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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army **Date:** May 2021

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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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	22.226	29.770	16.630	-	16.630	-	-	-	-	-	-
EB4: <i>CIRCM</i>	-	22.226	29.770	16.630	-	16.630	-	-	-	-	-	-

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 1) CIRCM, 2) 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 CIRCM Quick Reaction Capability(QRC), 3) funding to support HQDA Directed Requirement for the Phase 3 Advanced Threat Warner (ATW)/CIRCM QRC.

CIRCM (EB4)

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. Tech insertions, when coupled with future threat acquisition and integration, will ensure CIRCM performance to keep pace with future threats. CIRCM is part of the suite of ASE Mission Equipment for the FVL platform.

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 platforms. Due to a number of challenges, circumstances, and variables, the Army updated the 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. Sustainment of ATW on Special Operations Aircraft will transfer to Special Operations Aircraft budget line in FY22.) 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.

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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) 2022 Base Research, Development, Test, and Evaluation (RDTE) funding in the amount of \$16.630 million will fund A-Kit development, integration and test activities on multi-variant platforms.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	23.179	25.621	7.136	-	7.136
Current President's Budget	22.226	29.770	16.630	-	16.630
Total Adjustments	-0.953	4.149	9.494	-	9.494
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.953	-0.851			
• Adjustments to Budget Years	-	-	9.494	-	9.494

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: EB4: *CIRCM*

Congressional Add: *Program Increase - Aviation Artificial Intelligence Virtual Training Environment*

Congressional Add Subtotals for Project: EB4

Congressional Add Totals for all Projects

	FY 2020	FY 2021
Congressional Add: <i>Program Increase - Aviation Artificial Intelligence Virtual Training Environment</i>	-	5.000
Congressional Add Subtotals for Project: EB4	-	5.000
Congressional Add Totals for all Projects	-	5.000

Change Summary Explanation

Funding increase of \$9.494 million required to support A-Kit development and integration testing for UH-60V and AH-64E v6 platforms, in accordance with the Army Cost Position for Full Rate Production Decision.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EB4: <i>CIRCM</i>	-	22.226	29.770	16.630	-	16.630	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The CIRCM budget line includes funding to support the development and integration of ASE products onto FVL FARA, FLRAA aircraft variants and future platforms.

The CIRCM budget line includes 1) CIRCM, 2) funding to counter emerging technology as identified in JUONS SO-0010 Phase 2a and the HQDA Directed Requirement for the Common Infrared Countermeasures Quick Reaction Capability (CIRCM QRC), 3) funding to support HQDA Directed Requirement for the Phase 3 ATW/CIRCM QRC.

CIRCM (EB4)

CIRCM is the next generation lightweight, laser-based IRCM component that will interface with both the Army's CMWS and future 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. Tech insertions, when coupled with future threat acquisition and integration, will ensure CIRCM performance to keep pace with future threats. CIRCM is part of the suite of ASE Mission Equipment for the FVL platform.

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 DoN LAIRCM system onto the Army and SOA platforms. Due to a number of challenges, circumstances, and variables, the Army updated the ATW/CIRCM QRC and 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. Sustainment of ATW on Special Operations Aircraft will transfer to Special Operations Aircraft budget line in FY22.) 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.

Fiscal Year (FY) 2022 Base RDTE funding in the amount of \$16.630 million will fund A-Kit development, integration and test activities on multi-variant platforms.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021		
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>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Title: CIRCM Product Development Description: CIRCM product development, support costs, & management services FY 2021 Plans: FY 2021 Base funding supports continuing A-Kit development and integration activities for multi-variant platforms. FY 2022 Plans: FY 2022 RDTE Base funding supports continuing A-Kit development, model based systems engineering, and integration activities for the AH-64E v6 platform. Supports preliminary analysis for FVL A-kit development. FY 2021 to FY 2022 Increase/Decrease Statement: Decrease in requirements are due to the completion of IOT&E and the demonstrated growth in the CIRCM system reliability.		15.376	18.036	9.902
Title: CIRCM Test & Evaluation (T&E) Description: CIRCM T&E activities FY 2021 Plans: FY 2021 RDTE funding supports A-Kit Integration testing and Threat & Vulnerability Analysis. FY 2022 Plans: FY 2022 RDTE Base funding supports A-Kit Integration testing for the UH-60V & the AH-64E v6 platforms. Supports continuing Threat & Vulnerability Analysis. FY 2021 to FY 2022 Increase/Decrease Statement: Increase in requirements are due to A-Kit Integration testing for the UH-60V & the AH-64E v6 platforms.		6.850	4.434	6.728
Title: Phase 3 CIRCM QRC OCO Description: Phase 3 CIRCM QRC SEPM, Software Modeling and Simulation FY 2021 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. FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 QRC OCO funding line was reduced to \$0.		-	2.300	-
Accomplishments/Planned Programs Subtotals		22.226	24.770	16.630

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army	Date: May 2021
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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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	FY 2020	FY 2021
Congressional Add: Program Increase - Aviation Artificial Intelligence Virtual Training Environment	-	5.000
FY 2021 Plans: FY 2021 RDTE Base funding in the amount of \$5.000 million will fund the development of an Aviation Artificial Intelligence Virtual Training Environment.		
Congressional Adds Subtotals	-	5.000

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

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• AZ3537: <i>Common Infrared Countermeasures (CIRCM)</i>	178.094	266.517	240.412	-	240.412	-	-	-	-	-	-

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 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) achieved in the second quarter of FY 2020, and a Full Rate Production Decision Review (FRPDR) planned for the second quarter of FY 2021. During the MS C approval process, the CSA directed funding be increased beginning in FY 2020 to accelerate CIRCM production, Initial Operational Test (IOT) and to field one Combat Aviation Brigade (CAB) per year.

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. Sustainment of ATW on Special Operations Aircraft will transfer to Special Operations Aircraft budget line in FY22.) 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 CMWS in preparation for transition to the LIMWS system.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0605035A / Common Infrared Countermeasures (CIRCM)				EB4 / CIRCM							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 : -	29.585	2.087	Oct 2019	2.118	Nov 2020	1.700	Nov 2021	-		1.700	Continuing	Continuing	Continuing
CIRCM QRC System Engineering & Program Management	Various	Various : -	3.223	-		1.200	Oct 2020	-		-		-	Continuing	Continuing	Continuing
NDAAC SEC 825 MDAP Cost Overrun	TBD	Various : -	0.020	-		-		-		-		-	0.000	0.020	-
Subtotal			32.828	2.087		3.318		1.700		-		1.700	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 : -	82.006	10.038	Jun 2020	10.841	Jun 2021	7.010	Jun 2022	-		7.010	Continuing	Continuing	Continuing
Prototyping (A-Kit)	C/FPIF	Various : -	35.327	0.526		3.136		-		-		-	Continuing	Continuing	Continuing
Other - Threat Management	Various	Various : -	30.855	2.435		1.941		1.192		-		1.192	Continuing	Continuing	Continuing
Data - Logistics Support	Various	Various : -	1.005	0.290		-		-		-		-	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	-	-		1.100		-		-		-	Continuing	Continuing	Continuing
Aviation Artificial Intelligence Virtual Training Environment	TBD	To Be Determined : To Be Determined	-	-		5.000		-		-		-	0.000	5.000	-
Subtotal			185.599	13.289		22.018		8.202		-		8.202	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
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 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 : -	141.146	4.415	Apr 2020	4.434	Apr 2021	5.453	Apr 2022	-		5.453	Continuing	Continuing	Continuing
Other Testing - Test Support	Various	Various : -	35.647	2.435		-		1.275		-		1.275	Continuing	Continuing	Continuing
CIRCM QRC Government Integration, System Test & Evaluation	Various	Various : -	19.482	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			196.275	6.850		4.434		6.728		-		6.728	Continuing	Continuing	N/A
Project Cost Totals			420.265	22.226		29.770		16.630		-		16.630	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army **Date:** May 2021

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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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	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																																
Initial Operational Test and Evaluation (IOT&E)																																
Future Threat Acquisition & Integration																																

Note
none

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
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)	3	2019	1	2020
Future Threat Acquisition & Integration	1	2020	4	2029