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

DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

	COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
	Total Program Element (PE) Cost	85778	44834	34167	38585	44792	49364	80896	83890	Continuing	Continuing
D313	Advanced Rotary Wing Vehicle Technology	5127	16998	23634	23742	28169	31301	61773	52651	Continuing	Continuing
D391	D391	907	953	0	0	0	0	0	0	0	7682
D435	Aircraft Weapons	0	0	1438	4282	4648	5439	5855	11681	Continuing	Continuing
D436	Rotary-Wing Mission Equipment Package Integration	17199	5063	2103	3621	5131	5805	6165	12122	Continuing	Continuing
D447	Aircraft Demonstration Engines	5964	6584	6992	6940	6844	6819	7103	7436	Continuing	Continuing
D448	Stinger Universal Launcher	10867	0	0	0	0	0	0	0	0	11242
D464	Outrider Unmanned Aerial Vehicle	42156	0	0	0	0	0	0	0	0	42156
DA38	Starstreak	3185	15000	0	0	0	0	0	0	0	18185
DB97	Aircraft Avionics Equipment	373	236	0	0	0	0	0	0	0	1086

A. Mission Description and Justification: The objective of this program element (PE) is to conduct advanced technology development, integration, demonstration and transition of rotary wing vehicle (RWV) technologies to new and / or upgraded DoD / Army rotorcraft systems in support of Joint Vision 2010 and Army After-Next. RWVs offer practical solutions to many of the DoD / Army's current and future operational needs by their ability to accomplish tasks and missions which no other air or ground vehicle can perform (e.g., takeoff and land vertically, operate at or below tree-top level for Nap-of-the-Earth (NOE) missions). RWV configurations require significantly different analysis, integration and design challenges from traditional fixed wing vehicles that fly at higher altitudes. The Army Aviation Science and Technology program's functional organization, supported by the National Aeronautics and Space Administration (NASA) at three co-located activities, is the focal point for US efforts in rotorcraft technology. Technology areas for development / demonstration include aeromechanics, aerodynamics, structures, propulsion, reliability and maintainability, safety and survivability, mission support equipment integration, aircraft subsystems, advanced helicopter rotors and flight controls, flight simulation, aircrew-aircraft system integration, aircraft weapons integration for air-to-air / air-to-ground, aircraft avionics for command and control, communications, controls and displays, digital avionics and architectures, NOE navigation, mission planning, and air traffic management. These technologies are continuously being demonstrated for

applications that will improve and correct deficiencies in current DoD / Army RWV systems, and to improve the capabilities of future rotorcraft. The PE focuses on demonstrating

technologies to enable rotorcraft to operate affordably throughout the military spectrum from peacekeeping to combat missions. The work in this PE is consistent with the DoD Technology Area Plans, DoD Warfighting Science and Technology Master Plan, DoD Reliance Agreements (for which the Army is the lead service for the rotorcraft technology development) the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and a coordinated government/industry/academia national RWV Technology Development Approach. Technology demonstrated in this PE will support the future DoD Joint Transport Rotorcraft (JTR) identified to potentially replace the aging Army CH47D Chinook and Navy CH-53 Super Stallion helicopters. Upgrade activities [as applicable] of Army systems such as the AH-64 Apache, RAH-66 Comanche, UH-60 Blackhawk, Navy SH-60 Seahawk and USMC AH-1 Cobra are supported as well.

Work in this PE is performed by contractors including Georgia Institute of Technology, Atlanta, GA; Boeing Company, Mesa, AZ; and Philadelphia, PA; Loral Western Development Laboratories, San Jose, CA; Bell Helicopter Textron Incorporated, Ft. Worth, TX; Lockheed Martin, Atlanta, GA; General Electric, Lynn, MA; Allied Signal Engines, Phoenix, AZ; Honeywell, Minneapolis, MN; Sikorsky Aircraft, Stratford, CT; BDM International, Albuquerque, NM; MITRE, McLean, VA; Shorts Missile Systems, Belfast Northern Ireland, and CAE Electronics, Montreal, Canada.

Primary in-house developers of the technology under this program element include: Aviation and Missile Command (AMCOM), Redstone Arsenal, AL., Aeroflightdynamics Directorate, AMCOM, NASA Ames Research Center, Moffett Field, CA; Aviation Applied Technology Directorate, AMCOM, Ft. Eustis, VA; Vehicle Technology Center, Army Research Laboratory (ARL), NASA Langley Research Center, Hampton, VA; and Vehicle Technology Center, ARL, NASA Lewis Research Center, Cleveland, OH. Related activities are performed by National Aeronautics and Space Administration.

This program adheres to DoD Reliance Agreements on Aeropropulsion and Air Vehicles (Rotary Wing). Related applied research is conducted under PE 0602211A (Aviation Technology). Efforts under this PE transition and provide risk reduction for and lead into Demonstration / Validation and Engineering Development programs supported by PE 0603801A (Aviation - Advanced Development), PE 0604801A (Aviation - Engineering Development) and PE 0604270A (Electronic Warfare Development). In addition, this PE's deliverables provide technical support and technology transition to PE 0604223A (RAH-66 Comanche), PE 0604816A (Longbow), and PE 0203744A (Aircraft Modifications/Product Improvement).

The Army participates in and with the following groups, organizations and programs for total coordination: the DoD Tri-Service Joint Technical Coordination Group for Munitions Development and Aircraft Survivability; Aircraft Instruments and Aircrew Station Working Group; the Joint Integrated Avionics Working Group (JIAWG); Integrated High Performance Turbine Engine Technology (IHPTET) Steering Committee; and the Air Armament Working Party of NATO. This participation enables the gathering of technical information and assets in determining the joint use and standardization of airborne weaponization items. The Army Munitions Research and Development Committee, an organization within the Office of the Secretary of Defense, functions to establish Joint Service requirements and the development of air munitions. International related activities are The Technical Cooperation Programs (TTCP) with Australian, Canadian and United Kingdom governments, and Defense Development Share Plans. Formal Memoranda of Understanding (MOUs) and Data Exchange Agreements (DEAs) with various friendly nations are actively pursued to allow technology information exchange.

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

DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

B. Program Change Summary	FY 1998	FY 1999	FY 2000	FY 2001
Previous President's Budget (FY 1999 PB)	89467	30048	36197	39742
Appropriated Value	92330	45048		
Adjustments to Appropriated Value				
a. Congressional General Reductions	-2863	-214		
b. SBIR / STTR	-2244			
c. Omnibus or Other Above Threshold Reductions	-745			
d. Below Threshold Reprogramming	-700			
e. Rescissions				
Adjustments to Budget Years Since FY 1999 PB			-2030	-1157
Current Budget Submit (FY 2000/2001 PB)	85778	44834	34167	38585

Change Summary Explanation: Funding – FY 1999 – Congressional add for Starstreak (+15000).

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

DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: D313

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D313 Advanced Rotary Wing Vehicle Technology	5127	16998	23634	23742	28169	31301	61773	52651	Continuing	Continuing

Mission Description and Justification: This project provides for RWV technology demonstrations in support of research for advanced rotors / controls, flight controls, airframes/structures, crew/vehicle survivability, drive-trains and subsystems to increase strategic/tactical mobility, increase maneuverability / agility; increase reliability through improved maintainability/sustainability, and reduce acquisition and operational cost. Technology Demonstrations funded by this project include Rotary Wing Structures Technology (RWST), Advanced Rotorcraft Transmission Phase II (ART-II), Helicopter Active Control Technology (HACT), Variable Geometry Advanced Rotor Demonstration (VGARD), Survivable, Affordable, Repairable Airframe Program (SARAP), Rotorcraft Drive Systems for the 21st Century (RDS21), and Full Spectrum Threat Protection (FSTP). These programs will focus on the demonstration and transition of advanced technology to the Joint Transport Rotorcraft (JTR) program to meet the cargo / transport and commuter needs of the military and civilian sectors, as well as technology insertion for other DOD legacy rotorcraft systems. Funding profile supports these technology demonstrations which have been approved in DOD modernization plans for rotorcraft. These plans include the development of the future DoD JTR, identified to potentially replace the aging Army CH-47D Chinook and Navy CH-53 Super Stallion helicopters.

FY 1998 Accomplishments:

- 1085 - Conducted preliminary design of structural concepts to satisfy structural integrity requirements that will reduce manufacturing labor costs and structural airframe weight.
- 3577 - Conducted testing on positive engagement overrunning clutch for advanced transmission initial performance assessment.
  - Completed advanced transmission detailed design that when demonstrated will provide a –10 dB noise reduction, 25 % increase in power-to-weight, and 2X increase of transmission durability.
  - Began fabrication of complex, long lead advanced transmission demonstrator parts including precision forged planetary gears, ceramic / composite hybrid spherical roller bearings, large high temperature / corrosion resistant magnesium alloy housing, and forging for large double helical gears.
- 465 - Defined, with Industry and other Services, the helicopter active controls program to develop and flight demonstrate an affordable, advanced rotorcraft flight control system integrated with selected mission subsystems to improve handling qualities and mission effectiveness in day, night, and adverse weather conditions.

Total 5127

FY 1999 Planned Program:

- 8457 - Complete component testing of advanced transmission positive engagement overrunning clutch.
  - Complete fabrication of advanced transmission demonstrator hardware.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 1999
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603003A Aviation Advanced Technology
	PROJECT D313

FY 1999 Planned Program: (continued)

- Assemble advanced transmission demonstrator and conduct development testing consisting of fit and function, oil management, gear tooth and bearing pattern verification, split torque path load sharing assessment, 50 hour endurance run, and gear tooth scoring testing for initial performance and cost assessment.
- Complete fabrication of diamond-like carbon coated gears, ring gear isolation, low noise bevel pinion, advanced bearing materials, heat exchangers, and seal hardware for reduced weight and increased durability when applied to upgraded UH-60 Blackhawk and AH-64 Apache helicopter transmissions.

- 3267 - Develop baseline helicopter active flight control system designs; evaluate design methodologies; conduct engineering modeling, simulation, analysis, and evaluate candidate active control system designs.
- 4848 - Conduct detailed designs of structural concepts using virtual prototyping which will reduce developmental and manufacturing risk of demonstration fuselage assemblies and reduce detail design cycle time in half the normal time.
- 426 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs

Total 16998

FY 2000 Planned Program:

- 7000 - Conduct advanced transmission endurance testing for demonstration of 25 % increase in power-to-weight and 2X increase in transmission durability.
  - Conduct advanced transmission noise testing to demonstrate a -10dB reduction in transmission noise.
  - Perform endurance testing of diamond-like carbon coated gears, ring gear isolation, low noise bevel pinion, advanced bearing materials, heat exchangers, and seal hardware for reduced weight and increased durability when applied to upgraded UH-60 Blackhawk and AH-64 Apache helicopter transmissions.
- 9734 - Conduct detailed design of active flight control system for demonstration.
  - Develop active flight control engineering models, and piloted and hardware in-the-loop simulation to support flight demonstration.
  - Determine reduction in flight control design and development costs.
  - Integrate hardware and software into demonstration rotorcraft.
- 6326 - Fabricate rotary wing structural demonstrator fuselage sections comprised of advanced structural concepts demonstrating reduced weight and manufacturing cost, and conduct full scale-crash testing of demonstrator fuselage.
- 574 - Conduct testing and validation of techniques and tools for simulation-based acquisition approaches based on integration of models, simulations, and virtual prototyping for defining JTR concepts and upgrades of other DoD rotorcraft.
  - Conduct operational scenarios using constructive and virtual simulations based on JTR concepts and missions emerging from developing Joint Service needs and AAN.
  - Demonstrate simulation models which integrate the advanced technologies from transmission, active flight controls, turbine engine, rotors, airframes / structures and signature management programs for defining JTR configuration alternatives and upgrades of other DoD rotorcraft.

Total 23634

FY 2001 Planned Program:

- 6482 - Develop RDS21 preliminary design for 35% increase in power-to-weight, -15dB noise reduction, 2X increase in durability and 25% reduction in production cost.
- 8741 - Conduct flight control subsystems flight tests.
  - Refine helicopter active flight controls engineering models and simulation.
  - Complete helicopter active flight control system design.
  - Begin helicopter active flight control flight tests and demonstration to measure flight control system improvement.
- 5519 - Conduct full-scale static testing of rotary wing structural demonstrator fuselage sections demonstrating weight, cost and development cycle time reductions.
  - Conduct reparability demonstrations on fuselage sections.
- 3000 - Conduct preliminary design and analyses to demonstrate and evaluate configuration alternatives for low disk-loading Vertical Take-Off and Landing (VTOL) aircraft (e.g., helicopter, tilt rotor, tilt wing) for JTR.
  - Demonstrate JTR configuration alternatives in distributed interactive simulation environment to evaluate impact on warfighting capabilities.
  - Predict the magnitude of improvements which can be obtained in JTR mission effectiveness in areas such as payload / range, maximum cruise speed, deployability, fuel efficiency, maneuverability / agility, system acquisition costs, operations and support costs, accident rate, survivability, and reliability.
  - Provide technical rationale and prioritized list of JTR configuration alternatives for focusing future advanced technology demonstrations on specific VTOL configurations for JTR.

Total 23742

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

DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: D435

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D435 Aircraft Weapons	0	0	1438	4282	4648	5439	5855	11681	Continuing	Continuing

Mission Description and Justification: This project demonstrates rotorcraft weaponization technologies for air-to-ground and air-to-air application. Integration of advanced missiles (Air-to-Air / Air-to-Ground), rockets, guns, fire control and advanced target acquisition are evaluated and demonstrated on rotorcraft platforms to assure compatibility of the weapon system with the rotorcraft. Technology integration issues with on-board systems, vehicle flight characteristics and weapon system are investigated and evaluated. The project will integrate Low Cost Precision Kill (LCPK) rocket system using a 2.75 rocket with a laser seeker sensor and will evaluate other technologies for providing rotorcraft air combat enhancements, including a lightweight, electric turret for a 20% increase in air-to-air accuracy.

FY 1998 Accomplishments: Project not funded in FY 1998

FY 1999 Planned Program: Project not funded in FY 1999

FY 2000 Planned Program:

- 1438 - Conduct AH-64 Longbow Apache aircraft preliminary integration design for Low Cost Precision Kill (LCPK) guided rocket system .
  - Conduct AH-64 Longbow Apache aircraft preliminary integration of Multi-Role Aviation Weapon System (MRAWS) lightweight, electric turret.

Total 1438

FY 2001 Planned Program:

- 4282 - Complete LCPK aircraft integration design and fabricate flight hardware for Apache Longbow to support airborne evaluation of the LCPK guided rocket.
  - Continue platform integration design for the MRAWS lightweight turret to include man-machine interface, improved feed system design, and fire control upgrades for the improved 30 mm combat round.

Total 4282

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 1999
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603003A Aviation Advanced Technology PROJECT D436

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D436 Rotary-Wing Mission Equipment Package Integration	17199	5063	2103	3621	5131	5805	6165	12122	Continuing	Continuing

Mission Description and Justification: The objective of this project is to demonstrate man-machine integration and mission equipment technology to provide enhanced helicopter pilotage capability, improved crew workload distribution and improve overall mission execution. This is the primary project for the Rotorcraft Pilot's Associate (RPA) Advanced Technology Demonstration (ATD). It provides for the demonstration of rotorcraft crew stations utilizing knowledge-based information systems to develop Cognitive Decision Aiding (CDA) for crews. Advanced technology in information technology computing methods, sensors, displays, and controls will be demonstrated to maximize combat helicopter mission effectiveness and survivability for day / night adverse weather operations. The RPA program will demonstrate data fusion, battlefield assessment, route, reconnaissance, survivability and sensor planning, and cockpit information management, attack planning and crew intent estimation for dual crew operations. System Build 6 will complete and refine the RPA CDA software for use in the Combined Arms II simulation exercise and flight-test program. This demonstration of simulation capability will therefore be used as the foundation for evaluating combined rotorcraft control and crew performance via virtual prototyping and Distributed Interactive Simulation (DIS) and pursues state of the art technology for integration and linking a manned scout / attack rotorcraft with an unmanned aviation system to perform Army aviation missions. The Airborne Manned/Unmanned System Technology (AMUST) program integrates advanced technologies in sensors, displays, communication and controls necessary to team airborne manned and unmanned vehicle to maximize the teams' lethality, survivability, and operational tempo in support of the maneuver commander. The manned/unmanned team will be capable of performing scout and reconnaissance assignments and alerting manned rotorcraft of "just ahead" tactical situation awareness. The system will use state-of-the-art approaches in artificial intelligence, sensors, avionics, communications, pilot vehicle interfaces, and unmanned aerial vehicles, along with a level of autonomy that will result in an integrated team that augments the battlefield effectiveness of Army aviation.

FY 1998 Accomplishments:

- 16262 - Completed development of core architecture software; performed system build 6; integrated and tested Version 6 software; conducted performance demonstration, conducted preliminary engineering/integration flight testing; conducted operational evaluation flight testing; conducted government/industry system demonstrations.
  - Conducted engineering and full mission simulation System Formal Evaluations II in accordance with exit criteria.
  - Completed development of functional requirements for software builds.
  - Integrated classified data files; completed development of dual crew in the cockpit information management and improved the capacity of CDA with respect to team operations.

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BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603003A Aviation Advanced Technology
	PROJECT D436

•	937	- Conducted trade-off analysis to define potential operational value and key technical issues related to manned and unmanned aerial vehicle scout teams. - Conducted virtual simulation of manned / unmanned aerial scout teams to identify critical operational functions and man-machine interfaces. - Conducted limited demonstration of connectivity between manned and unmanned aerial systems.
Total	17199	

FY 1999 Planned Program:

•	4980	- Conduct RPA flight test including operationally relevant scenarios and threats which will be subject to the same tactical environments used in the virtual simulations; perform data reduction, analysis, final report / briefing and transition technology and lessons learned to fielded / development systems. - Complete virtual simulation tests which serves as final effort to measure exit criteria.
•	83	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs
Total	5063	

FY 2000 Planned Program:

•	2103	- Define airborne manned / unmanned system technology configuration and interfaces of manned / unmanned aerial scouts teams. - Develop airborne manned / unmanned system technology algorithms to support critical operational functions. - Construct engineering simulation to support preliminary development and engineering evaluation of the system. - Conduct knowledge acquisition collection and refinement for scout / attack and Special Operations aviation forces' mission teams composed of manned and unmanned systems.
Total	2103	

FY 2001 Planned Program:

•	3621	- Complete preliminary hardware design and preliminary software system builds, and begin fabrication, modification, and integration activities for the AMUST test and evaluation - Develop and demonstrate AMUST Hardware in the Loop simulation - Conduct engineering simulation of the airborne manned / unmanned system technology system.
Total	3621	

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DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: D447

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D447 Aircraft Demonstration Engines	5964	6584	6992	6940	6844	6819	7103	7436	Continuing	Continuing

Mission Description and Justification: The objective of this project is to competitively perform design, fabrication and test of advanced technology engines and integrated components to demonstrate achievable improved performance levels for current and future DoD RWV emphasizing Army unique requirements. The current/planned Joint Turbine Advanced Gas Generator (JTAGG) efforts are all fully coordinated / aligned with the phases / goals of the DoD Integrated High Performance Turbine Engine Technology (IHPTET) program and industry. IHPTET / JTAGG 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. This provides significantly increased range and payload capabilities for current fleet upgrades and for future new rotorcraft with significant Operation and Support cost savings.

FY 1998 Accomplishments:

- 5964 - Completed design and fabrication of gas generator II test and accessories.
  - Integrated gas generator II components that have advanced aerothermodynamic, mechanical, material and structural technologies into the first build of the gas generator.
  - Performed gas generator II test to provide a mechanical checkout of the gas generator and baseline performance demonstration.
  - Analyzed test data and optimized component designs for gas generator.
  - Developed gas generator III components draft detail design including metal matrix composite impellers, rich quench lean combustor with ceramic matrix composite liners, ceramic and ceramic matrix composite turbine airfoils, and magnetic bearings.

Total 5964

FY 1999 Planned Program:

- 6432 - Demonstrate JTAGG II goals of 80% increase in shaft horsepower to weight ratio, 30% decrease in specific fuel consumption and 20% reduction in acquisition and maintenance costs.
  - Complete gas generator III components detail design including dual-aluminide impellers, ceramic matrix composite combustor liners, ceramic and ceramic matrix composite turbine airfoils, and magnetic bearings for JTAGG III build.
  - Procure long-lead gas generator III hardware.
  - Conduct initial component testing in support of gas generator III initial build.
- 152 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs

Total 6584

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	PROJECT D447

FY 2000 Planned Program:

•	6992	- Fabricate / procure hardware for initial gas generator III build. - Continue initial component testing in support of initial gas generator III build. - Initiate gas generator III component design modifications in support of gas generator build.
Total	6992	

FY 2001 Planned Program:

•	6940	- Complete initial gas generator hardware fabrication and component testing - Conduct testing of JTAGG III initial gas generator build in support of 120% increase in shaft horsepower to weight, 40% decrease in specific fuel consumption, and 35% reduction in acquisition and maintenance costs. - Complete design modifications and fabricate / procure hardware for second gas generator build. - Conduct component testing in support of second gas generator build. - Perform JTAGG III component design modifications in support of final gas generator build for goal demonstration
Total	6940	

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BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: D448

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D448 Stinger Universal Launcher	10867	0	0	0	0	0	0	0	0	11242

Mission Description and Justification: This project supports a congressionally directed program to develop an Apache Longbow Stinger Universal Launcher (SUL). The SUL will be developed by FY99 with the highest degree of commonality between various host platforms.

FY 1998 Accomplishments:

- 10867 - Performed development of SUL / Stinger Universal Electronics (SUE) to support Apache, Comanche and Bradley Linebacker.
  - Developed Apache Longbow interface for the SUL / SUE and conducted integration testing.
  - Developed Comanche SUL interface.
  - Developed Bradley Linebacker SUE interfaces.

Total 10867

FY 1999 Planned Program: Project not funded in FY 1999.

FY 2000 Planned Program: Project not funded in FY 2000.

FY 2001 Planned Program: Project not funded in FY 2001.

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DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: D464

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D464 Outrider Unmanned Aerial Vehicle	42156	0	0	0	0	0	0	0	0	42156

Mission Description and Justification: The Tactical Unmanned Aerial Vehicle (TUAV), "Outrider", provides Army brigades/battalions, USMC regiments/battalions, and Navy forces with dedicated day/night, reconnaissance, surveillance and target acquisition (RSTA) and intelligence. Outrider provides the tactical warfighting commander with critical battlefield information in the rapid cycle time required for success at the tactical level. The Joint Requirements Oversight Council (JROC) reassessed warfighter UAV priorities and reconfirmed the TUAV as the JROC's top UAV priority to meet Service requirements. The Outrider Advanced Concept Technology Demonstration (ACTD) system consists of four air vehicles, each configured with an electro-optic (EO)/infrared (IR) sensor payload, ground control equipment, including communications equipment and launch and recovery equipment, remote video terminal, two HMMWVs and a trailer, and one mobile maintenance facility for every three TUAV systems. The ACTD contract has an option for six (6) LRIP systems. The Outrider LRIP options support a Full Rate Production (FRP) decision. The ACTD addressed Joint Services (Army, Navy, Marine Corps) tactical UAV requirements and validated military utility for each Service. The TUAV program employs "cost as an independent variable" in acquiring any follow-on systems. In FY99, this program transitions to PE 0305204A.

FY 1998 Accomplishments:

- 42156 - Completed 18 flights totaling 11 hours and 22 minutes of flight time.
  - Continued flight testing in support of Military Utility Assessment (MUA).
  - Completed system integration and demonstration.
  - Trained users for MUA.
  - Completed MUA (land & land / sea) and ACTD.
  - Evaluated MUA users lessons learned.
  - Prepared for transition from ACTD to Low Rate of Initial Production (i.e., documentation, air vehicle improvements, weight reduction).

Total 42156

FY 1999 Planned Program: Funded in PE 0305204A.

FY 2000 Planned Program: Funded in PE 0305204A.

FY 2001 Planned Program: Funded in PE 0305204A.

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DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: DA38

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
DA38 Starstreak	3185	15000	0	0	0	0	0	0	0	18185

Mission Description and Justification: This project supports a congressionally directed program to investigate air-to-air (ATA) applications of the Starstreak missile on rotary wing platforms. The effort explored the integration of the Air-to-Air Starstreak (ATASK) missile on the AH-64D Apache Longbow helicopter in preparation for a potential follow-on side-by-side comparison with the Air-to-Air Stinger (ATAS) missile. This effort follows a two-phased effort (FY95-FY97) in which the technical feasibility, safety and preliminary worth of the Starstreak (ATASK) was assessed as an air-to-air self defense weapon for the AH-64 Apache helicopter.

FY 1998 Accomplishments:

- 3185 - Designed roll stabilizing gimbal for Starstreak airborne laser guidance unit; designed Apache Longbow helicopter modifications to integrate Starstreak missile system into the aircraft based on Phase II data.

Total 3185

FY 1999 Planned Program:

- 6472 - Complete detail designs for roll stabilized airborne laser guidance unit to support Target Acquisition and Designation System (TADS) integration on Longbow Apache helicopter.
  - Complete detail designs for missile launcher blast diffuser, and hardware and electronic aircraft interfaces to support fabrication and build-up on Longbow Apache helicopter.
- 6250 - Fabricate & build roll stabilized laser guidance unit, missile launcher, and aircraft launcher & laser guidance unit interface components.
- 2278 - Integrate aircraft to launcher & guidance unit subsystems interface components into the Longbow Apache testbed to support bench & flight test programs.
  - Perform bench testing of subsystem components to preliminarily verify interface functionality of aircraft to subsystem components.

Total 15000

FY 2000 Planned Program: Project not funded in FY 2000.

FY 2001 Planned Program: Project not funded in FY 2001.

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

DATE: February 1999

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603003A Aviation Advanced Technology

PROJECT: DB97

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
DB97 Aircraft Avionics Equipment	373	236	0	0	0	0	0	0	0	1086

Mission Description and Justification: This project supports development and demonstration of advanced, integrated avionics equipment in support of aviation integration into the digitized battlefield. Evolving concepts in digital avionics will provide new functional capability in the areas of situational awareness, flight path guidance, position reporting and digital data transfer. Work in this project supports the Rotorcraft Pilot's Associate (RPA) program.

FY 1998 Accomplishments:

- 373 - Provided RPA mission equipment integration support in the areas of communication, navigation, pilotage, voice recognition, controls and displays, and artificial intelligence to support the instrumentation/calibration phase of the RPA flight test program.

Total 373

FY 1999 Planned Program:

- 230 - Complete RPA mission equipment integration support in the areas of communication, navigation, Advanced Helicopter Pilotage (AHP), voice recognition, controls and displays, and artificial intelligence, during the flight test program.
- 6 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs

Total 236

FY 2000 Planned Program: Project not funded in FY 2000.

FY 2001 Planned Program: Project not funded in FY 2001.

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