ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

BUDGET ACTIVITY
3 - Advanced technology development

PE NUMBER AND TITLE
0603313A - Missile and Rocket Advanced Technology

COST (In Thousands)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total Program Element (PE) Cost		128221	115332	70066	42939	72272	85892	88010	92984
206	MISSILE SIMULATION	9682	10470	3190	3277	3440	3491	3521	3546
263	FUTURE MSL TECH INTEGR(FMTI)	43667	29956	39635	14277	20826	37780	45694	52181
550	COUNTER ACTIVE PROTECTION	6721	5080	11000	12237	15313	15316	8167	5614
655	HYPERVELOCITY MISSILE TD	54359	50887	9367	0	0	0	0	0
704	ADVANCED MISSILE DEMO	6009	5997	6874	2950	3394	0	0	0
G03	ARMY HYPERSONICS ADVANCED TECHNOLOGY	0	0	0	10198	29299	29305	30628	31643
NA6	MISSILE AND ROCKET INITIATIVES (CA)	7783	12942	0	0	0	0	0	0

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 Force and, where feasible, exploits opportunities to enhance Current Force capabilities. Efforts are conducted through system simulation, design, demonstration, and test in laboratory and operational scenarios. This PE includes demonstrations of advanced tactical missiles, real-time hardware-in-the-loop simulations, and aircraft and ground system survivability efforts. The technologies focused on in this PE enhance the warfighting capabilities of 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), Compact Kinetic Energy Missile (CKEM), Advanced Multi-Mission Precision Guided Munition (AMMPGM), Air Defense for the Future Combat Systems (FCS) Unit of Action (concentrating on defense against Rockets, Artillery and Mortars (RAM)), Close-In Active Protection System (CIAPS) for ground and air platforms, and development and demonstration of hypersonic missile technology. The Army Hypersonics Applied Research program matures and demonstrated expendable hypersonic missiles and will advance the national goals in hypersonic weapons maturation. Survivability efforts are coordinated with PE 0602303A (Missile Technology), PE 0603003A (Aviation Advanced Technology) and PE 0603270A (Electronic Warfare 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	92800	66669	51189
Current Budget (FY 2006/2007 PB)	115332	70066	42939
Total Adjustments	22532	3397	-8250
Net of Program/Database Changes			
Congressional Program Reductions	-1713		
Congressional Rescissions			
Congressional Increases	27500		
Reprogrammings			
SBIR/STTR Transfer	-3247		
Adjustments to Budget Years		3397	-8250

Change Summary Explanation:
FY07 - Funds realigned ($8250K) to higher priority requirements.

Eleven FY05 Congressional adds totaling $27500 were added to this PE.

FY05 Congressional adds with no R-2A:

($1151) Long Range Aviation Missile (LRAM), Project NA6: The purpose of this one year Congressional add is to fund research on long-range missile technology. No additional funds are required to complete this project.

($959) Micro-factories for Precision Parts Program, Project NA6: The purpose of this one year Congressional add is to develop a "desktop" factory using modular micro CNC machines. No additional funding is required to complete this project.

($863) Multi-Controlled UAV Plug-n-Play Sensor, Project NA6: The purpose of this one year Congressional add is to fund research on a plug-and-play sensor for UAVs. No additional funding is required to complete this project.

($1726) Persistent Protective Surveillance for the Survivability of Rotary Wing Aircraft, Project NA6: The purpose of this one year Congressional add is to fund research on persistent protective surveillance for the survivability of rotary wing aircraft. No additional funding is required to complete this project.

($959) Smart Energetics Architecture for Missile Systems, Project NA6: The purpose of this one year Congressional add is to fund research on a smart energetics architecture for missile systems. No additional funding is required to complete this project.

($959) Volumetrically Controlled Manufacturing (VCM), Project NA6: The purpose of this one year Congressional Add is to develop a precision synthetic manufacturing process that uses mathematical algorithm to precisely calculate 3D material matrix coefficients, in discrete volumes, and then replicates those properties within a manufacturing process. No additional funding is required to complete this project.

($4603) Warfighter Protection and Homeland Security Lab, Project NA6: The purpose of this one year Congressional add is to apply army simulation technology to force protection and homeland security. No additional funding is required to complete this project.

($1726) Waterside Wide Area Tactical Coverage and Homing (WaterWATCH), Project NA6: The purpose of this one year Congressional add is to fund research in the Waterside Wide Area Tactical Coverage and Homing (WaterWATCH) project. No additional funds are required to complete this project.

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**206**

COST (In Thousands)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
206	MISSILE SIMULATION	9682	10470	3190	3277	3440	3491	3521	3546

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 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 reducing 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Missile Simulation - Missile Simulation – In FY04, continued the maturation of a tri-mode (RF MMW, semi-active laser, and IR) guidance HWIL capability and continued the maturation of a multi-channel Laser Detection and Ranging (LADAR) radar scene projector for use in HWIL simulation; matured end-to-end HWIL missile simulation techniques with remotely-located ground equipment (launchers, Command & Control, Communications, Computers and Intelligence (C4I) units, fire control sensors and units) connected to real-time HWIL missile components and simulations. In FY05, will complete the maturation of a tri-mode missile guidance HWIL simulation capability and demonstrate the performance of a multi-channel LADAR scene projector for HWIL simulation of LADAR sensors; and extend the capabilities of MMW HWIL simulation capabilities at 35 GHz by addressing synthetic aperture radar (SAR) types of missile guidance. In FY06, will apply the LADAR scene projector to mature closed-loop HWIL capabilities for NLOS-LS and other related acquisition programs; will initiate integrated digital electronic circuit techniques to improve MMW signal generation; will extend capabilities for semi-active laser HWIL simulation using updated lasers and detailed laser illuminator scene modeling. In FY07, will complete the application of the LADAR scene projector and integrate it with an advanced passive IR scene projector with low-temperature background scene capability; will continue the development of HWIL simulation techniques for missiles guided by MMW synthetic aperture radar signals; will continue work digital circuit techniques for application in MMW signal generation.	2966	3087	3190	3277
Missile Simulation Technology – In FY04, this Congressional add expanded the missile simulation capability to included representations of fielded missile systems. It also included representatives of missiles expected to be in the Unit of Action; also initiated the Joint Aviation, Missile, and Unmanned Systems (JAMUS) simulation to conduct engineering analyses on topics in a Future Force context; commenced the maturation, implementation, integration and test of missile simulation capabilities in the Modeling Architecture for Technology and Research Experimentation (MATREX) environment. MATREX is envisioned to support distributed simulations of various current, Future Combat Systems (FCS), and Future Force evaluations, technology trade studies, and experimentations. This effort will facilitate the modeling and simulation capabilities of various Army agencies allowing cooperative simulation efforts such as the MATREX. In FY05, will continue maturation of the JAMUS and MATREX systems to gain confidence in their capabilities and to initiate simulation validation exercises across a range of varied scenarios. No additional funding is required.	6716	7383	0	0
Totals	9682	10470	3190	3277

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February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**263**

COST (In Thousands)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
263	FUTURE MSL TECH INTEGR(FMTI)	43667	29956	39635	14277	20826	37780	45694	52181

A. Mission Description and Budget Item Justification: This project demonstrates advanced tactical missile technologies including seekers, propulsion, airframes, communications, and guidance and controls for the Non-Line-Of-Sight Launch System (NLOS-LS) Technology program supporting Future Combat Systems (FCS) and the Future Force. These technologies include the demonstration and integration of networked missile radios and missile antennas; multi-mode seeker concepts, controllable thrust motors (gels, pintle-controlled solids, or air breathing), aided target acquisition (ATA). The Army's baseline communications networking waveform for the NLOS-LS missiles was matured and demonstrated in conjunction with the Communications Electronics Research Development Engineering Center (CERDEC) Soldier-Level Integrated Communications Environment (SLICE) program. In addition, the project matured two missile radio designs capable of hosting the SLICE waveform as risk mitigation missile radio and antenna that supports current NLOS-LS System Development and Demonstration (SDD) program. Testing of the NLOS-LS products from both the SLICE and risk mitigation efforts are funded and accomplished by this program. Secure wide-band data link hardware, allowing target position updates during missile flight, and transmission of imagery to the ground were demonstrated. Seeker technology will address imaging infrared, Laser Detection and Ranging (LADAR), and millimeter wave seeker technologies, combined with semi-active laser technology, to provide precision strike and fire-and-forget guidance modes. Affordable, controllable thrust rocket motors, such as gelled bi-propellants or pintle-controlled solids, will be demonstrated to provide longer ranges and shorter flight times while increasing system insensitivity and robustness in air-to-ground, ground-to-ground, and ground-to-air roles. A missile communications network enables 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. These efforts provide support for the NLOS-LS SDD and are supported by the Program Executive Officer Tactical Missiles. In future years, a technology demonstration of air defense capability for the unit of action, concentrating on defense against rockets, artillery, and mortars will be performed using technologies funded under PE 0602303A. In addition, smaller, lighter weight, and more affordable missile technologies will be demonstrated using the technology matured under PE 0602303A. 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
NLOS-LS Communications Simulation: In FY04, evaluated results of simulation experiments to refine communications requirements for NLOS-LS; updated communications simulation with vendor enhancements and re-evaluated NLOS-LS communications performance in an operational environment.	2406	0	0	0
NLOS-LS Waveform Development: In FY04, matured JTRS SCA 2.2 compliant waveform and networking protocols for NLOS-LS; completed software maturation of the baseline NLOS-LS waveform (Soldier Radio Waveform, version 1) and the risk mitigation waveform (Missile Network Waveform) and conducted rigorous laboratory testing of the waveform software to prepare for captive-carry testing in a 20-node communications networking test.	9223	0	0	0
NLOS-LS Missile Radio and Antenna: In FY04, matured risk mitigation missile radio & antenna for NLOS-LS; fabricated and assembled 40 missile-form-factored JTRS prototype radios and antennas from each of two vendors and performed rigorous testing in the laboratory in preparation for captive-carry testing.	8780	0	0	0
NLOS-LS Communications Testing: In FY04, planned and conducted a realistic, real world test of the radio hardware, antennas, and waveforms; conducted pre-tests to give the two competing contractors a chance to dry-run their communication networking solutions, and successfully performed the culminating captive-carry tests using aircraft and SUVs as surrogate missiles and C2 nodes in a 20-node test of both the Soldier Radio Waveform and the Missile Network Waveform; tested 10 aircraft-based radios and 10 mobile ground-based radios operating in a variety of terrain and altitudes while in motion and replicated NLOS-LS in an operational environment.	4330	0	0	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Enhanced Seeker Development - In FY04, redesigned uncooled infrared (UCIR) optics for increased Field of View (FOV) for the enhanced Precision Attack Missile (PAM) seeker maturation effort, improved Aided Target Acquisition (ATA), fabricated and assembled two prototype seekers and performed bench testing, tower testing and captive flight testing and data reduction. Generated ATA analysis and assessment tools (software/simulation development) for ATA performance evaluations. In FY05, will complete maturation of enhanced UCIR seeker; bench and captive flight tests; conduct environmental/performance evaluation testing and transition to the enhanced UCIR seeker supporting NLOS-LS SDD. In support of spiral development, mature multiple seeker technologies for NLOS-LS; perform enhanced semi-active laser (SAL)/LADAR trade studies, component maturation and bench testing, and develop conceptual system designs; evaluate tri-mode (infrared/milli-meter wave/semi-active laser) seeker technology applications to NLOS-LS and mature/adapt seeker designs for integration; perform ATA performance evaluations; and prepare PAM and LAM sensors for NLOS-LS system testing. In FY06, will perform enhanced semi-active laser (SAL)/LADAR system maturation and begin fabrication and component testing; perform tri-mode seeker system maturation and begin fabrication and component/subsystem testing; begin captive flight testing of both the PAM seeker (Tri-mode PAM) and LAM seeker (Enhanced LADAR); will conduct realistic system testing of PAM and LAM sensors in relevant environment; and will perform ATA performance evaluations. In FY07, will evaluate and mature technology transition/future enhancements for seeker maturation; continue system maturation, fabrication and subsystem/system testing in relevant environments (captive flight testing) of SAL/LADAR technology for spiral transition to NLOS-LS; and will continue tri-mode seeker system maturation, fabrication, and subsystem/system testing.	8071	16760	21830	6577

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Advanced Propulsion – In FY04, conducted static tests of a 7-inch diameter, minimum signature propellant, pulse missile motor; performed nozzle material investigations and static tested with PAM type propellants. In FY05, identifies and evaluates critical technology for an enhanced solid propellant pintle; designs, matures, and fabricates critical PAM propulsion subsystems and perform laboratory subsystem/system level testing, begins system trade studies and maturation of a high efficiency turbofan engine leveraging from Loiter Attack Missile - Aviation (LAM-A) propulsion technology advancements. In FY06, will continue the design, maturation, and fabrication of critical PAM propulsion subsystems (composite case, igniter, nozzle/pintle/actuator, propellant grain) and perform laboratory/relevant environment system level testing; will conduct static tests of flight weight prototype systems (ambient/cold/hot) and perform insensitive munition screening tests; will mature and demonstrate a high efficiency turbofan engine and conduct rig testing of critical hardware. In FY07, will continue the design, maturation, and fabrication of critical PAM propulsion subsystems for spiral insertion and perform laboratory/relevant environment subsystem/system level testing; will fabricate and integrate flight worthy prototype subsystems and prepare for controlled test flight; will mature and demonstrate a high efficiency turbofan engine, conduct baseline evaluations and testing of critical hardware and demonstrate prototype engine hardware.	2180	3821	5925	3500
Warhead Testing and Integration - In FY04, performed lethality testing and integration of novel warhead designs for NLOS-LS application. In FY05, matures advanced, lighter, unitary/multi-purpose warhead technologies and integrates these technologies for increased lethality against anti-armor and other target sets/environments including non-lethal effects; exploits various fragmentation and shape charge technologies and optimize for NLOS-LS; matures explosive fill technologies including thermobarics; matures lethality toolset/models for warhead lethality assessments. In FY06, will mature advanced, lighter, unitary/multi-purpose combined effects warhead technologies for potential spiral insertion into NLOS-LS; will fabricate, integrate and static/dynamic test critical technologies (fragmentation, shape charge, and explosive fill); will perform verification/validation of toolset/models. In FY07, will continue maturation of warhead technologies and integration for increased lethality against anti-armor and other target sets/environments including non-lethal effects for spiral insertion into NLOS-LS. Will perform integrated warhead static and dynamic tests and validate modeling and simulation tools with test results.	2501	3126	3960	1400

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Modeling /Simulation and System Performance Evaluation – In FY04, conducted system analysis and simulation for initial few-on-few capabilities; matured Common Simulation Framework (CSF) 3-Degrees-Of-Freedom simulation for rapid trade studies, and enhanced visualization demonstrations; completed baseline affordability/cost analysis/ and manufacturing analysis of seekers, warhead and propulsion system technologies. In FY05, establishes an initial integrated flight simulation (IFS) capability, develops capability of few-on-few full-system, simulation and performs trade studies, identifying alternate variants and critical subsystem requirements to achieve NLOS-LS Objective System performance; addresses manufacturing and affordability issues; performs component and system level testing for performance evaluations. In FY06, will increase fidelity of CSF-based and few-on-few simulations; will perform trade studies, identifying alternate variants and critical subsystem requirements to achieve NLOS-LS Objective System performance; will address manufacturing and affordability issues through system research, design and maturation. In FY07, will conduct preflight and post flight reconstruction of flight tests performed; will support simulation formal accreditation process. Will continue trade studies taking into account various regions, targets, environments and countermeasures, identifying alternate variants and critical subsystem requirements to achieve NLOS-LS Objective System performance; will address manufacturing and affordability issues; will conduct excursions to expand the envelope of conditions evaluated by the simulation.	2806	6249	7920	2800
Loiter Attack Munition-Aviation (LAM-A) – This one year Congressional add generated force-on-force simulation exercises with warfighters, performed hardware-in-the-loop simulations with flight hardware, completed system vulnerability and turbofan propulsion studies, continued the aircraft cockpit integration design, tests breadboard high-bandwidth data-link hardware; and prepared for control vehicle test flights of a long-range, precision-strike weapon for the aviation forces. No additional funding is required to complete this project.	3370	0	0	0
Totals	43667	29956	39635	14277

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February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**550**

COST (In Thousands)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
550 COUNTER ACTIVE PROTECTION	6721	5080	11000	12237	15313	15316	8167	5614

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 RPGs and small arms. Close-In Active Protection Systems (CIAPS) Phase 1 prototype has been demonstrated on a light armored vehicle. New sensor and interceptor technologies are being 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 to 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 opportunity for operator input to survivability system configuration and guiding all aspects of technology maturation. Systems approach will ensure that we avoid interference among survivability system components and techniques while taking every advantage for synergy and assistance from existing aircraft survivability components to improve the performance of the entire survivability suite. This project complements work done on adaptive IR suppressor, Manned Unmanned Rotorcraft Enhanced Survivability (MURES), Survivability Planner Associate Re-router (SPAR) acoustic signature technologies matured in the Aviation Advanced Technology (PE 63003/313). This effort is building on the expertise developed in support of rockets, missile, sensors, 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Close-In Active Protection Systems (CIAPS) - In FY04, this completed Phase I demonstration with additional on-the-move testing and clutter testing associated with the transition of CIAPs technology to PM-Stryker. In FY06, will demonstrate a prototype CIAPS and technology matured under PE 0602303A missile technology, mounted on a HMMWV that defeats RPGs fired from short range with multiple threats; will conduct live range testing of system while stationary and on-the-move.	3730	0	5000	0
- Close-In Active Protection Systems (CIAPS) Congressional Add - In FY04, this Congressional add completed Phase 1 demonstration of CIAPS prototype on light armored vehicle (LAV). Completed tradeoff analysis for CIAPS concept for tactical wheeled vehicles. In FY05, this Congresional add will complete fabrication of science and technology prototype radar sensor.	2692	5080	0	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Integrated Aircraft Survivability Technology - In FY06 will evaluate, analyze, and initiate development of system solutions applying active protection techniques for aircraft survivability in defeat of RPGs and other non-traditional threat weapons. Will incorporate small arms/RPG indication and warning, automated threat avoidance, and active defeat concepts for aircraft. FY07 will demonstrate initial system breadboard implementations of integrated system solutions providing aircraft survivability against the full spectrum of threats.	0	0	6000	12237
- Small Arms ID Overwatch - In FY04, completed ground tests of eight passive eletro-optic sensors from elevated positions to evaluate ability to detect and locate small arms fire.	299	0	0	0
Totals	6721	5080	11000	12237

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**655**

COST (In Thousands)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
655 HYPERVELOCITY MISSILE TD	54359	50887	9367	0	0	0	0	0

A. Mission Description and Budget Item Justification: This program matures and demonstrated hypervelocity missile technology that will enable the Future Force by providing overwhelming lethality with a small, light, fast hypervelocity compact kinetic energy missile. The goal of the Compact Kinetic Energy Missisle (CKEM) ATD is to demonstrate enhanced system lethality with a threshold of 60-inch long, 100-lb missile and an objective of 54-inch long, 65-lb missile. Miniature guidance inertial measurement unit (IMU) technology will be demonstrated to survive high-g missile launch and will provide precision guidance to kill targets at ranges of 0.4-5 kilometer. The program will mature and demonstrate advanced component and subsystem and system level technologies in a missile system configuration to achieve next-generation system level performance improvements. 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**655**

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Compact Kinetic Energy Missile (CKEM) - In FY04, demonstrated critical hypervelocity missile component technologies in an integrated missile design; performed critical technology demonstrations and subsystem integration testing and evaluation including system simulations to validate performance models, conducted full-scale lethality sled tests against advanced threat armors to evaluate penetrator design performance; integrated advanced propulsion designs into competing missile configurations and conducted two Controlled Flight Tests of competing missile prototype designs; and performed the Preliminary Design Reviews (PDR) of ATD missile design. In FY05, provides a detailed design that is traceable to a tactical system; fabricates the missile, and integrates it with a surrogate weapon system for demonstration; will conduct testing in a Hardware-in-the-Loop (HWIL) facility and independently evaluates a system simulation of the design to verify performance for the Critical Design Review (CDR); conducts two controlled flight tests of the CKEM missile design. In FY06, will continue the CKEM ATD with the guided flight tests conducted from a vehicle representative of an FCS vehicle and a launcher with a representative/surrogate fire control. At least two of the guided flight tests will be against an instrumented vehicle representative of the armor threat.	54359	50887	9367	0
Totals	54359	50887	9367	0

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February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**704**

COST (In Thousands)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
704	ADVANCED MISSILE DEMO	6009	5997	6874	2950	3394	0	0	0

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 Future Combat Systems (FCS) and 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 the FCS family of 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 & 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- FC-NET - - In FY04, designed and matured technical fire control components through modeling and simulation; completed integration of the multi-weapon technical fire control architecture into the lethality module of the Crew integration and Automation Test Bed (CAT) Advanced Technology Demonstration (ATD); demonstrated common technical fire control architecture in a manned ground vehicle and an unmanned armed ground vehicle in a virtual test environment; continued to mature the Weapon-Target Pairing Algorithms currently identified as a for FCS. In FY05, develop a technical fire control interface to the tactical fire control infrastructure and finalize the Weapon-Target Pairing Algorithms; demonstrate and test in a virtual simulation environment a distributed Technical Fire Control Architecture. In FY06, finalize the technical fire control and demonstrate in a live exercise.	4896	3400	3900	0
- Advanced Multi-Mission Precision Guided Munition (AMMPGM) - In FY04, completed a preliminary design of the warhead and fuze. In FY05, complete static and dynamic warhead testing and limited qualification testing, including insensitive munition testing. In FY06, will mature a common joint Army/Navy smart 2.75 inch launcher; and design strapdown uncooled Infrared (IR) imaging seeker technology for a fire-and-forget capability for 2.75 inch missiles. In FY07, will build a prototype launcher and demonstrate it through platform integration and live fire testing. Will build a prototype strapdown uncooled IR seeker and perform a static test.	1113	2597	2974	2950
Totals	6009	5997	6874	2950

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603313A - Missile and Rocket Advanced Technology**	**G03**

COST (In Thousands)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
G03	ARMY HYPERSONICS ADVANCED TECHNOLOGY	0	0	0	10198	29299	29305	30628	31643

A. Mission Description and Budget Item Justification: This project funds advanced technology development to mature and validate, through experimental testing, the critical technologies required to develop expendable hypersonic missiles. Primary focus areas are those deemed critical for hypersonic weapon maturation to enhance Army operational capability in air and missile defense missions. These focus areas include scramjet engine components, active and passive thermal management systems, material selection and evaluation, airframe and engine component structural analysis and missile subcomponent design and development. Efforts will include experimental model design and fabrication, instrumentation of experimental models, extensive ground testing efforts of matured component technology and will build on preceding missile and engine component design efforts and will focus on further development, integration and validation through ground test activities at duplicated operational conditions. 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 Aviation & Missile Research, Development, and Engineering Center, Redstone Arsenal, AL.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Detailed Hypersonic Engine and Missile Component Design: In FY07, will transition of technology from PE 0602303A G02 to complete component technology maturation; begin integration of matured scramjet engine component designs; validate design concepts for inlets, combustor, fuel injectors, fuel mixing enhancement, thermal protection systems and other missile component technologies that were selected and evaluated in concept development phase of program in ground test facilities at duplicated flight conditions.	0	0	0	10198
Totals	0	0	0	10198