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**Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army** **DATE:** April 2013

<b>APPROPRIATION/BUDGET ACTIVITY</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army</i> BA 7: <i>Operational Systems Development</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0305233A: <i>RQ-7 Shadow UAV</i>
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COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
Total Program Element	-	31.896	31.158	12.031	-	12.031	29.735	27.594	18.991	22.100	Continuing	Continuing
RQ7: <i>RQ-7 SHADOW UAV</i>	-	31.896	31.158	12.031	-	12.031	29.735	27.594	18.991	22.100	Continuing	Continuing

<sup>#</sup> FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

<sup>##</sup> The FY 2014 OCO Request will be submitted at a later date

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

The Tactical Unmanned Aerial Vehicle (TUAV) RQ-7 Shadow provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA) and Force Protection. It also provides the Brigade Commander with critical battlefield intelligence and targeting information in the rapid cycle time required for success at the tactical level. The TUAV Shadow system air vehicle meets the required operating range of 50 kilometers and remains on station for up to nine hours. The TUAV Shadow system consists of four air vehicles (each configured with an Electro Optical/Infrared (EO/IR) sensor payload), launcher, ground control and support equipment including: power generation, communications equipment, automated recovery equipment, one system remote video terminals, vehicle mounted shelters, and High Mobility Multipurpose Wheeled Vehicles with trailer(s). Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by a Mobile Maintenance Facility (MMF).

All 102 Shadow UAS systems have been procured and fielded. Shadow has amassed over 803,326 total flight hours, most of which were flown in support of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). Incremental upgrades are required for continued improvement and interoperability. Common Systems Integration is required to ensure interoperability with other manned and unmanned weapon systems, to include One System Remote Video Terminal (OSRVT). Continued developmental improvements are required to provide greater interoperability, increase operational capability and flexibility to the Brigade Combat Team. Modifications to the airframe, avionics, payloads, ground control equipment, and support equipment are based on documented requirements and lessons learned from units operating in OEF and OIF.

Justification: FY2014 RQ-7 UAV Base funding of \$12.031 million will be used for capability and reliability improvements, specifically: Air Vehicle modifications (Engine Improvements, GPS Landing, System Vulnerability, and Redundant Avionics Development), and Ground Equipment (interoperability) improvements. Additionally, funds will be for System Engineering, Program Management, Software Architecture and Reliability Solutions, and System Test and Evaluation support. Funds will also be used to incorporate the Increment II OSRVT Bi-Directional capability, ensure interoperability, and applicable OSRVT test events.

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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014 Base</b>	<b>FY 2014 OCO</b>	<b>FY 2014 Total</b>
Previous President's Budget	31.896	31.158	23.634	-	23.634
Current President's Budget	31.896	31.158	12.031	-	12.031
Total Adjustments	0.000	0.000	-11.603	-	-11.603
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-11.603	-	-11.603

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**Exhibit R-2A, RDT&E Project Justification:** PB 2014 Army **DATE:** April 2013

<b>APPROPRIATION/BUDGET ACTIVITY</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army</i> BA 7: <i>Operational Systems Development</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0305233A: <i>RQ-7 Shadow UAV</i>	<b>PROJECT</b> RQ7: <i>RQ-7 SHADOW UAV</i>
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COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
RQ7: <i>RQ-7 SHADOW UAV</i>	-	31.896	31.158	12.031	-	12.031	29.735	27.594	18.991	22.100	Continuing	Continuing
Quantity of RDT&E Articles												

<sup>#</sup> FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

<sup>##</sup> The FY 2014 OCO Request will be submitted at a later date

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

The Tactical Unmanned Aerial Vehicle (TUAV) RQ-7 Shadow provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA) and Force Protection. It also provides the Brigade Commander with critical battlefield intelligence and targeting information in the rapid cycle time required for success at the tactical level. The TUAV Shadow system air vehicle meets the required operating range of 50 kilometers and remains on station for up to nine hours. The TUAV Shadow system consists of four air vehicles (each configured with an Electro Optical/Infrared (EO/IR) sensor payload), launcher, ground control and support equipment including: power generation, communications equipment, automated recovery equipment, one system remote video terminals, vehicle mounted shelters, and High Mobility Multipurpose Wheeled Vehicles with trailer(s). Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by a Mobile Maintenance Facility (MMF).

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Justification: FY2014 RQ-7 UAV Base funding of \$12.031 million will be used for capability and reliability improvements, specifically: Air Vehicle modifications (Engine Improvements, GPS Landing, System Vulnerability, and Redundant Avionics Development), and Ground Equipment (interoperability) improvements. Additionally, funds will be for System Engineering, Program Management, Software Architecture and Reliability Solutions, and System Test and Evaluation support. Funds will also be used to incorporate the Increment II OSRVT Bi-Directional capability, ensure interoperability, and applicable OSRVT test events.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2012	FY 2013	FY 2014
<b>Title:</b> Air Vehicle Improvements	19.560	10.520	6.902
<b>Articles:</b>	0	0	
<b>Description:</b> Funding is provided for the following effort			
<b>FY 2012 Accomplishments:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2014 Army		<b>DATE:</b> April 2013		
<b>APPROPRIATION/BUDGET ACTIVITY</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army</i> BA 7: <i>Operational Systems Development</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0305233A: <i>RQ-7 Shadow UAV</i>	<b>PROJECT</b> RQ7: <i>RQ-7 SHADOW UAV</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>		<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014</b>
Continued funding for Air Vehicle Improvements <b>FY 2013 Plans:</b> Continued development of improved weatherization, triple redundant avionics suite, reliability improvements, and development of a larger, more reliable engine. <b>FY 2014 Plans:</b> Continued development of improved weatherization, triple redundant avionics suite, reliability improvements, and larger more reliable engine. Begins development of GPS landing and GPS denied operations.				
<b>Title:</b> Payload Improvements <b>Description:</b> Funding is provided for the following effort <b>FY 2012 Accomplishments:</b> Funds SAR and SIGINT Payloads <b>FY 2013 Plans:</b> Continues to fund SAR Payload		2.750 0	6.000 0	0.000
<b>Articles:</b>				
<b>Title:</b> Ground Equipment Improvements <b>Description:</b> Funding is provided for the following effort <b>FY 2012 Accomplishments:</b> Continues to fund Ground Equipment Improvements. Continues development of interoperability capabilities through use of Universal Ground Data Terminals and Universal Ground Control Stations <b>FY 2013 Plans:</b> Continues development of interoperability capabilities through use of Universal Ground Data Terminals and Universal Ground Control Stations <b>FY 2014 Plans:</b> Continues to fund Ground Equipment Improvements. Continues development of interoperability capabilities through use of Universal Ground Data Terminals and Universal Ground Control Stations, and System Vulnerability		4.498 0	2.768 0	0.917
<b>Articles:</b>				
<b>Title:</b> Test and Evaluation		0.000	1.996 0	0.792
<b>Articles:</b>				

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<b>APPROPRIATION/BUDGET ACTIVITY</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army</i> BA 7: <i>Operational Systems Development</i>		<b>R-1 ITEM NOMENCLATURE</b> PE 0305233A: <i>RQ-7 Shadow UAV</i>		<b>PROJECT</b> RQ7: <i>RQ-7 SHADOW UAV</i>
<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>		<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014</b>
<p><b>Description:</b> Funding is provided for the following effort</p> <p><b>FY 2013 Plans:</b> Continues to fund Test and Evaluation</p> <p><b>FY 2014 Plans:</b> Continues to fund Test and Evaluation.</p>				
<p><b>Title:</b> System Engineering/Program Management</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> System Engineering/Program Management</p> <p><b>FY 2012 Accomplishments:</b> Continues to fund System Engineering/Program Management</p> <p><b>FY 2013 Plans:</b> Continues to fund System Engineering/Program Management</p> <p><b>FY 2014 Plans:</b> Continues to fund System Engineering/Program Management</p>		1.174 0	3.991 0	1.287
<p><b>Title:</b> One System Remote Video Terminal (OSRVT)</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> Funding is provided for the following effort</p> <p><b>FY 2012 Accomplishments:</b> Continues to fund One System Remote Video Terminal (OSRVT). Integrate Incremental II bi-directional functionality into the OSRVT</p> <p><b>FY 2013 Plans:</b> Continues to fund One System Remote Video Terminal (OSRVT). Integrate Incremental II bi-directional functionality into the OSRVT. Develop Software Blocking and Interoperability improvements</p>		3.914 0	5.883 0	0.000
<p><b>Title:</b> One System Remote Video Terminal Test and Evaluation</p> <p><b>Description:</b> One System Remote Video Terminal Test and Evaluation</p> <p><b>FY 2014 Plans:</b></p>		0.000	0.000	2.133

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014</b>
Funds user evaluation and test activities.			
<b>Accomplishments/Planned Programs Subtotals</b>	31.896	31.158	12.031

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

<b>Line Item</b>	<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014 Base</b>	<b>FY 2014 OCO</b>	<b>FY 2014 Total</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RQ-7 UAV MODS (A00018): <i>RQ-7 UAV MODS (A00018)</i>	165.139	104.339	121.902		121.902	167.186	141.196	139.992	151.100	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

A System Capability Demonstration (SCD) was conducted with four contractors. The results from the SCD in conjunction with proposal evaluations resulted in the competitive down select of a Best Value TUAS. A successful Milestone II ASARC was conducted 21 Dec 99 and a Milestone III Decision 25 Sep 02. The full rate production contract was awarded 27 Dec 02 and all 102 systems were procured by FY2009. Continued development of the selected TUAV system will be accomplished through a series of modifications and retrofits such as Tactical Common Data Link (TCDL), Communications Relay, Laser Designator, High reliability engine, and reliability upgrades. Development/integration of these improved capabilities will be through individual efforts on a (mostly) sole source cost-plus fixed fee engineering services contract with the Shadow prime contractor. Development of the high reliability engine is being accomplished through a competitive process.

**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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Exhibit R-3, RDT&E Project Cost Analysis: PB 2014 Army												DATE: April 2013				
APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE				PROJECT								
2040: Research, Development, Test & Evaluation, Army BA 7: Operational Systems Development				PE 0305233A: RQ-7 Shadow UAV				RQ7: RQ-7 SHADOW UAV								
<b>Management Services (\$ in Millions)</b>				FY 2012		FY 2013		FY 2014 Base		FY 2014 OCO		FY 2014 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	All Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Base: Program Management	RO	PM UAS:Redstone Arsenal, AL	0.475	1.174	Dec 2012	1.678	Dec 2012	0.600	Dec 2013	-		0.600	Continuing	Continuing	0.000	
<b>Subtotal</b>			0.475	1.174		1.678		0.600		0.000		0.600			0.000	
<b>Product Development (\$ in Millions)</b>				FY 2012		FY 2013		FY 2014 Base		FY 2014 OCO		FY 2014 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	All Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
OIF Improvements / Block Upgrades / Capability Improvements	SS/CPFF	AAI Corporation:Hunt Valley, MD	3.105	-		-		-		-		-	0.000	3.105	0.000	
System Engineering / Reliability Solutions	SS/CPFF	AAI Corporation:Hunt Valley, MD	2.025	-		-		-		-		-	0.000	2.025	0.000	
Ground Equipment Improvements	SS/CPFF	AAI Corporation, MD:AAI Corporation, MD	0.000	4.498	Jan 2012	2.768	Jan 2013	0.917	Dec 2013	-		0.917	Continuing	Continuing	0.000	
Air Vehicle Improvements	SS/CPFF	AAI Corporation, MD:AAI Corporation, MD	0.000	19.560	Jan 2012	10.520	Jan 2013	6.902	Dec 2013	-		6.902	Continuing	Continuing	0.000	
One System Remote Video Terminal (OSRVT)	SS/CPFF	AAI Corporation, MD:AAi Corporation, MD	0.000	3.914	Aug 2012	5.883	Apr 2013	-		-		-	Continuing	Continuing	0.000	
Payload Improvements	SS/CPFF	Various:Various	0.000	2.750	Jan 2013	6.000	Jan 2014	-		-		-	Continuing	Continuing	0.000	
<b>Subtotal</b>			5.130	30.722		25.171		7.819		0.000		7.819			0.000	
<b>Support (\$ in Millions)</b>				FY 2012		FY 2013		FY 2014 Base		FY 2014 OCO		FY 2014 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	All Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Contractor Engineering Support	Various	Various:Various	0.300	-		1.550	Dec 2012	0.460	Dec 2013	-		0.460	Continuing	Continuing	0.000	



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2014 Army		<b>DATE:</b> April 2013
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	FY 2012				FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redundant Avionics - Preliminary Design Review							■																					
Redundant Avionics - Critical Design Review											■																	
Redundant Avionics - Air Vehicle Integration and Qualification Testing															■	■												
Redundant Avionics Fielding																												
Software Architecture - Development											■	■																
Software Architecture - Fielding																												
Weatherization - Icing Systems Requirement Review							■																					
Weatherization Fielding Water Upgrades																												
Weatherization - Icing Preliminary Design Review							■																					
Weatherization - Icing Critical Design Review											■																	
Weatherization - Icing Qualification Test											■																	
Weatherization Fielding																												
High Reliability Engine - Vendor Down Select							■																					
High Reliability Engine - Phase II Contract Award											■																	
High Reliability Engine - Design-Reliability Growth and Qualification Test							■	■																				
High Reliability Engine - Production Contract Award																												
High Reliability Engine Fielding																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2014 Army		<b>DATE:</b> April 2013
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Redundant Avionics - Preliminary Design Review	3	2013	3	2013
Redundant Avionics - Critical Design Review	2	2014	2	2014
Redundant Avionics - Air Vehicle Integration and Qualification Testing	1	2015	4	2015
Redundant Avionics Fielding	1	2017	4	2018
Software Architecture - Development	1	2014	4	2016
Software Architecture - Fielding	1	2017	4	2018
Weatherization - Icing Systems Requirement Review	2	2013	2	2013
Weatherization Fielding Water Upgrades	4	2013	4	2018
Weatherization - Icing Preliminary Design Review	3	2013	3	2013
Weatherization - Icing Critical Design Review	4	2013	4	2013
Weatherization - Icing Qualification Test	4	2013	4	2013
Weatherization Fielding	1	2014	4	2018
High Reliability Engine - Vendor Down Select	2	2013	2	2013
High Reliability Engine - Phase II Contract Award	4	2013	4	2013
High Reliability Engine - Design-Reliability Growth and Qualification Test	3	2013	4	2013
High Reliability Engine - Production Contract Award	4	2015	4	2015
High Reliability Engine Fielding	1	2016	4	2018