| Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army | | | | | | | | | | | DATE: April 2013 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | | | | | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | | | | | | | |
| **COST ($ in Millions)** | **All Prior Years** | **FY 2012** | **FY 2013#** | **FY 2014 Base** | **FY 2014 OCO ##** | **FY 2014 Total** | **FY 2015** | **FY 2016** | **FY 2017** | **FY 2018** | **Cost To Complete** | **Total Cost** |
| Total Program Element | - | 87.749 | 71.111 | 64.009 | - | 64.009 | 42.647 | 47.737 | 49.929 | 51.372 | Continuing | Continuing |
| 206: *Missile Simulation* | - | 3.444 | 2.271 | 2.299 | - | 2.299 | 2.265 | 2.143 | 2.202 | 2.242 | Continuing | Continuing |
| 263: *Future Msl Tech Integr(FMTI)* | - | 58.799 | 58.907 | 54.945 | - | 54.945 | 27.821 | 28.194 | 33.440 | 33.817 | Continuing | Continuing |
| 550: *COUNTER ACTIVE PROTECTION* | - | 7.300 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| 704: *Advanced Missile Demo* | - | 8.527 | 4.879 | 6.765 | - | 6.765 | 12.561 | 17.400 | 14.287 | 15.313 | Continuing | Continuing |
| G03: *Area Defense Advanced Technology* | - | 9.679 | 5.054 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**Note**

Not applicable for this item.

**A. Mission Description and Budget Item Justification**

This program element (PE) matures, fabricates, and demonstrates advanced rocket, missile, interceptor, and guided munition technologies to enhance weapon system lethality, survivability, agility, deployability, and affordability. Project 206 develops high fidelity simulations for advanced tactical missiles and interceptors. Project 263 demonstrates missile and interceptor systems with capabilities to provide protection against rockets, artillery, and mortars; provide precision weapons for small units in close combat; provide precision long-range fires; and provide minimum smoke propulsion for aviation missiles. Project 550 demonstrates guided interceptors for ground combat vehicle active protection systems and evaluates the countering of threat active protection systems ensuring missile lethality. Project 704 demonstrates the capability to detect and track rocket, artillery, mortar, and unmanned air vehicles threats. Project G03 demonstrates missile-based deployable force protection and fire control systems as well as defense against unmanned aerial vehicles and rotary wing aircraft.

Work in this PE is complimentary to PE 0602303A (Missile Technology), and is fully coordinated with PE 0602618 (Ballistics Technology), PE 0602624A (Weapons and Munitions Technology), PE 0603003A (Aviation Advanced Technology), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603125 (Combating Terrorism Technology Development), PE 0603270A (Electronic Warfare Technology), PE 0603734A (Combat Engineering Systems), and PE 0708045A (Manufacturing Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army | DATE: April 2013 |
|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603313A: *Missile and Rocket Advanced Technology* |

Work in this PE is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) located at Huntsville, AL.

| B. Program Change Summary ($ in Millions) | FY 2012 | FY 2013 | FY 2014 Base | FY 2014 OCO | FY 2014 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 90.458 | 71.111 | 68.230 | - | 68.230 |
| Current President's Budget | 87.749 | 71.111 | 64.009 | - | 64.009 |
| Total Adjustments | -2.709 | 0.000 | -4.221 | - | -4.221 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -2.709 | - | | | |
| • Adjustments to Budget Years | - | - | -4.221 | - | -4.221 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | | DATE: April 2013 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>206: *Missile Simulation* | |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 206: *Missile Simulation* | - | 3.444 | 2.271 | 2.299 | - | 2.299 | 2.265 | 2.143 | 2.202 | 2.242 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**A. Mission Description and Budget Item Justification**

This project matures and demonstrates advanced modeling and simulation technologies for missile design and analysis. Evaluation of missile technology by means of modeling and simulation provides a cost-effective method that supports missile maturation throughout the weapon system life cycle. This effort permits a reduction in the number of flight tests required for programs of record as well as improves the confidence of flight test readiness and probability of flight test success.

This project support efforts in the Army science and technology Ground portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center, (AMRDEC) Huntsville, AL.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| ***Title:*** Missile Simulation | 3.444 | 2.271 | 2.299 |
| ***Description:*** This effort designs, matures, and demonstrates advanced simulation technologies and uses those technologies to support missile design, analysis, and evaluation including Hardware-in-the-Loop (HWIL) simulation, missile component and system simulations. | | | |
| ***FY 2012 Accomplishments:***<br>Continued simulation maturation to improve run-time performance of scene generators; improved HWIL multi-mode scene generation capabilities; increased standardization of HWIL interfaces to reduce integration time of different guidance systems; increased fidelity of real-time technical and programmatic modeling and simulation tools (visualization and fast-running models); and leveraged advancements in computer processing capabilities to improve fidelity and runtime of simulations. | | | |
| ***FY 2013 Plans:*** | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>206: *Missile Simulation* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| Improve simulation fidelity, run-time, integration time, and visualization capabilities including: reuse and validate of HWIL simulation modules to reduce integration time and cost; design reduce the run-time required for higher fidelity scene generation, and complete HWIL modifications to allow for varying radio frequency waveforms.<br>***FY 2014 Plans:***<br>Will complete scene generation technology for improved fidelity and runtime of complex millimeter wave (MMW) scenes; improve fidelity of complex modeling and simulation through the leveraging of advancements in microprocessor speed and throughput; enhance endgame lethality modeling to evaluate the effectiveness of complex shaping of integrated blast fragmentation warheads; conduct component and system level analysis simulations. | | | |
| **Accomplishments/Planned Programs Subtotals** | 3.444 | 2.271 | 2.299 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

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

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | | DATE: April 2013 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* | |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 263: *Future Msl Tech Integr(FMTI)* | - | 58.799 | 58.907 | 54.945 | - | 54.945 | 27.821 | 28.194 | 33.440 | 33.817 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**A. Mission Description and Budget Item Justification**

This project matures, fabricates, and demonstrates advanced missile and interceptor technologies, such as seekers, guidance and controls, propulsion, and airframes. The project goal is to reduce the life-cycle cost per kill of precision guided missiles and interceptors.

This project support efforts in the Army science and technology Ground portfolio.

This project matures technologies from PE 0602303A and directly supports systems managed by the Program Executive Officer for Missiles and Space. Work in this project is in collaboration with PE 0602618 (Ballistics Technology), PE 0602624A (Weapons and Munitions Technologies), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology) and PE 0708045A (Manufacturing Technology)..

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| ***Title:*** Technology for Guided Missiles and Interceptors | 5.495 | 0.000 | 0.000 |
| ***Description:*** This effort designs technologies for highly responsive missiles and interceptors. This effort matures and demonstrates guidance and control, seeker, propulsion, and airframe technologies. This effort compliments the: Enhanced Precision Interceptor Technology, Guided Interceptor Technology for Defense against RAM, Hit-to-Kill Interceptor Technology for Defense against RAM (PE 0603313, Project 263) and Kinetic Energy Active Protection System Guided Interceptor (PE 0603313, Project 550). | | | |
| ***FY 2012 Accomplishments:***<br>Continued efforts to design and demonstrate guidance, control, propulsion, and airframe technologies to enable a highly responsive interceptor to defeat incoming RAM threats; designed small radar frequency seeker technologies capable of guiding an | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| interceptor to incoming RAM threats; integrated these technologies with guided interceptor designs for flight demonstration; and updated designs based on flight demonstration results. | | | |
| ***Title:*** Applied Smaller, Lighter, and Cheaper (SLC) Munition Components<br><br>***Description:*** This effort designs, fabricates, and demonstrates technology for increasingly smaller, lighter, and cheaper munition components to enhance current system capabilities against asymmetric threats. These technologies will transition to current and next generation small precision munitions. This effort matures and transitions technologies developed in PE602303A.<br><br>***FY 2012 Accomplishments:***<br>Completed design of composite missile propulsion casing and perform static performance evaluation; completed design of common ESAD in Javelin configuration; and designed uncooled state-of-the-art infrared seeker design in support of Javelin upgrades. | 7.747 | 0.000 | 0.000 |
| ***Title:*** Small Organic Precision Munition Integrated Technology<br><br>***Description:*** This effort designs, fabricates, integrates, and flight demonstrates critical components to enhance system-level performance of a small precision munition. The effort provides a soldier portable, 5.5 pound, precision guided munition to enable small units to organically dominate asymmetric threats in complex terrain. The goals include improved: target tracking that distinguishes soft targets (to include personnel), effects against soft targets, communication with munition in flight, and power sources for increased flight and storage time. This effort matures and demonstrates technology from PE 0602303A, PE 0602624 Project H28, and the Applied Smaller, Lighter, and Cheaper Munition Components effort.<br><br>***FY 2012 Accomplishments:***<br>Integrated and demonstrated image stabilization and people tracking on a surrogate munition platform with captive flight imagery; completed the design, fabricated, and conducted dynamic evaluations of a small height of burst sensor package to provide warhead effects against soft targets; fabricated, integrated, and demonstrated a small warhead with improved effects against asymmetric threats; and characterized the performance of the state-of-the-art in small seekers for guidance to targets in high clutter environments, digital data-links to enable the Warfighter to communicate with the munition while in flight, and power sources to enable longer operation.<br><br>***FY 2013 Plans:***<br>Continue to integrate image stabilization and people tracking algorithms with small seeker, conduct flight demonstration in surrogate munition to demonstrate improved tracking performance, then complete algorithm optimization based on demonstration results; integrate small form-factored laser ranging height of burst sensor, less sensitive omni-directional warhead, and fuze optimized for lethal effects against personnel and soft targets, then evaluate effectiveness in obscured environments; integrate | 10.653 | 10.107 | 10.223 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| secure digital data link in surrogate munition and conduct hardware-in-the-loop evaluation and flight demonstrations; evaluate form-factored power source over operating temperature range to demonstrate increased shelf-life.<br>***FY 2014 Plans:***<br>Will implement and flight test enhanced image stabilization and people tracking algorithms in, form-factored modular hardware architecture; complete packaged design, fabricate, and flight test final form-factored digital data link hardware. | | | |
| ***Title:*** Multi-Mission/Multi-Purpose Single Missile Propulsion<br>***Description:*** This effort matures and demonstrates advanced missile propulsion technology that provides longer ranges, increased mission flexibility, and shorter flight times while increasing system insensitive munitions capability in air-to-ground, ground-to-ground, and ground-to-air roles for transition to PEO Missiles & Space.<br>***FY 2012 Accomplishments:***<br>Completed fabrication of best technical approach for demonstration; and integrated the propulsion system in a controlled flight vehicle for demonstration of improved insensitive munition capabilities. | 4.225 | 0.000 | 0.000 |
| ***Title:*** Technical Fire Control Technology<br>***Description:*** This effort demonstrates Technical Fire Control technology necessary to generate and execute a firing solution for defeat of rocket, artillery, and mortar (RAM), Unamnned Aerial Systems (UAS), and/or Cruise Missile threats in the required timeline to protect ground forces. This effort develops Technical Fire Control technology to complement the interceptor development performed in the Guided Interceptor Technology for Defense against RAM, UAS and/or Cruise Missile, Hit-to-Kill Interceptor Technology for Defense against RAM, UAS and/or Cruise Missile, and Counter RAM, UAS and/or Cruise Missile Tracking and Fire Control (PE 0603313 Project 704) efforts. These combined efforts will conduct multiple interceptor Hardware in the Loop (HWIL) and flight demonstrations each year beginning in FY12. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11 and other Air and Missile Defense programs.<br>***FY 2012 Accomplishments:***<br>Completed fabrication of a technical fire control node for the interceptor flight demonstration; integrated technical fire control components with interceptor guidance section and tracking and fire control system components for pre-flight evaluation in HWIL; fully integrated technical fire control hardware and software with the tracking and fire control sensor to obtain incoming RAM threat state information; integrated technical fire control with interceptors to provide interceptor control for guided flight demonstrations; conducted a flight demonstration using the technical fire control nodes to control a counter RAM interceptor through live-fire pre | 6.619 | 7.882 | 6.560 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| programmed flight maneuvers; and updated technical fire control design and system simulation based on HWIL evaluation and flight demonstration results.<br>***FY 2013 Plans:***<br>Increase the software capability and update the Technical Fire Control nodes based on analysis from the guided flight demonstrations of single RAM threats and support multiple flight demonstrations for both interceptor concepts; integrate updated Technical Fire Control components with interceptor guidance sections and Tracking and Fire Control system components for pre-flight evaluation in HWIL; conduct additional guided flight demonstrations using Technical Fire Control nodes to control each of the counter RAM interceptors through live-fire shoot down of single and dual RAM threats; and update system simulation based on HWIL evaluation and flight demonstration results.<br>***FY 2014 Plans:***<br>Will continue refinements and enhancements of Technical Fire Control nodes for the Counter RAM, UAS and/or Cruise Missile interceptors based on analysis of flight test performance; integrate updated Technical Fire Control node test articles with interceptor guidance sections and fire control systems in HWIL set-ups; conduct virtual and flight tests against single RAM, UAS and/or Cruise Missile targets using Technical Fire Control nodes to control each. | | | |
| ***Title:*** Guided Interceptor Concept Technology for defense against Rockets, Artillery, and Mortars (RAM), Unmanned Aerial Systems (UAS), and Cruise Missile<br>***Description:*** This effort demonstrates a Guided missile-based Interceptor concept with a high explosive warhead initially focused to defeat RAM, UAS, and Cruise Missile threats with the potential for precision ground-to-ground applications. This effort designs, fabricates, evaluates, and flight demonstrates a guided missile-based interceptor and launch system. The complementary effort, Technical Fire Control Technology, provides the interceptor with a firing solution and launch command, and Counter RAM, UAS and/or Cruise Missile Tracking and Fire Control, in PE 0603313A Project 704, tracks the RAM, UAS, and Cruise Missile threat. This effort will support the design, fabrication, integration, Hardware-in-the-Loop (HWIL) tests, and flight demonstration of multiple guided interceptors beginning in FY 2014. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11 and other Air and Missile Defense programs.<br>***FY 2012 Accomplishments:***<br>Updated Guided Interceptor and launch system designs based on HWIL evaluation; redesigned and tested components in preparation to integrate components and fabricate interceptors and a launch system for flight demonstration against single RAM threat; conducted pre-flight HWIL evaluation of each Guided Interceptor to ensure successful flight demonstration; simulated the target intercept engagement sequence in preparation to integrate the interceptor and launch system with the technical fire control node and tracking and fire control system; flight conducted pre-flight simulations of integrated interceptors, launch system, | 11.598 | 20.810 | 17.525 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| technical fire control node, and tracking and fire control system capability to defeat single RAM threats in flight within the required timeline; updated designs and system simulation based on component demonstration results.<br><br>***FY 2013 Plans:***<br>Continue the fabrication and integration of command Guided Interceptors for flight demonstration; integrate with the Technical Fire Control node and Tracking and Fire Control System; perform pre-flight HWIL evaluation on each interceptor to ensure successful flight demonstration and prepare for controlled and guided flight demonstrations of live-fire shoot down of single RAM threat targets; and update the interceptor design and system simulation based on HWIL evaluation and flight test results.<br><br>***FY 2014 Plans:***<br>Will fabricate, integrate, and test the alternative components for Guided interceptors; perform Hardware-In-The-Loop tests and pre-flight predictions to prepare for flight tests and reduce risk; conduct interceptor flight-test demonstrations against single RAM, UAS and/or Cruise Missile targets, ; analyze test results and correlate to predicted and HWIL performance; update the Battle Element system; and refine the system simulation based on performance demonstrated through preflight predictions and flight tests. Will complete preliminary designs of affordable propulsion and advanced seeker technologies to extend CUAS/CCM interceptor effective range, enabling the defeat of both current and emerging threats. | | | |
| ***Title:*** Hit-to-Kill Interceptor Concept Technology for Defense against Rockets, Artillery, and Mortars (RAM), Unmanned Aerial Systems (UAS), and Cruise Missile<br><br>***Description:*** This effort demonstrates a compact, very light weight, radar and alternative frequency guided Hit-to-Kill missile-based Interceptor concept initially focused to defeat RAM threats in flight with the potential for use on air launched platforms, small weapons platforms, and ground-to-ground applications. This effort designs, fabricates, evaluates, and flight demonstrates a Hit-to-Kill counter RAM system consisting of interceptors and a launch system. Complementary efforts include: Technical Fire Control Technology provides the firing solution and launch command and Counter RAM, UAS and/or Cruise Missile Tracking and Fire Control, PE 0603313A Project 704, provides tracking of the threat for intercept. This effort will support the design, fabrication, integration, Hardware-in-the-Loop (HWIL) tests, and flight demonstration of multiple hit-to-kill interceptors. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11.<br><br>***FY 2012 Accomplishments:***<br>Updated the Hit-to-Kill interceptor and launch system designs based on HWIL evaluation; integrated components and fabricated interceptors and launch system for flight demonstration; conducted pre-flight HWIL evaluation of each Hit-to-Kill interceptor to ensure successful flight demonstration; integrated the interceptor and launch system with the Technical Fire Control node and Tracking and Fire Control system; flight demonstrated the ability of the integrated interceptors, launch system, Technical Fire | 12.462 | 20.108 | 16.884 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| Control node, and Tracking and Fire Control system in a pre-programmed flight within the required timeline; updated designs and system simulation based on flight demonstration results.<br>***FY 2013 Plans:***<br>Continue fabrication and integration of Hit-to-Kill Interceptors and launch systems; integrate with the Technical Fire Control and Tracking and Fire Control system; conduct pre-flight HWIL evaluation of each Hit-to-Kill interceptor to ensure successful flight demonstration; perform multiple guided flight demonstrations of live-fire shoot down of single and dual RAM threat targets; and update the system simulation based on HWIL evaluation and flight demonstration results.<br>***FY 2014 Plans:***<br>Will continue flight tests of the miniature Hit-To-Kill interceptor; continue Hardware-In-The-Loop tests and pre-flight predictions to prepare for additional guided flight tests and to reduce risk; conduct additional interceptor flight-test demonstrations against single and multiple RAM, UAS, and/or Cruise Missile targets; analyze test results and correlate to predicted and HWIL performance; update the Battle Element system; and refine the system simulation based on performance demonstrated through preflight predictions and flight tests. | | | |
| ***Title:*** Low-cost Extended Range Air Defense<br>***Description:*** This effort focuses on developing key enabling technologies for a lower-cost interceptor system for a low- to medium-altitude, medium- to long-range capability. Resulting technologies will enable interceptor integration into a net-enabled Air and Missile Defense Task Force and protection of assets within a 150km diameter Area of Operations. Technologies will be designed for the defeat of tactical UAS and Cruise Missile threats with secondary capability against Large Caliber Rockets (LCR), Short Range Ballistic Missiles (SRBM), and Tactical Air-to-Surface Missiles (TASMS) at extended range and to be interoperable with existing Integrated Air and Missile Defense (IAMD) Force.<br>***FY 2014 Plans:***<br>Will complete systems and operational analysis of medium- to long-range missile-based interceptor given anticipated area of operations and anticipated force structure. Begin detailed design of integrated missile system. | 0.000 | 0.000 | 2.553 |
| ***Title:*** Javelin Command Launch Unit (CLU) with External Far Target Locator (FTL)<br>***Description:*** This effort focuses on the designs, fabrication, and demonstration of technology for a highly accurate, externally-mounted Javelin FTL that integrates with the CLU and provides a means to significantly lighten the load of the Javelin close-combat missile system. The system-technology construct comprises an externally mounted FTL connected to the Javelin Command Launcher Units. This construct will reduce the weight and volume of the FTL capability for close-combat weaponry carried by the individual Soldiers while increasing lethality, survivability, and situational awareness for Small Unit operations. This | 0.000 | 0.000 | 1.200 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>263: *Future Msl Tech Integr(FMTI)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| effort transitions, integrates, and demonstrates technology from PE 0602303A, Project 214, 'Smaller, Lighter, Cheaper Tactical Missile Technologies'.<br><br>***FY 2014 Plans:***<br>Will complete FTL-sensor lightweight-composite housing design, the initial design and fabrication of miniaturized electronics, development and integration of first-build software for the Javelin CLU. | | | |
| **Accomplishments/Planned Programs Subtotals** | 58.799 | 58.907 | 54.945 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

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

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | | DATE: April 2013 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>550: *COUNTER ACTIVE PROTECTION* | |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 550: *COUNTER ACTIVE PROTECTION* | - | 7.300 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**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. Focus is on guided interceptors for active protection systems capable of defeating tank-fired large caliber anti-armor threats, anti-tank guided missiles and long range rocket propelled grenades. This project also matures and demonstrates technologies for countering threat active protection systems to maintain missile lethality against vehicles.

This project support efforts in the Army science and technology Ground portfolio.

Work in this project is in collaboration with PE 0602624A (Weapons and Munitions Technologies) Project H28, PE 0603004 (Advanced Munitions Demonstration), and PE 0603005A (Combat Vehicle and Automotive Advanced Technology) Project 221, as well as complements work done on adaptive infrared suppressor and acoustic signature technologies matured in the PE 0603003A (Aviation Advanced Technology) Project 313.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| ***Title:*** Kinetic Energy Active Protection System (KEAPS) Guided Interceptor | 7.300 | 0.000 | 0.000 |
| ***Description:*** This effort designs, fabricates, and flight demonstrates an interceptor to defeat threats to combat vehicle survivability focusing on tank fired kinetic energy threats. This effort demonstrates interceptor performance against kinetic energy tank rounds through a series of guided flight demonstrations incrementally integrating key components as their designs mature. | | | |
| ***FY 2012 Accomplishments:***<br>Continued flight demonstration of interceptors with the TDD integrated; fabricate interceptors with seeker, ESAD, TDD, and warhead integrated to demonstrate the capability to defeat tank fired kinetic energy rounds in flight; and complete full horizontal | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>550: *COUNTER ACTIVE PROTECTION* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| launch end-to-end flight demonstrations with an integrated warhead demonstrating guidance to the intercept point of tank fired kinetic energy round. | | | |
| **Accomplishments/Planned Programs Subtotals** | 7.300 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

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

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | | DATE: April 2013 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>704: *Advanced Missile Demo* | |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 704: *Advanced Missile Demo* | - | 8.527 | 4.879 | 6.765 | - | 6.765 | 12.561 | 17.400 | 14.287 | 15.313 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**A. Mission Description and Budget Item Justification**

This project matures advanced missile system concepts and related hardware to enhance weapon system lethality, survivability, agility, versatility, deployability, and affordability for defense against the future air and ground, armored and non-armored threats.

This project support efforts in the Army science and technology Ground portfolio.

Work in this project is in collaboration with PE 0602624A (Weapons and Munitions Technologies).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| ***Title:*** Counter Rockets, Artillery, Mortars (RAM), UAS, and/or Cruise Missile Tracking and Fire Control | 8.527 | 4.879 | 6.765 |
| ***Description:*** This effort matures and demonstrates system technology to provide 360 degree, near hemispherical coverage for tracking and intercept of RAM, UAS, and/or Cruise Missile threats. This effort determines the trajectory and location of the incoming RAM, UAS, and/or Cruise Missile threat and feeds that information to the technical fire control node to generate a firing solution provided to the guidance section of each of the missile interceptors. Complementary work is conducted in the Technical Fire Control Technology, Guided Interceptor Technology for defense against Rockets, Artillery, and Mortars, and Hit-to-Kill Interceptor Technology for Defense against Rockets, Artillery, and Mortars and Unmanned Aerial Systems, and Cruise Missiles efforts in PE 0603313A Project 263. These efforts will be evaluated through Hardware-in-the-Loop (HWIL) tests and multiple interceptor flights. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11, and other Air and Missile Defense programs. | | | |
| ***FY 2012 Accomplishments:***<br>Updated tracking and fire control system hardware and software designs; integrated through simulation tracking and fire control systems with technical fire control nodes to provide RAM threat state information to support live-fire guided flight demonstrations | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>704: *Advanced Missile Demo* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| of interceptors to shoot down a single RAM threat; conducted simulated demonstrations to verify the tracking and fire control system can detect incoming RAM threats and provide the technical fire control node with a firing solution; and updated the system simulation based on component demonstration results.<br>***FY 2013 Plans:***<br>Finalize tracking and fire control system designs based on initial tracking testing and flight demonstrations; modify component hardware to optimize integrated performance against full range of target types; integrate updated tracking and fire control systems with technical fire control nodes to provide RAM threat state information; support multiple flight demonstrations of live-fire shoot down of single and dual RAM threat targets; and verify the system simulation based on HWIL evaluation and flight demonstration results.<br>***FY 2014 Plans:***<br>Will use final test bed and/or existing counter RAM, UAS, and Cruise Missile tracking and fire control systems for interceptor flight tests against RAM, UAS, and Cruise Missile targets, and verify tracking and fire control simulations based on results of Hardware-In-the-Loop and flight tests. | | | |
| **Accomplishments/Planned Programs Subtotals** | 8.527 | 4.879 | 6.765 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

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

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | | DATE: April 2013 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>G03: *Area Defense Advanced Technology* | |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G03: *Area Defense Advanced Technology* | - | 9.679 | 5.054 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**A. Mission Description and Budget Item Justification**

This project matures and demonstrates Deployable Force Protection missile technology for small command outposts and air defense missile technology to protect against: unmanned aerial vehicles, rotary wing aircraft large caliber rockets, and cruise missiles as well as expands the protection envelope to a division/corps area.

This project support efforts in the Army science and technology Ground portfolio.

Work in this project is in collaboration with PE 0603734A (Combat Engineering Systems) and PE 0603125 (Combating Terrorism - Technology Development).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| ***Title:*** Deployable Force Protection Missile Technology | 9.679 | 5.054 | 0.000 |
| ***Description:*** This effort demonstrates affordable missile technology to provide force protection for smaller forward operating bases (FOBs). This effort will integrate existing and developmental missile technology and design novel fire control, guidance, and control systems to use missiles in a force protection role. | | | |
| ***FY 2012 Accomplishments:***<br>Integrated missile component technologies into missile systems; integrated missile system with the fire control systems; demonstrated missile and fire control systems individually and evaluated performance of the combined systems. | | | |
| ***FY 2013 Plans:***<br>Complete integration of missile systems with fire control technologies to demonstrate an integrated base protection system; and conduct demonstration of integrated fire control, missile systems, sensor systems, and other systems in a base protection role. | | | |
| **Accomplishments/Planned Programs Subtotals** | 9.679 | 5.054 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Army | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>2040: *Research, Development, Test & Evaluation, Army*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603313A: *Missile and Rocket Advanced Technology* | PROJECT<br>G03: *Area Defense Advanced Technology* |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

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