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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0605035A / Common Infrared Countermeasures (CIRCM)							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	97.746	33.809	34.488	11.770	46.258	36.078	7.143	11.272	5.103	0.000	237.409
EB4: CIRCM	-	97.746	33.809	34.488	11.770	46.258	36.078	7.143	11.272	5.103	0.000	237.409

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

The Common Infrared Countermeasure (CIRCM) budget line includes CIRCM (EB4), and funding to counter emerging technology as identified in Joint Urgent Operational Needs Statement (JUONS) SO-0010 Phase 2a and the Headquarters Department of the Army (HQDA) Directed Requirement for the Common Infrared Countermeasures Quick Reaction Capability (CIRCM QRC) approved Nov 2018.

CIRCM (EB4)

The CIRCM is the next generation lightweight, laser-based Infrared Countermeasure (IRCM) component that will interface with both the Army's Common Missile Warning System (CMWS) and future Missile Warning Systems (MWS) to defeat current and emerging missile threats that use multispectral technology for rotary-wing, tilt-rotor and small fixed-wing aircraft across the DoD. CIRCM receives an angular bearing hand-off from the MWS, employs a pointing and tracking system which acquires the handed-over threat and tracks the incoming missile during and after motor burnout. CIRCM jams the missile by using modulated laser energy in the missile seeker band, thus degrading the tracking capability of the missile and causing it to miss the aircraft. CIRCM is utilizing Open Systems Architecture which allows flexibility with software and hardware refreshes to keep pace with future threats.

The CIRCM A-Kit includes mounting hardware, wiring harnesses, and other components necessary to install and interface the mission kit on host aircraft. The A-Kit ensures the mission kit is functionally and physically operational with a specific host aircraft type. The CIRCM B-Kit is the mission kit (laser, pointer tracker, and controller) required to achieve near spherical coverage for an aircraft.

JUONS SO-0010 and CIRCM QRC

As a part of Phase 2a of the JUONS (SO-0010) program, the Army has now integrated the Department of the Navy Large Aircraft Infrared Countermeasure (DoN LAIRCM) system onto the Apache, Blackhawk, and Chinook platforms. Due to a number of challenges, circumstances, and variables, the Army updated the ATW/ CIRCM QRC and LIMWS Directed Requirements (dated 16 November 2018). The updated requirements extend the utilization of ATW DoN LAIRCM on conventional Army aircraft and cancel the need for the ATW/CIRCM QRC system for the conventional Army. (It should be noted that the updated requirement maintains the need for ATW/CIRCM on the Special Operations aircraft.) As a result, the Army will no longer acquire the ATW sensors for use in Phase 3 of the JUONS effort. Instead, the Army will accelerate the procurement of the CIRCM QRC systems for use with the currently fielded Common Missile Warning System (CMWS) in preparation for transition to the Limited Interim Missile Warning System (LIMWS) system when available.

FY 2020 Base Research, Development, Test, and Evaluation (RDT&E) funding in the amount of 34.488 million will fund development, integration and test activities.

FY 2020 RDT&E Overseas Contingency Operations (OCO) funding in the amount of \$11.770 million will fund development, integration and test activities for JUONS QRC in support of Technology Applications Program Office (TAPO) and CMWS/CIRCM in support of conventional Army.

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Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)		R-1 Program Element (Number/Name) PE 0605035A / Common Infrared Countermeasures (CIRCM)				
B. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		127.318	53.848	46.445	-	46.445
Current President's Budget		97.746	33.809	34.488	11.770	46.258
Total Adjustments		-29.572	-20.039	-11.957	11.770	-0.187
• Congressional General Reductions		-0.065	-0.039			
• Congressional Directed Reductions		-26.400	-20.000			
• Congressional Rescissions		-	-			
• Congressional Adds		-	-			
• Congressional Directed Transfers		-	-			
• Reprogrammings		-	-			
• SBIR/STTR Transfer		-3.107	-			
• Adjustments to Budget Years		-	-	-11.957	11.770	-0.187
Change Summary Explanation						
FY 2020 RDT&E Overseas Contingency Operations (OCO) funding increased to fund development, integration and test activities for CIRCM QRC.						

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0605035A / Common Infrared Countermeasures (CIRCM)				Project (Number/Name) EB4 / CIRCM			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EB4: CIRCM	-	97.746	33.809	34.488	11.770	46.258	36.078	7.143	11.272	5.103	0.000	237.409
Quantity of RDT&E Articles	-	13	-	-	-	-	-	-	-	-		
Note FY 2018 \$9.99M purchased a quantity of 13 LRIP1 B-Kits. These 13 B-Kits are test assets for the EMD phase. The remaining FY 2018 funding was for development cost and testing.												
A. Mission Description and Budget Item Justification The Common Infrared Countermeasure (CIRCM) budget line includes CIRCM (EB4), and funding to counter emerging technology as identified in Joint Urgent Operational Needs Statement (JUONS) SO-0010 Phase 2a and the Headquarters Department of the Army (HQDA) Directed Requirement for the Common Infrared Countermeasures Quick Reaction Capability (CIRCM QRC) approved in Nov 2018.  CIRCM (EB4) The Common Infrared Countermeasure (CIRCM) is the next generation lightweight, laser-based Infrared Countermeasure (IRCM) component that will interface with both the Army's Common Missile Warning System (CMWS) and future missile warning systems (MWS) to defeat current and emerging missile threats that use multispectral technology for rotary-wing, tilt-rotor and small fixed-wing aircraft across the DoD. CIRCM receives an angular bearing hand-off from the MWS, employs a pointing and tracking system which acquires the handed-over threat and tracks the incoming missile during and after motor burnout. CIRCM jams the missile by using modulated laser energy in the missile seeker band, thus degrading the tracking capability of the missile and causing it to miss the aircraft. CIRCM is utilizing Open Systems Architecture which allows flexibility with software and hardware refreshes to keep pace with future threats.  The CIRCM A-Kit includes mounting hardware, wiring harnesses, and other components necessary to install and interface the mission kit on host aircraft. The A-Kit ensures the mission kit is functionally and physically operational with a specific host aircraft type. The CIRCM B-Kit is the mission kit (laser, pointer tracker, and controller) required to achieve near spherical coverage for an aircraft.  JUONS SO-0010 and CIRCM QRC As a part of Phase 2a of the JUONS (SO-0010) program, the Army has now integrated the Department of the Navy Large Aircraft Infrared Countermeasure (DoN LAIRCM) system onto the Apache, Blackhawk, and Chinook platforms. Due to a number of challenges, circumstances, and variables, the Army updated the ATW/ CIRCM QRC and LIMWS Directed Requirements (dated 16 November 2018). The updated requirements extend the utilization of ATW DoN LAIRCM on conventional Army aircraft and cancel the need for the ATW/CIRCM QRC system for the conventional Army. (It should be noted that the updated requirement maintains the need for ATW/CIRCM on the Special Operations aircraft.) As a result, the Army will no longer acquire the ATW sensors for use in Phase 3 of the JUONS effort. Instead, the Army will accelerate the procurement of the CIRCM QRC systems for use with the currently fielded Common Missile Warning System (CMWS) in preparation for transition to the Limited Interim Missile Warning System (LIMWS) system when available.												

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0605035A / Common Infrared Countermeasures (CIRCM)		Project (Number/Name) EB4 / CIRCM		
FY 2020 Base Research, Development, Test, and Evaluation (RDT&E) funding in the amount of \$34.488 million will fund development, integration and test activities.						
FY 2020 RDT&E Overseas Contingency Operations (OCO) funding in the amount of \$11.770 million will fund development, integration and test activities for JUONS QRC in support of Technology Applications Program Office (TAPO) and CMWS/CIRCM in support of conventional Army.						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: CIRCM Product Development Description: CIRCM Product Development, Support Costs, & Management Services  FY 2019 Plans: RDT&E dollars support continued software and hardware development of B-Kits and A-Kits for the AH-64E and CH-47F platforms.  FY 2020 Base Plans: FY 2020 base funding supports continuing development and integration activities.  FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding increased to continue development and integration activities.		43.539	1.195	25.911	-	25.911
Title: CIRCM Test & Evaluation (T&E) Description: CIRCM Test & Evaluation (T&E) Activities  FY 2019 Plans: RDT&E dollars support post Milestone C planning and execution of IOT&E, and continued efforts to develop IRCM solutions to defeat newly developed threats.  FY 2020 Base Plans: RDT&E funding supports the completion of post Milestone C Initial Operational Test & Evaluation (IOT&E), and Threat & Vulnerability Analysis.  FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding requirements for testing decreased at the completion of IOT&E.		32.667	28.160	8.577	-	8.577
Title: Phase 3 CIRCM QRC OCO Description: Phase 3 CIRCM QRC Integration and Testing  FY 2019 Plans:		21.540	2.670	0.000	11.770	11.770

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<b>Appropriation/Budget Activity</b> 2040 / 5				<b>R-1 Program Element (Number/Name)</b> PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>				<b>Project (Number/Name)</b> EB4 / <i>CIRCM</i>				
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>												
								<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
RDT&E dollars supports integration and associated T&E efforts. This effort will integrate the ATW and CIRCM systems for TAPO and CWMS/CIRCM for conventional Army to reduce Space, Weight and Power - Cooling (SWaP-C) in support of Phase 3.  <b>FY 2020 Base Plans:</b> OCO funding  <b>FY 2020 OCO Plans:</b> Continue development and testing for CIRCM QRC. CIRCM QRC (Phase 3) is changing to maximize the Army fleet protection and meet operational requirements.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 RDT&E Overseas Contingency Operations (OCO) funding increased to fund development, integration and test activities for CIRCM QRC.												
<b>Title:</b> FY 2019 SBIR / STTR Transfer  <b>Description:</b> FY 2019 SBIR / STTR Transfer  <b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2019 SBIR / STTR Transfer								-	1.784	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>								97.746	33.809	34.488	11.770	46.258
<b>C. Other Program Funding Summary (\$ in Millions)</b>												
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	
• AZ3537: <i>Common Infrared Countermeasures (CIRCM)</i>	80.677	60.899	168.784	9.310	178.094	247.014	215.744	252.769	332.713	0.000	1,367.910	
<b>Remarks</b>												
<b>D. Acquisition Strategy</b> The December 28, 2011, Defense Acquisition Executive (DAE) Acquisition Decision Memorandum (ADM) authorized entry into the Technology Maturation and Risk Reduction (TMRR) phase, designated the program a pre-Major Defense Acquisition Program (MDAP), and approved the updated exit criteria. The August 25, 2015,												

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<b>Appropriation/Budget Activity</b> 2040 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>	<b>Project (Number/Name)</b> EB4 / <i>CIRCM</i>
<p>DAE ADM authorized entry into the Engineering and Manufacturing Development (EMD) phase and designated the program as a MDAP. The EMD contract was awarded to Northrop Grumman Systems Corporation (NGSC) on August 28, 2015. The EMD contract includes priced options for Other Platform A-Kit Development, A-Kit Engineering Support, Low Rate Initial Production (LRIP) 1 and 2 Prototypes (Hardware and Installs), LRIP 1 and 2 Engineering and Test Support, Software Technical Data Package (TDP), Navy funded requirements, and Defense Exportability Features (DEF). CIRCM MS C was approved September 14, 2018, the LRIP and Engineering Support options were exercised and the program entered the Production &amp; Deployment phase with First Unit Equipped (FUE) planned for third quarter of FY 2020, and a Full Rate Production Decision Review (FRPDR) planned for the third quarter of FY 2020.</p> <p>Due to the urgency of addressing the Size, Weight, Power, and Cooling (SWaP-C) issues related to the Phase 2a JUONS SO-0010 DoN LAIRCM initial materiel solution, the Army approved a Directed Requirement for the Phase 3 ATW/CIRCM QRC (requirement updated in November 2018) which will be a sole source QRC effort with Northrop Grumman. Northrop Grumman has the required technical capabilities, knowledge and special equipment to meet the urgent and compelling need for the Phase 3 CIRCM QRC effort.</p> <p><b><u>E. Performance Metrics</u></b> N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0605035A / Common Infrared Countermeasures (CIRCM)				Project (Number/Name) EB4 / CIRCM					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Program Management	Various	Various : -	22.521	3.990		3.066	Oct 2018	2.639	Oct 2019	-		2.639	Continuing	Continuing	Continuing
CIRCM QRC System Engineering & Program Management	Various	Various : -	1.100	2.123		0.667		0.000		1.240	Oct 2019	1.240	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.784		-		-		-	0.000	1.784	-
Subtotal			23.621	6.113		5.517		2.639		1.240		3.879	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Non-recurring Engineering (NRE) - Multi Platform A-Kit Development & Integration	C/CPFF	Various : -	56.913	21.489		1.000	Jun 2019	16.901	Jun 2020	-		16.901	Continuing	Continuing	Continuing
Prototyping	C/FPIF	Various : -	25.334	9.993		-		1.860		-		1.860	Continuing	Continuing	Continuing
Other - Threat Management	Various	Various : -	23.676	7.179		2.299	Mar 2019	7.150		-		7.150	Continuing	Continuing	Continuing
Data - Logistics Support	Various	Various : -	0.705	0.300		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC NRE	C/CPFF	Various : -	3.280	3.231		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC Prototyping	C/CPFF	Various : -	2.120	-		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC A-Kit Development & Integration	Various	Various : -	22.390	5.385		0.668		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC Software Modeling & Simulation	Various	Various : Various	-	-		-		0.000		3.510	Jan 2020	3.510	Continuing	Continuing	Continuing
Subtotal			134.418	47.577		3.967		25.911		3.510		29.421	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Army</b>												<b>Date:</b> March 2019			
<b>Appropriation/Budget Activity</b> 2040 / 5				<b>R-1 Program Element (Number/Name)</b> PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>				<b>Project (Number/Name)</b> EB4 / <i>CIRCM</i>							
<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Support Equipment	Various	Various : -	5.046	0.517		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			5.046	0.517		-		-		-		-	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Government System Test and Evaluation / IOT&E	Various	Various : -	90.407	28.082		20.691	Apr 2019	-		-		-	Continuing	Continuing	Continuing
Other Testing - Threat Assets	Various	Various : -	30.992	4.655		2.299	May 2019	5.938		-		5.938	Continuing	Continuing	Continuing
CIRCM QRC Government Integration, System Test & Evaluation	Various	Various : -	6.010	10.802		1.335		0.000		7.020	Jan 2020	7.020	Continuing	Continuing	Continuing
<b>Subtotal</b>			127.409	43.539		24.325		5.938		7.020		12.958	Continuing	Continuing	N/A
			<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
<b>Project Cost Totals</b>			290.494	97.746		33.809		34.488		11.770		46.258	Continuing	Continuing	N/A
<b>Remarks</b>															



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army</b>			<b>Date:</b> March 2019		
<b>Appropriation/Budget Activity</b> 2040 / 5		<b>R-1 Program Element (Number/Name)</b> PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>		<b>Project (Number/Name)</b> EB4 / <i>CIRCM</i>	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
EMD Phase																												
Developmental Test Activity																												
Prototyping																												
Reliability Demonstration Test (RDT)																												
MS C																												
Multi-Platform A-Kit Development and Integration																												
LRIP 1																												
Initial Operational Test and Evaluation (IOT&E) Start																												
FUE																												
FRPDR																												
Initial Operating Capability (IOC)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / Common Infrared Countermeasures (CIRCM)	Project (Number/Name) EB4 / CIRCM	

## Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
EMD Phase	4	2015	4	2018
Developmental Test Activity	1	2016	4	2018
Prototyping	1	2016	1	2018
Reliability Demonstration Test (RDT)	2	2018	4	2018
MS C	4	2018	4	2018
Multi-Platform A-Kit Development and Integration	1	2015	4	2027
LRIP 1	4	2018	4	2019
Initial Operational Test and Evaluation (IOT&E) Start	3	2019	1	2020
FUE	3	2020	3	2020
FRPDR	3	2020	3	2020
Initial Operating Capability (IOC)	4	2021	4	2021