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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					PE 0607142A / Aviation Rocket System Product Improvement & Dev							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	0.000	10.064	60.860	-	60.860	24.221	17.171	13.608	11.066	Continuing	Continuing
EW9: Aviation Rocket System Product Improvement and Dev	-	0.000	10.064	60.860	-	60.860	24.221	17.171	13.608	11.066	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Aviation Rockets Product Improvement and Development line funds the development, integration and test of munitions and their interface to launcher and platforms to meet user requirements. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system to include improvements to performance, safety, reliability, transportability, producibility, affordability and Insensitive Munitions (IM) compliance. The current Hydra-70 2.75 inch rocket system is more than 50 years old and is in need of performance improvements to comply with 1) USC - Title 10, Chapter 141, Section 2389, 2) DoD Directive 5000.1, CJCS Instruction 3170.01C, USD (AT&L) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to IM Requirements", and 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement ONS 16-21556 and 4) existing/emerging HQDA G-3/5/7 and TRADOC aviation weapon requirements for guided and unguided rocket systems. Improvements to existing rocket systems and munitions will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	8.000	10.064	26.103	-	26.103
Current President's Budget	0.000	10.064	60.860	-	60.860
Total Adjustments	-8.000	0.000	34.757	-	34.757
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	34.757	-	34.757
• RAA not Appropriated	-8.000	-	-	-	-

Change Summary Explanation

Additional funding is required to support technical assessments, concept studies, perform risk reduction, technology maturation, demonstration, engineering design, engineering / manufacturing development, test, integration and document preparation for Army Aviation manned and unmanned platforms.

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Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev				Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EW9: Aviation Rocket System Product Improvement and Dev	-	0.000	10.064	60.860	-	60.860	24.221	17.171	13.608	11.066	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Aviation Rockets Product Improvement and Development line funds the development, integration and test of munitions and their interface to launcher and platforms to meet user requirements. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system to include improvements to performance, safety, reliability, transportability, producibility, affordability and Insensitive Munitions (IM) compliance. The current Hydra-70 2.75 inch rocket system is more than 50 years old and is in need of performance improvements to comply with 1) USC - Title 10, Chapter 141, Section 2389, 2) DoD Directive 5000.1, CJCS Instruction 3170.01C, USD (AT&L) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to IM Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement ONS 16-21556, and 4) existing/emerging HQDA G-3/5/7 and TRADOC aviation weapon requirements for guided and unguided rocket systems. Improvements to existing rocket systems and munitions will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Advanced Precision Kill Weapon System (APKWS)	-	3.536	2.064	-	2.064
Description: These funds will be used to optimize APKWS integration on the Apache and for activities required to obtain an Army Full Materiel Release (FMR) for APKWS II. This effort includes design and build of all-up-round (AUR) containers and test assets, conduct environmental qualification testing, perform ground firings, update aviation platform software, support Apache weapon survey firings, provide technical support to platform integration and testing, and development and revision of training/maintenance materiel.					
FY 2018 Plans: Begin FMR efforts and analysis needed to optimize fire control integration on the AH-64 for guided variants.					
FY 2019 Base Plans: Complete FMR efforts and analysis needed to optimize fire control integration on the AH-64 for guided variants. Continue APKWS IM AUR container.					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev		Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Decrease due to effort completion of FMR and containers activities.						
Title: Modernized Rocket Launcher Increment 1 Description: This effort will provide the interface with aircraft and emerging munitions utilizing non-proprietary, open systems architecture allowing easy compatibility when integrating with aircrafts. This inherent flexibility of an open architecture serves as a building block for future weapons systems. FY 2018 Plans: Design and development of the HYLEA software and hardware efforts. FY 2019 Base Plans: Perform technical performance assessments, concept studies, and prepare documentation in effort to merge Modernized Rocket Launcher (MRL) and Smart Digital Interface (SDI) efforts into a single, universal capability. FY 2018 to FY 2019 Increase/Decrease Statement: Increase due to merging of Modernized Rocket Launcher (MRL) and Smart Digital Interface (SDI) into single, integrated capability.		-	2.930	9.176	-	9.176
Title: Insensitive Munitions (IM) Compliance Description: Incorporation of IM-compliant explosives and design features into the Hydra-70 Rocket System to make system less sensitive. FY 2018 Plans: 1. Continue efforts to qualify the XM283 Warhead / XM1165 Fuze for fielding in place of the M151, achieving warhead compliance with Fast Cook Off, Slow Cook Off, and Bullet Impact IM requirements. 2. Continue efforts to begin transition of demonstrated venting technology to production MK66 motor and associated containers to achieve compliance with Fast Cook Off and Slow Cook Off IM requirements. FY 2019 Base Plans: 1. Continue qualification of the XM283 Warhead / XM1165 Fuze for fielding in place of the M151 warhead, achieving warhead compliance with Fast Cook Off, Slow Cook Off, and Bullet Impact IM requirements to comply with 1) USC - Title 10, Chapter 141, Section 2389, and 2) DoD Directive 5000.1, CJCS Instruction 3170.01C, USD (AT&L) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to IM Requirements. 2. Complete transition of demonstrated venting technology to production MK66 motor and associated containers to achieve compliance with Fast Cook Off and Slow Cook Off IM requirements to comply with 1) USC - Title		-	2.000	6.042	-	6.042

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Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev		Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
10, Chapter 141, Section 2389, and 2) DoD Directive 5000.1, CJCS Instruction 3170.01C, USD (AT&L) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to IM Requirements."						
FY 2018 to FY 2019 Increase/Decrease Statement: Increase due to delay start of efforts in FY2018 due to new start.						
Title: Smart Digital Interface Description: The Smart Digital Interface program is an effort to support the future smart, two-way digital communications capability to be included in the fully capable Integrated Munitions Launcher (IML). This effort will evaluate launcher-to-munition physical interfaces for the fully capable smart munition and launcher system to reduce both programmatic and technical risk, as well as to inform requirements for a government owned, non-proprietary physical interface definition. FY 2018 Plans: Complete the program phase 1 physical interface candidate evaluation, interface asset availability determination, and interface concept selection. Begin the phase 2 test asset development/procurement and testing. FY 2019 Base Plans: Continue phase 2 test asset development/procurement and testing. FY 2018 to FY 2019 Increase/Decrease Statement: Increase due to merging of MRL and SDI into single, integrated capability		-	1.598	4.941	-	4.941
Title: Army aviation weapons Description: These funds will be used for Army Aviation modular weapon systems and their interface to launchers and platforms. This effort will include technical assessments, concept studies, perform risk reduction efforts, technology maturation, demonstration, engineering design, engineering / manufacturing development, test, integration and document preparation for Army Aviation manned and unmanned platforms. FY 2019 Base Plans: 1. Perform technical assessments, concept studies, perform risk reduction efforts and prepare appropriate documentation for emerging Army Aviation Weapons, Sub-systems and Munitions (AAWSM) Initial Capability Document requirements.		-	-	38.637	-	38.637

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Appropriation/Budget Activity 2040 / 7			R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev			Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev					
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
2. Begin Lightweight Precision Munition (LPM) technology maturity and risk reduction efforts with industry to include fabrication of munition/launch system prototypes, evaluate mature existing systems to meet validated ONS 16-21556, integration and test efforts on the MQ-1C Gray Eagle.											
FY 2018 to FY 2019 Increase/Decrease Statement: This is a new start.											
Accomplishments/Planned Programs Subtotals							-	10.064	60.860	-	60.860
C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E37300: <i>Rockets Hydra, All Types</i>	144.794	236.975	211.211	39.974	251.185	74.536	73.527	78.906	129.758	Continuing	Continuing
Remarks											
D. Acquisition Strategy											
The Acquisition Strategy is to utilize in-house expertise, Other Government Agencies and defense industry capabilities. The strategy allows for the Government to have the ability to support urgent operational needs and to support unanticipated incidents, which require immediate and expert attention. Each product will have an individual strategy developed in a timely manner. This strategy will allow for the Government to maintain the capability of the Hydra-70 all-up-round rocket, its variants, Small Guided Munitions and posture for emerging requirements.											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 7						R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev						Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev			
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering/ Project Management	SS/ Various	Various : Performers	-	-		0.507	Mar 2018	3.874	Oct 2018	-		3.874	Continuing	Continuing	-
Subtotal			-	-		0.507		3.874		-		3.874	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Precision Kill Weapon System (APKWS)	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		2.944	Mar 2018	1.156	Nov 2018	-		1.156	Continuing	Continuing	-
Modernized Rocket Launcher Increment 1	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		2.197	Mar 2018	9.176	Nov 2018	-		9.176	Continuing	Continuing	-
Insensitive Munitions (IM) Compliance	SS/CPFF	GDOTS : Wilmington, VT	-	-		1.710	Mar 2018	4.306	Dec 2018	-		4.306	Continuing	Continuing	-
Smart Digital Interface	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		0.500	Mar 2018	4.941	Dec 2018	-		4.941	Continuing	Continuing	-
Army aviation weapons	MIPR	Various : Various Performers	-	-		-		21.207	Jan 2019	-		21.207	Continuing	Continuing	-
Subtotal			-	-		7.351		40.786		-		40.786	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Research Studies	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		0.415	Mar 2018	14.467	Dec 2018	-		14.467	Continuing	Continuing	-
Subtotal			-	-		0.415		14.467		-		14.467	Continuing	Continuing	N/A

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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Confidence Testing	C/Various	TBD : TBD	-	-		1.791	Mar 2018	1.733	Dec 2018	-		1.733	Continuing	Continuing	-
Subtotal			-	-		1.791		1.733		-		1.733	Continuing	Continuing	N/A

	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	10.064	60.860	-	60.860	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army												Date: February 2018																				
Appropriation/Budget Activity 2040 / 7								R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev								Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev																
Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
APKWS																																
									APKWS																							
Insensitive Munitions (IM) Compliance																																
									Insensitive Munitions (IM) Compliance																							
Army aviation weapons																																
									Army aviation weapons																							
Moderized Rocket Launcher Increment 1																																
	Moderized Rocket Launcher Increment 1																															
Smart Digital Interface																																
	Smart Digital Interface																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev	Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
APKWS	2	2018	4	2020
Insensitive Munitions (IM) Compliance	2	2018	4	2021
Army aviation weapons	2	2019	4	2028
Moderized Rocket Launcher Increment 1	2	2018	1	2021
Smart Digital Interface	2	2018	1	2021