission Description and Budget Item Justification</u> This project matures, demonstrates and integrates manned and unmanned sensor and weaponization technologies such as advanced missiles, guns, fire controls, advanced target acquisition and pilotage sensors into Army aviation platforms. Efforts are directed toward reducing the integrated weight of weapons, increasing engagement ranges, providing selectable effects on a variety of threats, and enabling cost-effective integration across multiple aviation platforms. The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan. Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Redstone Arsenal, AL and Fort Eustis, VA.											
<u>B. Accomplishments/Planned Program (\$ in Millions)</u>											
							FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Aviation Multi-Platform Munition (AMPM): Aircraft weapons efforts were consolidated in this project to focus technologies toward integrating a new lightweight weapon for use with both manned and unmanned rotorcraft systems. In FY09, developed and fabricated a Universal Test Pod (UTP) which integrated weapons using the Universal Armaments Interface (UAI) standard and enabled flight test and integration analysis of industry weapon systems. Conducted flight testing of the most promising industry candidate weapon systems in conjunction with scheduled Kiowa Warrior weapons pylon testing. In FY10, develop and publish interface control documentation of weapons for multi-platform integration. Begin development of a weapon system engineering concept and develop key technologies. In FY11, will complete the system concept and system engineering plan for integration of smart weapons, to include initial definition of a universal weapon integration architecture. Will demonstrate smart weapon (Shadow Hawk) integration implementing the UAI standard. <i>FY 2009 Accomplishments:</i> FY 2009							2.620	2.630	2.608	0.000	2.608

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #2	0.000	0.060	0.000	0.000	0.000
Small Business Innovative Research/Small Business Technology Transfer Programs					
FY 2009 Accomplishments: FY 2009					
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	2.620	2.690	2.608	0.000	2.608

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<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A		
<u>D. Acquisition Strategy</u> N/A		
<u>E. Performance Metrics</u> Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.		

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
436: <i>ROTARYWING MEP INTEG</i>	0.000	0.000	1.754	0.000	1.754	7.619	10.070	13.752	18.013	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this project is to mature and validate man-machine integration and mission equipment technologies, such as artificial intelligence, intelligent agents, cognitive decision aiding (CDA) sensors, avionics, communications, pilot vehicle interfaces, and autonomous assistants. This project improves the overall mission execution by demonstrating manned and unmanned system teaming, enhanced helicopter pilotage capability, improved crew workload distribution, and new capabilities for both manned and unmanned aircraft. This project supports Army transformation by providing mature technology to greatly expand the capabilities of unmanned aircraft, in current operating roles and future unmanned wingman roles. The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan. Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development and Engineering Center (AMRDEC), Fort Eustis, VA.

B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Intelligent Autonomy for Unmanned Systems: Mature and apply tactical behaviors and safe-flight technologies to enable unmanned aircraft to maintain safe, responsive, flexible and tactical formation flight with manned helicopters for unmanned wingman applications in re-supply, reconnaissance, surveillance and attack missions. In FY11, will evaluate and down-select flight-following algorithms. Will assess architectures for integrating flight-following algorithms and tactical behaviors with flight controls. <i>FY 2009 Accomplishments:</i> FY 2009 <i>FY 2010 Plans:</i> FY 2010	0.000	0.000	1.754	0.000	1.754

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<u>B. Accomplishments/Planned Program (\$ in Millions)</u>						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
<i>Base FY 2011 Plans:</i> FY 2011 Base <i>OCO FY 2011 Plans:</i> FY 2011 OCO						
Accomplishments/Planned Programs Subtotals		0.000	0.000	1.754	0.000	1.754
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A						
<u>D. Acquisition Strategy</u> N/A						
<u>E. Performance Metrics</u> Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.						

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
447: ACFT DEMO ENGINES	11.281	17.842	10.943	0.000	10.943	9.635	9.813	9.998	10.167	Continuing	Continuing
A. Mission Description and Budget Item Justification											
This project matures and demonstrates power system technologies through design, fabrication, and testing of advanced engine components in order to improve the performance of turbine engines. This project supports Army transformation by demonstrating mature technologies for lighter turbine engines that provide increased power, increased fuel efficiency, improved sustainability and reduced maintenance. These advanced engine designs will significantly improve the overall aircraft performance characteristics and reduce the logistical footprint of rotary wing aircraft. The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan. Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), at Fort Eustis, VA.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Advanced Affordable Turbine Engine (AATE) Tech: Demonstrate a 3000 horsepower gas turbine engine for improved operational capability for Blackhawk, Apache, and other future rotorcraft. AATE includes two competitive engine demonstrator efforts (1 - General Electric and 2 - Advanced Turbine Engine Company (ATEC) (Honeywell and Pratt & Whitney Joint Venture)). The AATE effort included FY09 funding from project 313 to support competitive demonstrations. Work in this project is coordinated with efforts in PE 602211A. In FY09, completed initial rig-tests for several engine components (e.g., compressor, turbine, combustor and mechanical systems) of the competing designs. Verified each tested component's aerodynamic performance and mechanical integrity against design goals, prior to an integrated, full-engine test. FY 2009 Accomplishments: FY 2009							11.281	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #2 Advanced Affordable Turbine Engine (AATE) Tech (cont'd FY10 and FY11): In FY10, integrate core engine components into gas generator configurations and complete initial testing, demonstrating mechanical integrity of the integrated core engine designs. Integrate power turbines and conduct first full engine tests, establishing initial engine performance capability. Determine design modifications required, if any, to fully achieve performance goals. Design and fabricate component modifications to meet performance goals. In FY11, will complete optimized component rig tests and analyze results in support of engine testing. Will integrate optimized components into goal engine demonstrator hardware. Will complete full engine testing to include final engine performance and weight assessment. Will complete assessment of engine production and maintenance costs for demonstration purposes. Will complete additional engine testing to gain insight into engine durability characteristics. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010		0.000	17.368	10.943	0.000	10.943

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<u>B. Accomplishments/Planned Program (\$ in Millions)</u>					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
<i>Base FY 2011 Plans:</i> FY 2011 Base <i>OCO FY 2011 Plans:</i> FY 2011 OCO					
Program #3 Small Business Innovative Research/Small Business Technology Transfer Programs <i>FY 2009 Accomplishments:</i> FY 2009 <i>FY 2010 Plans:</i> FY 2010 <i>Base FY 2011 Plans:</i> FY 2011 Base <i>OCO FY 2011 Plans:</i> FY 2011 OCO	0.000	0.474	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	11.281	17.842	10.943	0.000	10.943
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A					
<u>D. Acquisition Strategy</u> N/A					

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E. Performance Metrics Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.		

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
BA7: AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)	46.605	47.630	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
<u>A. Mission Description and Budget Item Justification</u> Congressional Interest Item funding for Aviation advanced technology development.											
<u>B. Accomplishments/Planned Program (\$ in Millions)</u>											
							FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 UAV-Resupply (BURRO) : In FY09, this Congressional Interest Item supported the development of an unmanned aerial logistics resupply delivery system designed to overcome effects of threat, weather, elevation and chem-bio-radiation. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO							1.197	3.184	0.000	0.000	0.000
Program #2							3.589	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Technologies for Military Equipment Replenishment: In FY09, this Congressional Interest Item developed and applied advanced processing technologies to facilitate the production of hard-to-acquire parts and developed flexible manufacturing processes that enable efficient small lot production. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO					
Program #3 Cutting Tools for Aerospace Materials: In FY09, this Congressional Interest Item developed tools capable of cutting and removing material from the toughest advanced aerospace materials without damaging any adjoining matrix or softer ply material; investigated better materials for tooling boards; and investigated better water soluble tooling materials. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010	0.797	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #4 Fuel Cells for Mobile Robotic Systems Project: In FY09, this Congressional Interest Item developed small, lightweight fuel cell technology for application to unmanned systems, with potential application to manned platforms, in addition to establishing a research and educational capability at Chicago State University. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO	0.797	0.000	0.000	0.000	0.000
Program #5 Universal Control Full Authority Digital Engine Control (FADEC): In FY09, this Congressional Interest Item developed a universal control architecture that incorporates model-based schemes to improve operational performance and reduce ownership cost for turboshaft engine control systems.	3.189	7.162	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009					
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #6 Drive System Composite Structural Component Risk - Reduction Program: In FY09, this Congressional Interest Item matured design and manufacturing technologies for composite transmission and gearbox housings. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO	2.392	2.387	0.000	0.000	0.000
Program #7	0.797	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Quick-MEDS Automated Release Pod: In FY09, this Congressional Interest Item designed a re-usable delivery system for a wide range of supplies: medical, food, water, comms, etc. (Combat Search and Rescue, Re-supply, etc). FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #8 Autonomous Cargo Acquisition for Rotorcraft Unmanned Aerial Vehicles: In FY09, this Congressional Interest Item investigated rotorcraft unmanned aerial systems (UAS) to provide logistics supply and precise load emplacement and extraction. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010		2.392	1.273	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #9 Inter Turbine Burner for Turbo Shaft Engines: In FY09, this Congressional Interest Item supported development of an innovative engine cycle concept that includes reheat to improve the performance of turboshaft engines. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		3.189	2.387	0.000	0.000	0.000
Program #10 Power Dense Transmissions: In FY09, this Congressional Interest Item supported development of advanced gear material systems for helicopter power transmissions FY 2009 Accomplishments: FY 2009		1.276	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #11 Enhanced Rapid Tactical Integration and Fielding of Systems: In FY09, this Congressional Interest Item supported development of systems that provide network-centric capabilities to the future force. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO	1.595	3.104	0.000	0.000	0.000
Program #12 Parts-on-Demand for CONUS Operations: In FY09, this Congressional Interest Item developed a "stationary" mobile parts hospital-like capability to support continental United States (CONUS) operations, by utilizing rapid	4.983	4.477	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
processing technologies requiring quick turnaround; and established an infrastructure and skill sets in carpentry, laser fabrication, welding, machining and sheet metal fabrication capabilities to support the Warfighter. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #13 Next Generation Ice Protection Technologies for UAVs: In FY09, this Congressional Interest Item developed a low-weight, low cost and low power in-flight icing protection alternative that is applicable to UAVs. This effort allowed extended operations in Federal Aviation Regulation (FAR) Part 25 Appendix C icing conditions and safe exit from encounters with icing conditions. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010		1.595	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #14 Heavy Fuel Burning Engines for UAVs: In FY09, this Congressional Interest Item supported an effort to develop reliable, economical, fuel-efficient, high performance, turbine engine family in 10-150 horsepower range applicable to tactical Unmanned Aerial Vehicles (UAVS) and other Aviation applications. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		1.994	0.000	0.000	0.000	0.000
Program #15 Reconfiguration Tooling System: In FY09, this Congressional Interest Item supported development of a new reconfigurable tooling system (RTS) for single-sided lay-up and repair of composite material parts, for vacuum thermoforming of thermoplastic material parts, and for open or closed molding of liquid polymers. This		1.595	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
lightweight and transportable system uses a new class of materials that can be reversibly transformed from a liquid-like state to a solid state at room temperature with no change in volume. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #16 Mission Execution Technology Impementation: In FY09, this Congressional Interest Item supported the advanced aviation technology initiative to improve safety and performance while reducing pilot, crew and maintainer workloads associated with Aviation mission planning and execution. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base		3.189	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
OCO FY 2011 Plans: FY 2011 OCO						
Program #17 Defense Helicopter Power Dense Transmission: In FY09, this Congressional Interest Item evaluated advanced gear steels with potential for increased strength and durability for helicopter gears. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		1.276	0.000	0.000	0.000	0.000
Program #18 Non-Hazardous Infrared Anti-Reflective Coatings for Army Aircraft Sensors: In FY09, this Congressional Interest Item replaced Thorium based Anti-Reflective coatings with non-hazardous carbon based coatings which meet or exceed current operational requirements. FY 2009 Accomplishments: FY 2009		1.197	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #19 Helicopter Vulnerability Reduction : In FY09, this Congressional Interest Item developed improved design and analysis method including modeling and simulation tools to predict ballistic response and residual load capabilities of large helicopter structures and dynamic components. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		2.392	0.000	0.000	0.000	0.000
Program #20		0.797	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Brownout Sensor Visualization and Hazard Avoidance System : In FY09, this Congressional Interest Item supported Brownout Sensor Visualization and Hazard Avoidance System development to provide a three dimensional (3D) helicopter cockpit display based synthetic terrain generated using stereo range cameras and a millimeter wave radar sensor, resulting in improved depth perception for helicopter pilots during brownout or degraded visual environment conditions.						
FY 2009 Accomplishments: FY 2009						
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #21		0.797	0.000	0.000	0.000	0.000
Improved Black Hawk De-Icing: In FY09, this Congressional Interest Item developed improved slip ring performance and reliability for purposes of blade de-icing through the use and retrofit of metal fiber brushes in existing UH-60 slip rings.						
FY 2009 Accomplishments: FY 2009						
FY 2010 Plans: FY 2010						

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #22 Army Aviation Weapon Technology: In FY09, this Congressional Interest Item applied a Model Development Architecture (MDA) approach to manned Army aviation and the development of the Improved Data Modem (IDM) Open Systems Architecture (OSA). FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		0.797	0.000	0.000	0.000	0.000
Program #23 UAS Sense and Avoid Concept Evaluation for Airspace Integration: In FY09, this Congressional Interest Item supported the Army UAS Sense and Avoid Technology (AUSAT) Toolkit, a one-year development team effort for a software product employing sensor models and simulations runs that will, when delivered as an initial Beta		2.392	2.865	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
release, provide commanders and UAS Stakeholders an automated mechanism to evaluate GBSAA concepts for UAS integration in the National Airspace System (NAS). FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #24 Fighting Combat-related Fatigue Syndrome. This is a Congressional Interest Item. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		0.000	0.796	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #25 Next Generation Green, Economical and Automated Production of Composite Structures for Aerospace. This is a Congressional Interest Item. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO		0.000	0.995	0.000	0.000	0.000
Program #26 UH-60 Transmission/Gearbox Galvanic Corrosion Reduction. This is a Congressional Interest Item. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base		0.000	1.492	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
OCO FY 2011 Plans: FY 2011 OCO						
Program #27 Robust Composite Structural Core for Army Helicopters. This is a Congressional Interest Item.		0.000	1.592	0.000	0.000	0.000
FY 2009 Accomplishments: FY 2009						
FY 2010 Plans: FY 2010						
Base FY 2011 Plans: FY 2011 Base						
OCO FY 2011 Plans: FY 2011 OCO						
Program #28 Crewmember Alert Display Development Program. This is a Congressional Interest Item.		0.000	1.592	0.000	0.000	0.000
FY 2009 Accomplishments: FY 2009						
FY 2010 Plans: FY 2010						

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification				DATE: February 2010				
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603003A: AVIATION ADVANCED TECHNOLOGY		PROJECT BA7: AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)				
B. Accomplishments/Planned Program (\$ in Millions)								
				FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base								
OCO FY 2011 Plans: FY 2011 OCO								
Program #29 Wireless HUMS for Condition Based Maintenance of Army Helicopters. This is a Congressional Interest Item.				0.000	1.592	0.000	0.000	0.000
FY 2009 Accomplishments: FY 2009								
FY 2010 Plans: FY 2010								
Base FY 2011 Plans: FY 2011 Base								
OCO FY 2011 Plans: FY 2011 OCO								
Program #30 Heavy Fuel Engine Family for Unmanned Systems. This is a Congressional Interest Item.				0.000	3.183	0.000	0.000	0.000
FY 2009 Accomplishments: FY 2009								

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification			DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 3: Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603003A: AVIATION ADVANCED TECHNOLOGY	PROJECT BA7: AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)			
B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO					
Program #31 Transitioning Stretch Broken Carbon Fiber to Production Programs. This is a Congressional Interest Item. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO	0.000	3.183	0.000	0.000	0.000
Program #32 Advanced Affordable Turbine Engine Program. This is a Congressional Interest Item.	0.000	3.979	0.000	0.000	0.000

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification			DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 3: Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603003A: AVIATION ADVANCED TECHNOLOGY	PROJECT BA7: AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)			
B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009					
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #33 New Hi Temp Dom PES Foam Fab/Cert DoD Aerospace Applications. This is a Congressional Interest Item.	2.391	2.387	0.000	0.000	0.000
FY 2009 Accomplishments: FY 2009					
FY 2010 Plans: FY 2010					
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	46.605	47.630	0.000	0.000	0.000

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 2040: <i>Research, Development, Test & Evaluation, Army</i> BA 3: <i>Advanced Technology Development (ATD)</i>	R-1 ITEM NOMENCLATURE PE 0603003A: <i>AVIATION ADVANCED TECHNOLOGY</i>	PROJECT BA7: <i>AVIATION ADVANCED TECHNOLOGY INITIATIVES (CA)</i>
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A		
<u>D. Acquisition Strategy</u> N/A		
<u>E. Performance Metrics</u> Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.		

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE				PROJECT			
2040: Research, Development, Test & Evaluation, Army				PE 0603003A: AVIATION ADVANCED TECHNOLOGY				BA8: VECTORED THRUST DUCTED PROPELLER (CA)			
BA 3: Advanced Technology Development (ATD)											
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
BA8: VECTORED THRUST DUCTED PROPELLER (CA)	0.000	4.974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
A. Mission Description and Budget Item Justification											
Congressional Interest Item funding for Vectored Thrust Ducted Propeller Compound Helicopter.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1							0.000	4.974	0.000	0.000	0.000
Vectored Thrust Ducted Propeller Compound Helicopter											
FY 2009 Accomplishments:											
FY 2009											
FY 2010 Plans:											
FY 2010											
Base FY 2011 Plans:											
FY 2011 Base											
OCO FY 2011 Plans:											
FY 2011 OCO											
Accomplishments/Planned Programs Subtotals							0.000	4.974	0.000	0.000	0.000

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 2040: <i>Research, Development, Test & Evaluation, Army</i> BA 3: <i>Advanced Technology Development (ATD)</i>	R-1 ITEM NOMENCLATURE PE 0603003A: <i>AVIATION ADVANCED TECHNOLOGY</i>	PROJECT BA8: <i>VECTORED THRUST DUCTED PROPELLER (CA)</i>
C. Other Program Funding Summary (\$ in Millions) N/A		
D. Acquisition Strategy N/A		
E. Performance Metrics Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.		

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