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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army **Date:** February 2020

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)
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	32.025	23.179	23.321	2.300	25.621	7.136	11.261	5.098	5.644	0.000	109.964
EB4: CIRCM	-	32.025	23.179	23.321	2.300	25.621	7.136	11.261	5.098	5.644	0.000	109.964

A. Mission Description and Budget Item Justification

The Common Infrared Countermeasure (CIRCM) budget line includes funding to support the development and integration of Aircraft Survivability Equipment (ASE) products onto Future Vertical Lift (FVL) Future Attack Reconnaissance Aircraft (FARA), Future Long Range Assault Aircraft (FLRAA) aircraft variants and future platforms.

The 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 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. These tech insertions, when coupled with future threat acquisition & integration, will ensure CIRCM performance 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 integrated the Department of the Navy Large Aircraft Infrared Countermeasure (DoN LAIRCM) system onto the Army and Special Operations Aircraft (SOA) platforms. Due to a number of challenges, circumstances, and variables, the Army updated the Advanced Threat Warning (ATW)/CIRCM QRC and Limited Interim Missile Warning System (LIMWS) Directed Requirements (dated November 16, 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 did not acquire the ATW sensors for use in Phase 3 of the JUONS effort. Instead, the Army accelerated the procurement of the CIRCM QRC systems for use with the currently fielded CMWS in preparation for transition to the LIMWS system when available.

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>
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Fiscal Year (FY) 2021 Base Research, Development, Test, and Evaluation (RDTE) funding in the amount of \$23.344 million will fund A-Kit development, integration and test activities on multi-variant platforms.

FY 2021 RDTE Overseas Contingency Operations (OCO) funding in the amount of \$2.300 million will fund System Test & Evaluation (ST&E) activities and software support activities.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	33.809	46.258	36.078	-	36.078
Current President's Budget	32.025	23.179	23.321	2.300	25.621
Total Adjustments	-1.784	-23.079	-12.757	2.300	-10.457
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-23.079			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.784	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-12.757	2.300	-10.457

Change Summary Explanation

In FY 2021, Reimbursable Manpower for this line has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

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Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>				Project (Number/Name) EB4 / <i>CIRCM</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
EB4: <i>CIRCM</i>	-	32.025	23.179	23.321	2.300	25.621	7.136	11.261	5.098	5.644	0.000	109.964
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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The 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 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. These tech insertions, when coupled with future threat acquisition & integration, will ensure CIRCM performance 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 integrated the Department of the Navy Large Aircraft Infrared Countermeasure (DoN LAIRCM) system onto the Army and Special Operations Aircraft (SOA) platforms. Due to a number of challenges, circumstances, and variables, the Army updated the Advanced Threat Warning (ATW)/CIRCM QRC and Limited Interim Missile Warning System (LIMWS) Directed Requirements (dated November 16, 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 did not acquire the ATW sensors for use in Phase 3 of the JUONS effort. Instead, the Army accelerated the procurement of the CIRCM QRC systems for use with the currently fielded CMWS in preparation for transition to the LIMWS system when available.

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>	Project (Number/Name) EB4 / <i>CIRCM</i>
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Fiscal Year (FY) 2021 Base Research, Development, Test, and Evaluation (RDTE) funding in the amount of \$23.344 million will fund A-Kit development, integration and test activities on multi-variant platforms.

FY 2021 RDTE Overseas Contingency Operations (OCO) funding in the amount of \$2.300 million will fund System Test & Evaluation (ST&E) activities and software support activities.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: CIRCM Product Development</p> <p>Description: CIRCM product development, support costs, & management services</p> <p>FY 2020 Plans: FY 2020 base funding supported continuing development and integration activities.</p> <p>FY 2021 Base Plans: FY 2021 Base funding supports continuing A-Kit development and integration activities for multi-variant platforms.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease is due to the completion of A-Kit development for the lead platform (UH-60M).</p>	9.109	10.164	15.938	-	15.938
<p>Title: CIRCM Test & Evaluation (T&E)</p> <p>Description: CIRCM Test & Evaluation (T&E) activities</p> <p>FY 2020 Plans: RDT&E funding supported the completion of post Milestone C Initial Operational Test & Evaluation (IOT&E), and Threat & Vulnerability Analysis.</p> <p>FY 2021 Base Plans: FY 2021 RDTE funding supports A-Kit Integration testing and Threat & Vulnerability Analysis.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to testing requirements reduction.</p>	20.246	10.093	7.383	-	7.383
<p>Title: Phase 3 CIRCM QRC OCO</p> <p>Description: Phase 3 CIRCM QRC SEPM, Software Modeling and Simulation</p>	2.670	1.869	0.000	2.300	2.300

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: Continued development and testing for CIRCM QRC to maximize the Army fleet protection and meet operational requirements.</p> <p>FY 2021 Base Plans: N/A - OCO funding only</p> <p>FY 2021 OCO Plans: FY 2021 RDTE OCO funding in the amount of \$2.300 million will fund Phase 3 CIRCM QRC SEPM, Software Modeling and Simulation activities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to CIRCM QRC moving towards completion of development.</p>					
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638</p>	-	1.053	-	-	-
Accomplishments/Planned Programs Subtotals	32.025	23.179	23.321	2.300	25.621

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• AZ3537: <i>Common Infrared Countermeasures (CIRCM)</i>	60.899	178.094	237.467	32.400	269.867	215.527	252.517	332.386	276.456	0.000	1,585.746

Remarks

D. Acquisition Strategy
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, DAE ADM authorized entry into the Engineering and Manufacturing Development (EMD) phase and designated the program as a MDAP. The EMD contract was

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<p>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 & 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). 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 accelerated 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.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>	Project (Number/Name) EB4 / <i>CIRCM</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Engineering Program Management	Various	Various : -	26.511	3.074	Oct 2018	2.178	Oct 2019	2.318	Nov 2020	-		2.318	Continuing	Continuing	Continuing
CIRCM QRC System Engineering & Program Management	Various	Various : -	3.223	-		-		0.000		1.200	Oct 2020	1.200	Continuing	Continuing	Continuing
NDA SEC 825 MDAP Cost Overrun	TBD	Various : -	-	0.020		-		-		-		-	0.000	0.020	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.053		-		-		-	0.000	1.053	-
Subtotal			29.734	3.094		3.231		2.318		1.200		3.518	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Non-recurring Engineering (NRE) - Multi Platform A-Kit Development & Integration	C/CPFF	Various : -	78.402	3.604	Jun 2019	5.078	Jun 2020	7.050	Jun 2021	-		7.050	Continuing	Continuing	Continuing
Prototyping (A-Kit)	C/FPIF	Various : -	35.327	-		0.350		3.255		-		3.255	Continuing	Continuing	Continuing
Other - Threat Management	Various	Various : -	30.855	-		3.728		5.633		-		5.633	Continuing	Continuing	Continuing
Data - Logistics Support	Various	Various : -	1.005	-		0.804		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC NRE	C/CPFF	Various : -	6.511	-		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC Prototyping	C/CPFF	Various : -	2.120	-		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC A-Kit Development & Integration	Various	Various : -	27.775	-		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC Software Modeling & Simulation	Various	Various : Various	-	-		-		0.000		1.100		1.100	Continuing	Continuing	Continuing
Subtotal			181.995	3.604		9.960		15.938		1.100		17.038	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0605035A / Common Infrared Countermeasures (CIRCM)				EB4 / CIRCM							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
Support Equipment	Various	Various : -	5.563	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			5.563	-		-		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
Government System Test and Evaluation	Various	Various : -	118.489	22.657	Apr 2019	9.988	Apr 2020	5.065	Apr 2021	-		5.065	Continuing	Continuing	Continuing
Other Testing - Test Support	Various	Various : -	35.647	-		-		-		-		-	Continuing	Continuing	Continuing
CIRCM QRC Government Integration, System Test & Evaluation	Various	Various : -	16.812	2.670		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			170.948	25.327		9.988		5.065		-		5.065	Continuing	Continuing	N/A
Project Cost Totals			388.240	32.025		23.179		23.321		2.300		25.621	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>	Project (Number/Name) EB4 / <i>CIRCM</i>

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	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				
Multi-Platform A-Kit Development, Integration, Testing	[Redacted]																															
Initial Operational Test and Evaluation (IOT&E) Start	[Redacted]																															
Future Threat Acquisition & Integration	[Redacted]																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / <i>Common Infrared Countermeasures (CIRCM)</i>	Project (Number/Name) EB4 / <i>CIRCM</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Multi-Platform A-Kit Development, Integration, Testing	1	2015	4	2029
Engineering & Manufacturing Development (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
Initial Operational Test and Evaluation (IOT&E) Start	3	2019	1	2020
Future Threat Acquisition & Integration	1	2020	4	2029