

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2007

| BUDGET ACTIVITY | PE NUMBER AND TITLE | | | | | | | |
|--|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 3 - Advanced technology development | 0603313A - Missile and Rocket 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 | 113079 | 62940 | 60353 | 64398 | 71248 | 71105 | 67042 | 65585 |
| 206 MISSILE SIMULATION | 9771 | 3383 | 3481 | 3556 | 3591 | 3618 | 3698 | 3779 |
| 263 FUTURE MSL TECH INTEGR(FMTI) | 40159 | 9380 | 31119 | 37158 | 49335 | 48919 | 45907 | 46917 |
| 550 COUNTER ACTIVE PROTECTION | 16294 | 12262 | 15395 | 15496 | 8278 | 5691 | 5816 | 5944 |
| 655 HYPERVELOCITY MISSILE TD | 11608 | | | | | | | |
| 704 Advanced Missile Demo | 6589 | 2956 | 8373 | 6189 | 8000 | 10800 | 8500 | 6742 |
| G03 Army Hypersonics Advanced Technology | | | 1985 | 1999 | 2044 | 2077 | 3121 | 2203 |
| NA6 Missile and Rocket Initiatives (CA) | 28658 | 34959 | | | | | | |

A. Mission Description and Budget Item Justification: This program element (PE) matures and demonstrates advanced missile technologies to enhance weapon system lethality, survivability, agility, deployability, and affordability for the Future Modular Force and, where feasible, exploits opportunities to enhance Current Force capabilities. (Note that FY08 represents a funding amount more closely resembling established levels. The ramp down in FY07 is largely the result of the successful completion and transition of three major 6.3 efforts in FY06: Non-Line-of-Sight Launch System (NLOS-LS) completion and spiral of the enhanced Precision Attack Missile (ePAM) to the project office; successful completion of the Compact Kinetic Energy Missile (CKEM) ATD, and successful completion of the Close-In Active Protection System (CIAPS) effort. The ramp up in FY08 is due to the progression of 6.2 efforts to 6.3, including Close Combat Networking of Weapons and Systems, Defense against Rockets, Artillery, and Mortars (RAM), and Counter RAM Tracking and Fire Control.) Efforts are conducted through system simulation, design, demonstration, and test in both laboratory and operational scenarios. This PE includes demonstrations of advanced tactical missiles, real-time hardware-in-the-loop simulations, and ground system survivability efforts. The technologies focused on in this PE enhance the warfighting capabilities for locating targets in clutter, precision guidance, hypervelocity missile flight, and missile communications, command, and control. The major efforts in this PE are the Non-Line-of-Sight Launch System (NLOS-LS), Advanced Multi-Mission Precision Guided Munition (AMMPGM), Active Defense for the Current and Future Force (concentrating on defense against rockets, artillery, and mortars (RAM)), Active Protection System (APS) components for ground air platforms, and development and demonstration of hypersonic missile technology. A key effort is the development of a guided interceptor to work with the APS being developed for Future Combat Systems (FCS) and the Future Force. This interceptor requires advanced technology in controls, inertial sensors, and guidance algorithms. Development and demonstration of the guided interceptor will be done in collaboration with the FCS APS developer, who will provide the tracking sensor and launch mechanism required for the development and demonstration of the guided interceptor. The Army Hypersonics Applied Research program matures and demonstrates expendable hypersonic/hypervelocity missiles and technologies for the defeat of hypersonic threats. Survivability efforts are coordinated with PE 0602303A (Missile Technology), PE 0603003A (Aviation Advanced Technology), PE 0603270A (Electronic Warfare Technology), PE 0602624A (Weapons and Munitions Technology), PE 0603004A (Weapons and Munitions Advanced Technology), and PE 0603005A (Combat Vehicle and Automotive Advanced Technology). The emphasis in this program element is on smaller, lighter weight, more affordable missiles. 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). This work is performed at the US Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

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| <u>B. Program Change Summary</u> | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|---|---------|---------|---------|---------|
| Previous President's Budget (FY 2007) | 114018 | 42127 | 67167 | 81003 |
| Current BES/President's Budget (FY 2008/2009) | 113079 | 62940 | 60353 | 64398 |
| Total Adjustments | -939 | 20813 | -6814 | -16605 |
| Congressional Program Reductions | | -14073 | | |
| Congressional Rescissions | | | | |
| Congressional Increases | | 35350 | | |
| Reprogrammings | -939 | -464 | | |
| SBIR/STTR Transfer | | | | |
| Adjustments to Budget Years | | | -6814 | -16605 |

FY09 funds decreased due to Army decision to reduce emphasis on hypersonic missile technology and fund higher priority Army efforts.

Eight FY07 congressional adds totaling \$20846 (after adjustment for Congressional undistributed reductions) were added to this PE.

- (\$1869) Warfighter Protection & Homeland Security Lab
- (\$958) Smart Energetics Arch for Missile Systems
- (\$1294) FTT50 High Efficiency Turbine Engine
- (\$7667) Cessna Optionally Piloted Aircraft (COPA)-RSTA
- (\$1246) Close Combat Lethal Recon (CCLR)
- (\$1294) Compact Kinetic Energy Missile (CKEM)
- (\$4409) Missile Sim Tech Rapid Assessment & Deployment
- (\$2109) Permanent Magnet System

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|--|--|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------------|---------------------|
| BUDGET ACTIVITY 3 - Advanced technology development | PE NUMBER AND TITLE 0603313A - Missile and Rocket Advanced Technology | | | | | | PROJECT 206 | |
| 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 |
| 206 MISSILE SIMULATION | 9771 | 3383 | 3481 | 3556 | 3591 | 3618 | 3698 | 3779 |

A. Mission Description and Budget Item Justification: This project matures, develops, and demonstrates modeling and simulation tools for missile design and analysis. This project accomplishes the design, expansion, and improvement of hardware-in-the-loop (HWIL) simulation capabilities. HWIL simulation is used to evaluate tactical and theater missiles and precision-guided munitions (ground-to-air, ground-to-ground, air-to-ground) guided by radar frequency (RF), millimeter-wave RF (MMW), electro-optical (EO), and passive and active infrared (IR) spectral signals. Future missile systems will use multi-mode combinations of these guidance technologies such as those envisioned for the Non-Line-of-Sight Launch System (NLOS-LS) and other systems within the Future Modular Force. Evaluation by means of HWIL provides a cost-effective method that supports missile maturation throughout weapon system life cycles and permits a reduction in the number of flight tests required, as well as improving the confidence of flight test readiness and the probability of successful flight tests. Recent developments in HWIL simulation technology have enabled these techniques to be applied to missile production lot acceptance testing and post-deployment stockpile reliability tests to reduce their costs. 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 is performed at the US Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

| <u>Accomplishments/Planned Program:</u> | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> |
|---|----------------|----------------|----------------|----------------|
| Missile Simulation: In FY06, matured a single-channel scanning laser radar (LADAR) for testing of LADAR sensors. Integrated digital circuit techniques to improve radio frequency (RF) millimeter wave (MMW) signal generation. Advanced capabilities for semi-active laser HWIL simulation. Completed design of an advanced passive IR scene projector for HWIL simulation including dynamic hot-spots. Demonstrated applications of low-cost Personal Computers (PC) to real-time scene modeling. Investigated and established techniques for MMW synthetic aperture radar (SAR). Designed method for rapid integration of missile seekers into a HWIL environment. In FY07, will test scanning and multi-channel LADAR projectors against a high-resolution LADAR sensor. Will complete the advanced IR projector and perform initial tests and advance the development of MMW synthetic aperture radar processing for missile guidance. Will design general-purpose interfaces using Field-Programmable Gate Arrays (FPGA) for interfacing to particular seeker designs. Will support integration and development of a multi-guidance mode HWIL capability. Will extend PC scene generation techniques to a practical application. In FY08, investigate controls to project coherent Frequency Modulated Continuous Wave (FMCW) LADAR signals. Will complete testing of the advanced passive IR projector and apply lab data to IR simulation environment for more accurate IR seeker testing. Will develop MMW signal generation techniques to include high-rate FM pulse processing and develop SAR signal processing techniques to improve output images. In FY09, will extend the LADAR projector capability to flash 2-D and coherent LADARs, and reduce background temperature and improve dynamic range for the advanced IR projector and test the prototype rapid integration-into-laboratory of seeker modules. Will continue development of MMW FM pulse processing to achieve necessary bandwidth. | 3061 | 3291 | 3481 | 3556 |
| Missile Simulation Technology Rapid Assessment and Deployment of Systems Initiative: This one-year congressional add funded the development of a missile simulation capability supporting a rapid assessment capability. No additional funding is required. | 6710 | | | |
| Small Business Innovative Research/Small Business Technology Transfer Programs | | 92 | | |
| Total | 9771 | 3383 | 3481 | 3556 |

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|--|--|---------------------|---------------------|---------------------|---------------------|------------------------------|---------------------|---------------------|--|
| BUDGET ACTIVITY 3 - Advanced technology development | PE NUMBER AND TITLE 0603313A - Missile and Rocket Advanced Technology | | | | | PROJECT 263 | | | |
| 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 | |
| 263 FUTURE MSL TECH INTEGR(FMTI) | 40159 | 9380 | 31119 | 37158 | 49335 | 48919 | 45907 | 46917 | |

A. Mission Description and Budget Item Justification: This project demonstrates advanced tactical missile technologies such as seekers, propulsion, airframes, and guidance and controls for missiles supporting the Future Modular Force. (Note that FY08 represents a funding level more closely resembling established levels. FY07 sees a drop from FY06 due to the reduction of the Non-Line-of-Sight Launch System (NLOS-LS) effort associated with the spiral of the enhanced Precision Attack Missile (ePAM) to the project office. Improved PAM (iPAM) and other spiral transitions continue.) These technologies include: multi-mode seekers, controllable thrust motors (gels, pintle-controlled solids, and air breathing), and aided target acquisition (ATA) for missile systems. Seeker development addresses imaging infrared, laser radar (LADAR), and millimeter wave seeker technologies, combined with semi-active laser technology, to provide precision strike and fire-and-forget guidance modes. Investigates affordable, controllable thrust rocket motors that provide longer ranges, and shorter flight times while increasing system safety and robustness in various mission roles. Matures missile guidance and electronics technologies to enable target position updates to the missiles, re-tasking orders to the missiles, and transmission of imagery to the ground for target verification and battle damage assessment. This project funds the demonstration of air defense capability for the Future Force, concentrating on active defense against rockets, artillery, and mortars using technologies funded under PE 0602303A. In addition, smaller, lighter-weight, and more affordable missile technologies are demonstrated using the technology matured under PE 0602303A. The continuing Smaller, Lighter, Cheaper (SLC) Tactical Missiles effort transitions this matured technology to reduce the cost and logistics burden of precision munitions. This program's goal is to reduce the cost per kill of precision guided missiles, through the innovative application of technology. Close Combat Networking of Weapons and Sensors (CCNW&S) demonstrates a prototype infantry networked lethality capability to dramatically improve weapon/target pairing at the squad and platoon level. This project responds to a priority US Army Infantry Center need for direct-fire range overmatch against current and future threats. This effort strives to leverage and ensure compatibility with fielded tactical systems, including weapons, sensors, displays, radios, and networks. A key project component is the addition of networked Far Target Locators (FTL) and image/data transmission capability to the Javelin Command Launch Unit (CLU) and Tube-launched, Optically-tracked, Wire-guided (TOW) Improved Target Acquisition System (ITAS). These FTLs organically calculate target coordinates and feed the infantry battle command system. Networked CLUs are to be employed in the same manner. Payoffs include increased Line-of-Sight/Beyond-Line-of-Sight lethality and overmatch made possible by synchronized sensors, fires, and maneuver in near-real time; increased warfighter survivability via early acquisition and targeting; and increased situational awareness. These provide a common operating picture for the manned platform and dismounted Soldier through the rapid sharing of actionable information. The project will also mature the technologies demonstrated and funded under PE 062303A. These efforts directly support the NLOS-LS System Development and Demonstration (SDD) program and multiple other systems managed by the Program Executive Officer for Missiles and Space. 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 is performed at the US Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

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|--|----------------|----------------|----------------|----------------|
| Accomplishments/Planned Program: | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> |
| Enhanced Seeker Development: In FY06, completed the final design of the multi-mode Precision Attack Missile (PAM) seeker, fabricated components and began component testing. Began integration of the PAM multi-mode seeker and test planning for captive flight testing. Completed the final design of the LADAR dual-mode seeker and began fabrication and component/subsystem testing. Conducted manufacturability and producibility studies of both multi-mode PAM seeker and dual-mode LADAR seeker. Integrated seeker model updates for both enhanced seekers into Integrated Flight Simulation (IFS) models to conduct system effectiveness and performance | 24630 | 6520 | 2321 | 942 |
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| BUDGET ACTIVITY | PE NUMBER AND TITLE | | | PROJECT |
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| 3 - Advanced technology development | 0603313A - Missile and Rocket Advanced Technology | | | 263 |
| <p>studies. Provided multi-mode seeker information to Navy Small Diameter Bomb technical leads. Developed a program plan and initiated the design and evaluation of miniaturized electronics for PAM applications (leveraging PE0602303A). Performed aided target acquisition (ATA) performance evaluations utilizing enhanced PAM (ePAM) seeker captive flight tests and LADAR captive flight test data. In FY07, complete fabrication and perform subsystem tests and system captive flight testing of the PAM multi-mode seeker. Perform ATA performance evaluations utilizing multi-mode PAM seeker captive flight test data and develop concepts, detailed designs, and begin prototype fabrication and component/subsystem testing of NLOS-LS spirals. In FY08, perform captive flight testing and final evaluation of the multi-mode PAM seeker and transition the technology as a spiral upgrade to NLOS-LS System Design and Development (SDD) phase. Will mature NLOS spiral concepts/designs. In FY09, will evaluate and mature technology and transition enhanced iPAM seeker, ATA, and electronics as a spiral upgrade to NLOS-LS SDD. Finalize testing and evaluation through technology demonstration of NLOS-LS spirals.</p> | | | | |
| <p>Advanced Propulsion and Warheads: In FY06, performed enhanced propulsion trade studies and identified propulsion concepts and/or thrust cycle that maximize range of Precision Attack Missile (PAM). Completed design of test-bed pintle motor for advanced materials testing and began fabrication of hardware. Performed insensitive munition screening tests. Developed high efficiency turbine engine (HETE) configurations and performed design studies. Formed manufacturing and cost teams to investigate risk and benefits of productions plans. Performed trade studies to verify HETE performance. In FY07, update propulsion trades and evaluations of critical enhanced PAM propulsion subsystems for spiral insertion. In addition, conduct baseline evaluations and simulation of the HETE critical technologies. In FY08, will investigate enhanced PAM propulsion and warhead technologies and incorporate insensitive munitions PAM applications and improved PAM (iPAM) design (leverage PE0602303A). iPAM design includes improved seeker, new electronics, autopilot modifications, and evaluation of interaction with energetics modifications. Will further mature the HETE technologies through detailed design, prototype/flight-weight hardware fabrication, integration, and testing. In FY09, will continue development and maturation of enhanced PAM propulsion technologies and perform subsystem and system integration testing; and finalize maturation of HETE flight-weight hardware, and will transition to PEO Missiles and Space.</p> | 7625 | 866 | 4724 | 1884 |
| <p>Modeling/Simulation and System Performance Evaluation: In FY06, increased fidelity of models to support few-on-few simulations; performed trade studies, identified alternate variants, and critical subsystem requirements to achieve NLOS-LS Objective System performance; and addressed manufacturing and affordability (M&A) issues through system research, design, and maturation. Performed high-fidelity PAM multi-mode seeker Integrated Flight Simulations (IFS) studies to include probability of encounter, in-flight update considerations, and sensor fusion studies. Integrated scene generator with multi-mode sensor models and optimized simulation capabilities. Performed stability/controllability and kinematics/search study with updated wind tunnel test data for Loiter Attack Missile (LAM); developed visualization tools for enhanced LAM scenarios; performed high maneuverable airframe analyses and preliminary performance evaluations of turbo engine designs. In FY07, conduct preflight and post flight reconstruction of PAM captive flight tests and support simulation formal accreditation process. Continue trade studies taking into account various regions, targets, environments, and countermeasures, identifying alternate variants, and critical subsystem requirements. Address M&A issues and expand the envelope of conditions evaluated by the simulation. Perform trade studies and generate detailed simulation models for evaluation of NLOS-LS variant missiles. In FY08, will support few-on-few simulations and experiments. Will perform trade studies and generate detailed simulation models for evaluation of PAM propulsion technology insertion. Model M&A issues in preliminary design phase of NLOS-LS variants. In FY09, will perform many-on-many system trade studies and generate detailed simulation models for evaluation of NLOS variants and PAM upgrades while continuing to address M&A issues; conduct excursions to expand the envelope of simulation evaluated conditions.</p> | 7904 | 1755 | 2527 | 942 |
| <p>Smaller, Lighter, Cheaper (SLC): In FY08, will integrate warhead, safe and arm, and final guidance electronics unit into the Close Combat</p> | | | 5169 | 7334 |

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| Lethal Recon (CCLR) system (developed with DARPA under PE 0602303A project 214) and perform integration testing. Will conduct multipurpose warhead design verification testing and warhead pre-qualification tests. In FY09, will design and initiate prototype development for small, low cost seeker/sensor system, and electronics for small lightweight precision munitions that meet urban and emerging threats. | | | | |
| Close Combat Networking of Weapons and Sensors: In FY08, will complete technical specifications definition for network-enabled Tube-launched, Optically-tracked, Wire-guided (TOW), Improved Target Acquisition System (ITAS), and Javelin Command Launch Unit (CLU), including interfacing with the desired tactical network transport, infantry battle command, and display devices. Will conduct networked lethality trade studies, including consideration of interface to current and future infantry battle command. Will initiate mission software design and component-level assessment. In FY09, will continue mission software design and development. Will initiate prototype development and network integration of the Command Launch Unit Far Target Locators (FTLs) and a squad/platoon level infantry battle command interface. Initiate planning for a network lethality demo employing current and future tactical radios/waveforms. | | | 3829 | 4709 |
| Multi-Mission/Multi-Purpose Single Missile Propulsion: In FY08, will perform system level trades and initiate concept designs of gelled bi-propellants, pintle-controlled solids, and hybrids that provide longer ranges, close inner boundaries, and shorter flight times while increasing system insensitive munition capability and mission robustness in air-to-ground, ground-to-ground, and ground-to-air roles. In FY09, will complete concept designs. Will initiate fabrication and prepare for demonstration of critical components (including propellants, engine, expulsion systems, and controls) for variable propulsion motors. Will begin validation of designs. | | | 1764 | 2270 |
| Defense Against Rockets, Artillery, and Mortars (RAM): This project transitions from Defense Against RAM efforts in 0602303A project 214. In FY08, will begin development of integrated, form factored interceptor prototypes, launcher prototypes, and fire control prototypes capable of intercepting and defeating rocket, artillery, and mortar threats. Will begin fabrication of interceptor, launcher, and fire control components. In FY09, will complete fabrication of prototype interceptor, launcher, and fire control components and conduct bench and field testing. In addition, will integrate components and begin system level hardware in the loop testing and evaluation will use the results all component and system level testing to update and verify the system level simulations. | | | 10785 | 19077 |
| Small Business Innovative Research/Small Business Technology Transfer Programs | | | 239 | |
| Total | | 40159 | 9380 | 31119 |

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| BUDGET ACTIVITY 3 - Advanced technology development | PE NUMBER AND TITLE 0603313A - Missile and Rocket Advanced Technology | | | | | | PROJECT 550 | |
| 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 |
| 550 COUNTER ACTIVE PROTECTION | 16294 | 12262 | 15395 | 15496 | 8278 | 5691 | 5816 | 5944 |

A. Mission Description and Budget Item Justification: This project matures and demonstrates integrated survivability technologies and techniques for lightweight combat platforms including light armored vehicles, tactical wheeled vehicles, and helicopters. Current aircraft survivability materiel solutions have limited effectiveness against optically aimed (i.e. "dumb") weapons such as Rocket Propelled Grenades (RPGs) and small arms. The Close-In Active Protection Systems (CIAPS) Phase 1 prototype has been demonstrated on a light armored vehicle. New sensor and interceptor technologies were matured in CIAPS Phase 2 to enable the system to be mounted on tactical wheeled vehicles for protection against RPGs. A new integrated aircraft survivability technology maturation program with mature new survivability techniques and technologies optimized to work in concert with components already matured and being fielded is being explored. System modeling and simulation conducted with user participation will maximize the opportunities for operator input to survivability system configuration and guide all aspects of technology maturation. Systems approach will ensure the avoidance of interference among survivability system components and techniques while taking every advantage of synergy and assistance from existing aircraft survivability components to improve the performance of the entire survivability suite. This project complements work done on adaptive infrared suppressor, Manned Unmanned Rotorcraft Enhanced Survivability (MURES), Survivability Planner Associate Re-router (SPAR) acoustic signature technologies matured in the Aviation Advanced Technology (program element (PE) 63003/313). This effort is building on the expertise developed in support of rockets, missile, sensors, and active control to develop innovative solutions survivability. 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 is performed at the US Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

| <u>Accomplishments/Planned Program:</u> | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> |
|--|----------------|----------------|----------------|----------------|
| Close-In Active Protection Systems (CIAPS): The Close-In Active Protection Systems Phase 1 prototype (CIAPS 1) has been demonstrated on a light armored vehicle. New sensor and interceptor technologies have been matured in CIAPS Phase 2 (CIAPS 2) to enable the system to be mounted on tactical wheeled vehicles for protection against Rocket Propelled Grenades (RPGs) and reduce the size, weight, and power burden. This also decreases the hazard to dismounted troops operating with such a system. In FY06, completed the integration of CIAPS 2 radar and launcher, incorporating technologies matured under PE 0602303A Missile Technology, on HMMWV including dynamic testing against rocket-ball and RPG threats, proving accurate fire-control solutions. Completed dynamic testing of CIAPS 2 interceptors, including integration and operation of radio frequency data link, roll-control thruster firing system, confirming accurate interceptor flyout, and pointing. Proved all-composite interceptor limiting fragmentation to only the direction of the threat, minimizing the fragmentation hazard. | 4800 | | | |
| Kinetic Energy Active Protection System (KEAPS) Guided Interceptor: In FY06, developed and analyzed active protection system (APS) concepts using a guided interceptor for protection against tank gun fired threats as well as other long range threats to light armored platforms. Initiated component development for guided interceptor including guidance algorithms, inertial instruments, and control system. In FY07, continue development of guided interceptor component technologies to include guided interceptor guidance algorithms, inertial instruments, and control system. Build components and begin component and subsystem testing, including integration of tracking sensor/launcher ground station. Perform at least ten unguided flight tests. In FY08, will complete integration of interceptor components, conduct up to five pre-programmed flight tests, and demonstrate full guided interceptor in up to five flight tests. Will begin fabrication of | 5744 | 11933 | 15395 | 15496 |

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| guided interceptors to support system level demonstration. In FY09, will complete fabrication of guided interceptors for system demonstration in 20 flight tests, support integration of AP system for demonstration, and support system level demonstration testing. | | | | |
| Close-In Active Protection Systems (CIAPS) on Stryker: In FY06 this Congressional Add funded a risk reduction integration experiment under cooperative R&D agreement with the FCS AP developer using a prototype of the Quick-Kill close-in APS mounted on a Stryker vehicle. | 5750 | | | |
| Small Business Innovative Research/Small Business Technology Transfer Programs | | 329 | | |
| Total | 16294 | 12262 | 15395 | 15496 |

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| BUDGET ACTIVITY 3 - Advanced technology development | | PE NUMBER AND TITLE 0603313A - Missile and Rocket Advanced Technology | | | | | PROJECT 704 | | |
| 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 | |
| 704 Advanced Missile Demo | 6589 | 2956 | 8373 | 6189 | 8000 | 10800 | 8500 | 6742 | |

A. Mission Description and Budget Item Justification: This project demonstrates advanced state-of-the-art missile system concepts to enhance weapon system lethality, survivability, agility, versatility, deployability, and affordability for the Future Force. Current planned advanced demonstrations are Fire Control-Node Engagement Technology (FC-NET) and Advanced Multi-Role Miniature Precision Guided Missile (AMMPGM). The FC-NET program objective is to mature a common fire control architecture for combat vehicles. The resulting Fire Control Architecture will enable a platform to host, and a commander to effectively manage, an interchangeable, and distributed suite of weapons. The system will recommend Weapon-Target Pairings for multiple weapons (missiles and guns) and is expandable to include future weapon types. The objective of AMMPGM program is to mature and demonstrate advanced, miniature, multi-role precision-guided missile technology that provides robust defeat of a variety of non-armored threats from multiple platforms including manned and unmanned air and ground platforms with a significantly reduced logistics footprint. This program uses technology developed under 0602303A Missile 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 is performed at the US Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

| <u>Accomplishments/Planned Program:</u> | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> |
|---|----------------|----------------|----------------|----------------|
| Fire Control Node Engagement Technology (FC-NET): In FY06, finalized technical fire control, validated the weapon target paring algorithms, and demonstrated the ability to give a common fire control for both missiles and guns in a live exercise. | 3737 | | | |
| Advanced Multi-Mission Precision Guided Munition (AMMPGM): In FY06, demonstrated an advanced insensitive munition (IM) and an improved lethality warhead, and a fuze subsystem compatible with the Hydra-70 and Advanced Precision Kill Weapon System II (APKWS II). This technology successfully transitioned to the APKWS II program. Also, demonstrated an improved insensitive munition rocket motor to improve minimum and maximum range system performance through static and ballistic flight testing. In FY07, design and begin fabrication of a prototype smart launcher and IM capability for the Hydra-70 family of munitions, as well as other munitions such as Joint Common Missile. In FY08, will complete fabrication and demonstration of the smart launcher through HWIL testing, bench testing, and live fire testing. | 2486 | 2873 | 3373 | |
| Counter Rockets, Artillery, Mortars (CRAM) Tracking, and Fire Control: In FY08, will transition short range surveillance sensors technology from PE 603004A and initiate fabrication of prototype short range surveillance sensors capable of acquiring and tracking rocket, artillery, and mortar threats under realistic operational conditions. Also, in FY08, will transition fire control sensor technologies from PE 0602303A (Missile technology) project 214 and initiate development and fabrication of prototype fire control sensors capable of providing end game accuracy for intercepting and defeating RAM threats. In FY09, will complete fabrication and test the prototype surveillance sensors in a relevant environment and integrate fire control sensor components for development and test. | 366 | | 5000 | 6189 |
| Small Business Innovative Research/Small Business Technology Transfer Program | | 83 | | |
| Total | 6589 | 2956 | 8373 | 6189 |

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| BUDGET ACTIVITY 3 - Advanced technology development | | PE NUMBER AND TITLE 0603313A - Missile and Rocket Advanced Technology | | | | | PROJECT G03 | | |
| 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 | |
| G03 Army Hypersonics Advanced Technology | | | 1985 | 1999 | 2044 | 2077 | 3121 | 2203 | |

A. Mission Description and Budget Item Justification: This project funds advanced technology development to mature and validate, through evaluation testing, the critical technologies required to develop expendable hypersonic/hypervelocity missiles and interceptors to defeat hypersonic threats and Enhanced Area Air Defense Systems (EAADS) outer tier threats. Primary focus areas are those deemed critical for hypersonic/hypervelocity weapon maturation to enhance Army operational capability. These focus areas include engine component design, low cost seeker components, active and passive thermal management systems, material selection and evaluation, airframe structural analysis, and missile subcomponent design and development. Efforts include experimental model design and fabrication, instrumentation of experimental modes, extensive ground testing of matured component 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 is performed at the US Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

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| Accomplishments/Planned Program: | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> |
| In FY08, transition technology from PE 0602303A project G02 to complete component technology designs; validate system design concepts and begin fabrication of components and subsystems. In FY09, will complete design and fabrication of missile components and subsystems, such as seekers, warheads, engine, guidance, or radomes, for ground testing at component level. | | | 1985 | 1999 |
| Total | | | 1985 | 1999 |