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**Exhibit R-2, PB 2010 Army RDT&E Budget Item Justification** **DATE:** May 2009

| <b>APPROPRIATION/BUDGET ACTIVITY</b>   |                       |                         |                         |                         | <b>R-1 ITEM NOMENCLATURE</b>              |                         |                         |                         |                         |                   |
|--|-----------------------|-------------------------|-------------------------|-------------------------|---|-------------------------|-------------------------|-------------------------|-------------------------|-------------------|
| 2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) |                       |                         |                         |                         | PE 0603270A Electronic Warfare Technology |                         |                         |                         |                         |                   |
| <b>COST (\$ in Millions)</b>   | <b>FY 2008 Actual</b> | <b>FY 2009 Estimate</b> | <b>FY 2010 Estimate</b> | <b>FY 2011 Estimate</b> | <b>FY 2012 Estimate</b>                   | <b>FY 2013 Estimate</b> | <b>FY 2014 Estimate</b> | <b>FY 2015 Estimate</b> | <b>Cost To Complete</b> | <b>Total Cost</b> |
| Total Program Element  | 41.902                | 33.086                  | 19.192                  |                         |   |                         |                         |                         | Continuing              | Continuing        |
| K12: EW Demonstrations (CA)  | 24.960                | 9.170                   | .000                    |                         |   |                         |                         |                         | Continuing              | Continuing        |
| K15: ADVANCED COMM ECM DEMO  | 9.143                 | 14.486                  | 9.391                   |                         |   |                         |                         |                         | Continuing              | Continuing        |
| K16: NON-COMMO ECM TECH DEM  | 7.799                 | 9.430                   | 9.801                   |                         |   |                         |                         |                         | Continuing              | Continuing        |

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

Efforts in this program element (PE) mature and demonstrate electronic warfare (EW) technologies intended to deny, disrupt, locate, or destroy the enemy's Command, Control, and Communications (C3) systems and intelligence, surveillance and reconnaissance assets. This PE matures both countermeasures (CM) and counter-countermeasures (CCM) to deny the enemy the use of their systems while protecting US assets from enemy deception and jamming. This PE supports the maturation and demonstration of technologies to locate and exploit enemy communication systems including computer networks (project K15) and multifunctional EW capability to enhance platform survivability (jamming) and the detection, identification and geo-location of emitters of interest to provide near real-time situational awareness to the commander (project K16). Project K12 funds congressional special interest items.

Work in this PE is coordinated with PE 0603313A (Missile and Rocket Advanced Technology), PE 0603003A (Aviation Advanced Technology), PE 0602270A (EW Techniques), PE 0602120A (Sensors and Electronic Survivability), and PE 0603772A (Advanced Tactical Computer Science).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Monmouth, NJ.

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| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |
|--|---|

**B. Program Change Summary (\$ in Millions)**

|                                  | <u>FY 2008</u> | <u>FY 2009</u> | <u>FY 2010</u> | <u>FY 2011</u> |
|----------------------------------|----------------|----------------|----------------|----------------|
| Previous President's Budget      | 41.951         | 23.996         | 19.317         |                |
| Current BES/President's Budget   | 41.902         | 33.086         | 19.192         |                |
| Total Adjustments                | -.049          | 9.090          | -.125          |                |
| Congressional Program Reductions | .000           | -.110          |                |                |
| Congressional Rescissions        | .000           | .000           |                |                |
| Total Congressional Increases    | .000           | 9.200          |                |                |
| Total Reprogrammings             | 1.013          | .000           |                |                |
| SBIR/STTR Transfer               | -1.062         | .000           |                |                |

**Change Summary Explanation**

FY09 funding increase is due to congressional adds.

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| <b>Exhibit R-2a, PB 2010 Army RDT&amp;E Project Justification</b>  |                       |                         |                         |   |                         |                         |                         | <b>DATE:</b> May 2009   |                              |                   |
| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) |                       |                         |                         | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |                         |                         |                         |                         | <b>PROJECT NUMBER</b><br>K12 |                   |
| <b>COST (\$ in Millions)</b>   | <b>FY 2008 Actual</b> | <b>FY 2009 Estimate</b> | <b>FY 2010 Estimate</b> | <b>FY 2011 Estimate</b>   | <b>FY 2012 Estimate</b> | <b>FY 2013 Estimate</b> | <b>FY 2014 Estimate</b> | <b>FY 2015 Estimate</b> | <b>Cost To Complete</b>      | <b>Total Cost</b> |
| K12: EW Demonstrations (CA)  | 24.960                | 9.170                   | .000                    |   |                         |                         |                         |                         | Continuing                   | Continuing        |
| <b>A. Mission Description and Budget Item Justification</b><br>Congressional Interest Item funding for Electronic Warfare Demonstrations.  |                       |                         |                         |   |                         |                         |                         |                         |                              |                   |
| <b>B. Accomplishments/Planned Program (\$ in Millions)</b>   |                       |                         |                         |   |                         |                         | <b>FY 2008</b>          | <b>FY 2009</b>          | <b>FY 2010</b>               | <b>FY 2011</b>    |
| WIZARD - Remotely Controlled Improvised Explosive Device Countermeasures   |                       |                         |                         |   |                         |                         | 1.546                   | .000                    | .000                         |                   |
| Advanced Communications ECM Demonstration  |                       |                         |                         |   |                         |                         | 9.274                   | 1.551                   | .000                         |                   |
| Non-communications ECM Technology Demonstration  |                       |                         |                         |   |                         |                         | 6.183                   | 1.162                   | .000                         |                   |
| DAIRCM/CMWS for Army Helicopters   |                       |                         |                         |   |                         |                         | 2.705                   | .000                    | .000                         |                   |
| Highly Mobile Remote Controlled IED Countermeasures  |                       |                         |                         |   |                         |                         | .000                    | .775                    | .000                         |                   |
| ALQ-211 Networked EW Controller  |                       |                         |                         |   |                         |                         | .000                    | 1.550                   | .000                         |                   |
| SBIR/STTR  |                       |                         |                         |   |                         |                         | .000                    | .256                    | .000                         |                   |
| US Army Future Force ELINT   |                       |                         |                         |   |                         |                         | 1.933                   | .000                    | .000                         |                   |
| Aerial Canopy MASINT System (ACMS)   |                       |                         |                         |   |                         |                         | 1.000                   | 1.938                   | .000                         |                   |
| Advanced IED Jammer Research and Development Program   |                       |                         |                         |   |                         |                         | 2.319                   | 1.938                   | .000                         |                   |
| Total  |                       |                         |                         |   |                         |                         | 24.960                  | 9.170                   | .000                         |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b><br>N/A  |                       |                         |                         |   |                         |                         |                         |                         |                              |                   |
| <b>D. Acquisition Strategy</b><br>N/A  |                       |                         |                         |   |                         |                         |                         |                         |                              |                   |

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| <b>Exhibit R-2a, PB 2010 Army RDT&amp;E Project Justification</b>  |   | <b>DATE:</b> May 2009        |
| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology | <b>PROJECT NUMBER</b><br>K12 |

**E. Performance Metrics**

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

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| <b>Exhibit R-2a, PB 2010 Army RDT&amp;E Project Justification</b>  |                       |                         |                         |   |                         |                         |                         | <b>DATE:</b> May 2009   |                              |                   |
| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) |                       |                         |                         | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |                         |                         |                         |                         | <b>PROJECT NUMBER</b><br>K15 |                   |
| <b>COST (\$ in Millions)</b>   | <b>FY 2008 Actual</b> | <b>FY 2009 Estimate</b> | <b>FY 2010 Estimate</b> | <b>FY 2011 Estimate</b>   | <b>FY 2012 Estimate</b> | <b>FY 2013 Estimate</b> | <b>FY 2014 Estimate</b> | <b>FY 2015 Estimate</b> | <b>Cost To Complete</b>      | <b>Total Cost</b> |
| K15: ADVANCED COMM ECM DEMO  | 9.143                 | 14.486                  | 9.391                   |   |                         |                         |                         |                         | Continuing                   | Continuing        |

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

Efforts in this project mature and demonstrate the ability to locate and identify modern tactical battlefield enemy and blue force radio frequency (RF) communications, radars, and computer networks and nodes to enable uninterrupted air and ground based intelligence collection and long range targeting operations in a hostile electromagnetic and cyber environment. This project matures and demonstrates communications countermeasures (CM) and counter-countermeasures (CCM) technologies to first intercept, then identify, and locate tactical communications and degrade threat computer networks and their components.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering Center (CERDEC), Ft. Monmouth NJ.

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

|  | <b>FY 2008</b> | <b>FY 2009</b> | <b>FY 2010</b> | <b>FY 2011</b> |
|--|----------------|----------------|----------------|----------------|
| <b>Combat Identification (CID) Technology Demonstration:</b><br>This effort matures and demonstrates real time CID technologies for light weight tactical vehicles and Soldiers. In FY09, mature and demonstrate the Soldier Radio Waveform (SRW) as a radio-based application that would provide both a target identification (TI) and situational awareness (SA) capability for light vehicle applications as well as urban and open terrain operation for Soldier level applications; mature TI interrogation approaches utilizing either laser or radio frequency components; enhance the SRW software to allow it to respond to directed interrogations for TI capability as well as to provide SA capability even in Global Positioning System denied environments; integrate and demonstrate the processor, transceiver, and antenna for the miniaturized Battlefield Target Identification Device (BTID) CID system on light weight tactical vehicles. Work related to this effort is also being accomplished under PE 0602120A/project H15. | .000           | 5.088          | .000           |                |
| <b>Networked Electronic Warfare (EW):</b><br>This effort provides the capability to autonomously detect, classify, correlate, and geo-locate modern wireless communication emitters on the battle field and in urban terrain.  | 9.143          | 9.067          | .000           |                |

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| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD)  |  | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |                       | <b>PROJECT NUMBER</b><br>K15 |                |                |
| <b>B. Accomplishments/Planned Program (\$ in Millions)</b>  |  |   | <b>FY 2008</b>        | <b>FY 2009</b>               | <b>FY 2010</b> | <b>FY 2011</b> |
| <p>In FY08, conducted developmental tests of surgical EW techniques against 3 threats simultaneously; integrated complementary jamming and detection/location/neutralization capabilities such as time difference of arrival (TDOA) geolocation and electronic attack based on geolocation; integrated algorithms into government off-the-shelf hardware. In FY09, integrate commercial off-the-shelf 3-D visualization and mapping tools with geo-location solution set for optimal urban situational awareness and emitter representation; integrate capabilities into net-centric solution that combines jamming and detection/location/neutralization capabilities; complete algorithm development and validation and fabrication of adaptive processing arrays. Related work is also accomplished under PE 0602270A/project 442, PE 0602270A/project 906, and PE 0603270A/project K16.</p> |  |   |                       |                              |                |                |
| Small Business Innovative Research/Small Business Technology Transfer Programs  |  |   | .000                  | .331                         | .000           |                |
| <p><b>Offensive Operations:</b><br/>This effort matures and demonstrates integrated Electronic Attack (EA)/Computer Network Operations (CNO) capabilities for the Electronic Warfare Officer (EWO) to plan and engage a multitude of diverse multi-node, multi-waveform, multi-platform and cyber (internetworked computer) targets in a distributed and coordinated fashion while maximizing overall network efficiency, effectiveness, and preserving blue force and non-combatant communications. In FY10, will develop and mature algorithms for distributed scheduling and predicted impact; will mature high-fidelity models of next generation techniques to include lethal effects and threat/node characterization.</p>  |  |   | .000                  | .000                         | 4.696          |                |
| <p><b>Stand-off Non-Cooperative Multi-Intelligence Technologies:</b><br/>This effort matures and demonstrates technologies to detect, identify, map, and track targets, which may include humans, vehicles, communications devices, Unexploded Ordnance (UXO), Concealed Weapons/Concealed Explosives (CW/CE), and booby traps. In FY10, will analyze and design optimum sensor mix; will develop and mature software algorithms and hardware; and will mature modeling and simulation for sensor mix.</p>  |  |   | .000                  | .000                         | 4.695          |                |
| <b>Total</b>  |  |   | <b>9.143</b>          | <b>14.486</b>                | <b>9.391</b>   |                |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |  |   |                       |                              |                |                |
| N/A   |  |   |                       |                              |                |                |
| <b>D. Acquisition Strategy</b>  |  |   |                       |                              |                |                |
| N/A   |  |   |                       |                              |                |                |

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| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology | <b>PROJECT NUMBER</b><br>K15 |

**E. Performance Metrics**

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

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| <b>Exhibit R-2a, PB 2010 Army RDT&amp;E Project Justification</b>  |                       |                         |                         |   |                         |                         |                         | <b>DATE:</b> May 2009   |                              |                   |
| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD) |                       |                         |                         | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |                         |                         |                         |                         | <b>PROJECT NUMBER</b><br>K16 |                   |
| <b>COST (\$ in Millions)</b>   | <b>FY 2008 Actual</b> | <b>FY 2009 Estimate</b> | <b>FY 2010 Estimate</b> | <b>FY 2011 Estimate</b>   | <b>FY 2012 Estimate</b> | <b>FY 2013 Estimate</b> | <b>FY 2014 Estimate</b> | <b>FY 2015 Estimate</b> | <b>Cost To Complete</b>      | <b>Total Cost</b> |
| K16: NON-COMMO ECM TECH DEM  | 7.799                 | 9.430                   | 9.801                   |   |                         |                         |                         |                         | Continuing                   | Continuing        |

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

Efforts in this project mature and demonstrate non-communication, multi-functional electronic warfare capabilities that enhance the survivability of Army air and ground platforms and dismounted forces. This project matures and demonstrates radio frequency (RF), infrared (IR) and electro-optical (EO) sensor and jamming source technologies to detect, locate, deceive, and neutralize (jam) booby traps, radar directed target acquisition systems, target-tracking sensors, surface-to-air missiles (SAMs), air-to-air missiles (AAMs), top attack and electronically fuzed munitions. This project also matures and demonstrates Electronic Support (ES) technologies to detect, identify, and geolocate emitters of interest from an effective standoff distance and provide near real-time situational awareness.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronic Research, Development, and Engineering Center (CERDEC), Ft. Monmouth NJ, and the Army Research Lab, Adelphi MD.

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

|   | <b>FY 2008</b> | <b>FY 2009</b> | <b>FY 2010</b> | <b>FY 2011</b> |
|---|----------------|----------------|----------------|----------------|
| Hostile Fire Indication (HFI) and Countermeasure (CM):<br>This effort implements affordable hostile fire indication for aircraft against small arms fire and rocket propelled grenades (RPG) by modifying currently fielded systems.<br>In FY08, completed software modifications to cockpit display HFI display interface; defined overall suite architecture for net-centric survivability in a Simulation environment; conducted live fire test to demonstrate Common Missile Warning System (CMWS) processing upgrades for hostile fire indication and countermeasure; transitioned technology to Aviation and Missile Research, Development, and Engineering Center aircraft survivability program for flight testing. | 2.294          | .000           | .000           |                |
| Small Business Innovative Research/Small Business Technology Transfer Programs  | .000           | .212           | .000           |                |
| Networked Electronic Warfare:<br>This effort provides autonomous detection, classification, correlation, and geo-location capability against modern wireless emitters and other threats supporting force protection technology.   | 2.014          | 2.174          | .000           |                |

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| <b>Exhibit R-2a, PB 2010 Army RDT&amp;E Project Justification</b>   |   |                | <b>DATE:</b> May 2009        |                |
| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD)  | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |                | <b>PROJECT NUMBER</b><br>K16 |                |
| <b>B. Accomplishments/Planned Program (\$ in Millions)</b>  | <b>FY 2008</b>  | <b>FY 2009</b> | <b>FY 2010</b>               | <b>FY 2011</b> |
| In FY08, integrated algorithms into government off-the-shelf hardware; conducted performance testing of prototype system; refined the system design based on test results; integrated jamming and detection, location, neutralization capabilities.<br>In FY09, complete algorithm development and validation of adaptive processing arrays; integrate visualization and mapping tools with geolocation solution sets; demonstrate capability in the lab. Work related to this effort is also being accomplished under PE 0602270A/project 442; PE 0602270A/project 906, and PE 0603270A/project K15.   |   |                |                              |                |
| <b>Cueing Sensor:</b><br>This effort matures and demonstrates low cost infrared sensors that detect rocket propelled grenades, anti-tank guided missiles, tank fired and high energy anti-tank rounds and then cues active protection systems for Army vehicles.<br>In FY08, optimized Focal Plane Array (FPA) design; enhanced and evaluated sensor, electronics, and algorithms for testing on-the-move (OTM) environment.<br>In FY09, demonstrate the cueing sensor software and hardware against different types of live fire munitions (threats to ground vehicle); demonstrate the capability to detect, declare, and classify the live fire threats; transition the cueing sensor hardware and software to the active protection system (APS) effort for integration into the kinetic energy APS vehicle survivability system. Work related to this effort is also being accomplished under PE 0602120A/project H15. | 3.491   | 7.044          | .000                         |                |
| <b>Distributed Aperture Infrared Countermeasures (DAIRCM) Technologies:</b><br>This effort matures and demonstrates an integrated laser source, distribution system, and beam director that support a multi-function helicopter protection capability.<br>In FY10, will investigate and mature a laser pointer tracker (LPT) to be aligned bore-sited with the UV-based CMWS sensors. The LPT will scan areas of interest cued by the missile warning system (MWS) and receive laser return for the incoming threat.  | .000  | .000           | 4.900                        |                |
| <b>Advanced Tactical Radio Frequency Countermeasures (ATRFCM) Technologies:</b><br>This effort matures and demonstrates an integrated Electronic Warfare/Direction Finding system for the protection of platforms from emerging RF threats.<br>In FY10, will mature and demonstrate improved wideband frequency waveform generators for higher spectral purity and modulation flexibility; wideband receivers capable of high speed, dynamic signal demodulation and data collection; and high power, efficient, RF amplifiers, for improved Electronic Warfare (EW)/communications compatibility; will begin integration into a working brassboard for lab and field testing; will develop and mature integrated and distributed packaging for improved vehicle integration and thermal performance.   | .000  | .000           | 4.901                        |                |

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| <b>APPROPRIATION/BUDGET ACTIVITY</b><br>2040 - Research, Development, Test & Evaluation, Army/BA 3 - Advanced Technology Development (ATD)  | <b>R-1 ITEM NOMENCLATURE</b><br>PE 0603270A Electronic Warfare Technology |                | <b>PROJECT NUMBER</b><br>K16 |                |
| <b>B. Accomplishments/Planned Program (\$ in Millions)</b>  | <b>FY 2008</b>  | <b>FY 2009</b> | <b>FY 2010</b>               | <b>FY 2011</b> |
| Total   | 7.799   | 9.430          | 9.801                        |                |
| <b>C. Other Program Funding Summary (\$ in Millions)</b><br>N/A   |   |                |                              |                |
| <b>D. Acquisition Strategy</b><br>N/A   |   |                |                              |                |
| <b>E. Performance Metrics</b><br>Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010. |   |                |                              |                |

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