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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605051A / <i>Aircraft Survivability Development</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	99.403	61.768	19.123	-	19.123	16.610	13.368	14.853	14.997	0.000	240.122
ER7: <i>Aircraft Survivability Equipment Development</i>	-	31.323	38.329	12.083	-	12.083	8.456	8.047	9.936	10.033	0.000	118.207
ER8: <i>Common Missile Warning System (CMWS)</i>	-	68.080	23.439	7.040	-	7.040	8.154	5.321	4.917	4.964	0.000	121.915

A. Mission Description and Budget Item Justification

This funding line is a key enabler of the Army Modernization Priorities in support of the Aviation Survivability Equipment (ASE) as well as the Future Vertical Lift (FVL) Future Attack Reconnaissance Aircraft (FARA) and Future Long-Range Assault Aircraft (FLRAA) platforms. The Aircraft Survivability Development program includes Projects titled Aircraft Survivability Equipment Development (ER7) and Common Missile Warning System (CMWS) (ER8). This program also includes funding for Joint Urgent Operational Needs Statement (JUONS) SO-0010 Phase 2a, Headquarters Department of the Army (HQDA) Directed Requirement for Advanced Threat Warner (ATW) portion of Phase 3 ATW/Common Infrared Countermeasures Quick Reaction Capability (ATW/CIRCM QRC), and Limited Interim Missile Warning System Quick Reaction Capability (LIMWS QRC).

ER7: Aircraft Survivability Development.

The objective of the ASE Development project is to improve Radio Frequency (RF) ASE for Army Aviation. APR-39 Radar Warning Receiver (RWR) detects, categorizes, and prioritizes RF emitters and provides a visual / aural alert to aircrew members warning them of targeting by RF-guided weapons. The Milestone Decision Authority (MDA) approved Phases 1 and 2 of a 3-phased path forward.

Phase 1, APR-39C(V)1/4, serves as an obsolescence / sustainment upgrade to the Processor Line Replaceable Unit (LRU) for AN/APR-39A(V) RWR implemented to ensure that the currently fielded system remains viable until affordable improved RF ASE capability can be pursued in Phases 2 and 3.

Phase 2A is RWR Modernization begins by adopting the United States Navy APR-39D(V)2 system. APR-39D(V)2 will significantly improve the RF threat coverage, automatic detection and identification of threat types, bearing, and lethality. Phase 2B, the APR-39E(V)2, Modernized Radar Warning Receiver (MRWR), is an Army Engineering Change Proposal (ECP) to APR-39D(V)2, approved in the Acquisition Decision Memorandum (ADM) signed June 24, 2019. This ECP will implement enhanced hardware and software upgrades to keep APR-39 technically relevant against new and emerging agile threats. APR-39E(V)2 is part of the suite of ASE mission equipment for the FVL platforms.

Phase 3 adds active Radio Frequency Electronic Countermeasures (RF-ECM) capability for selected aircraft with Material Development Decision (MDD) planned in the future.

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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 0605051A / <i>Aircraft Survivability Development</i>	
Justification: FY 2023 Base Research Development Technology & Evaluation (RDTE) funding of \$12.083 million supports APR-39E(V)2 hardware and software system development, system government qualification, and performance testing.		
ER8: Common Missile Warning System (CMWS). The CMWS program is a missile warning system that cues both flare and laser-based countermeasures to defeat incoming Infrared (IR)-seeking missiles and will alert aircrews to the presence of certain incoming unguided munitions. The B-Kit consists of the components which perform the missile detection and aircrew notification, unguided munitions detection and aircrew notification, false alarm rejection, and countermeasure employment/cueing functions of the system. The CMWS Electronic Control Unit (ECU) receives ultraviolet (UV) missile detection data from Electro-Optic Missile Sensors (EOMS), which detect UV signals, and sends a missile alert signal to warn aircrews via on-board avionics. Tier 1 threat missiles detected and tracked by CMWS are subsequently defeated by a combination of missile seeker countermeasures, including decoy flares and IR Laser Jamming (currently Common Infrared Countermeasures (CIRCM) -multiple platforms and Advanced Threat Infrared Countermeasures (ATIRCM)-equipped CH-47 platform only). In addition CMWS ECU receives from the EOMS unguided munitions detection data which it also passes to the aircrew through aural and visual alerts. The aircrew then applies the appropriate Tactics, Techniques and Procedures (TTPs) to break contact or engage the enemy with own-ship ordnance. CMWS Generation 3 (Gen 3) ECU in conjunction with ongoing software development efforts will address outstanding materiel release conditions and ensure protection against emerging IR-guided missile threats. Due to evolving threats, CMWS will remain in the Army inventory beyond 2040 and must remain relevant against emerging threats.		
The A-Kit for CMWS includes mounting hardware, wiring harnesses, cables, 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.		
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 Advanced Threat Warning/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 FY23). 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.		
Phase 4 LIMWS QRC addresses the HQDA Directed Requirement to provide a greater capability than CMWS, the current Program of Record (POR), to bridge the gap between CMWS and the future POR. LIMWS is required to provide increased detection range, improved detection in clutter, more agile algorithms to rapidly respond to emerging threats, and eliminates the need for sensor alignments. To maintain overmatch of quickly emerging threat technology and tactics, LIMWS will explore and develop system modifications and performance improvements.		
Justification:		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
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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 0605051A / <i>Aircraft Survivability Development</i>
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CMWS: FY 2023 Base RDTE dollars in the amount of \$7.040 million will fund Future Sensor and Algorithm Analysis, Threat and Vulnerability Analysis, Systems Engineering and Program Management (SEPM), and Model Based Systems Engineering (MBSE).

- References:
- Joint Staff, J-8 Deputy Director for Requirements (DOR) memorandum, April 24, 2015
 - Phase 2a SOCOM JUONs SO-0010, Joint Rapid Acquisition Cell (JRAC) memorandum, May 29, 2015
 - Directed Requirement for the Phase 3 Advanced Threat Warner and Common Infrared Countermeasure Quick Reaction Capability (ATW/CIRCM QRC) to Support Joint Urgent Operational Need (JUON) SO-0010, CIRCM Critical Intelligence Parameters Breach, December 18, 2015
 - Directed Requirement for Limited Interim Missile Warning System to Detect Enemy Man Portable Air Defense Systems, March 26, 2017
 - Update to the Directed Requirement for the United States Special Operations Command Joint Urgent Operational Needs SO-0010 Threat Detection and Countermeasures to Enemy Man Portable Air Defense System Capability, November 16, 2018
 - Directed Requirement for Limited Interim Missile Warning System to Detect Enemy Man Portable Air Defense Systems, November 16, 2018
 - Aircraft Survivability Equipment (ASE) Modernization Fielding Guidance, Change 1, November 19, 2018
 - Acquisition Decision Memorandum (ADM) for Radio Frequency (RF) Project Manager Aircraft Survivability Equipment (PM ASE) Engineering Change Proposal (ECP) for Radar Warning Receiver AN/APR39-D(V)2 to AN/APR39-E(V)2, June 24, 2019 by PEO IEW&S.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	99.208	65.603	0.000	-	0.000
Current President's Budget	99.403	61.768	19.123	-	19.123
Total Adjustments	0.195	-3.835	19.123	-	19.123
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-6.835			
• Congressional Rescissions	-	-			
• Congressional Adds	-	3.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.195	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	19.123	-	19.123

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

Project: ER8: *Common Missile Warning System (CMWS)*

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

Congressional Add Subtotals for Project: ER8

	FY 2021	FY 2022
Congressional Add: <i>Program Increase - Aviation Artificial Intelligence Virtual Training Environment</i>	-	3.000
Congressional Add Subtotals for Project: ER8	-	3.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
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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 0605051A / <i>Aircraft Survivability Development</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)		FY 2021		FY 2022
Congressional Add Totals for all Projects		-		3.000

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development				Project (Number/Name) ER7 / Aircraft Survivability Equipment Development			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
ER7: Aircraft Survivability Equipment Development	-	31.323	38.329	12.083	-	12.083	8.456	8.047	9.936	10.033	0.000	118.207
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is a key enabler of the Army Modernization Priorities in support of FVL FARA and FLRAA platforms.

The objective of the ASE Development project is to improve RF ASE for Army aviation. APR-39 RWR detects, categorizes, and prioritizes RF emitters and provides a visual / aural alert to aircrew members warning them of targeting by RF-guided weapons. The MDA approved Phases 1 and 2 of a 3-phased path forward.

Phase 1, APR-39C(V)1/4, serves as an obsolescence / sustainment upgrade to the Processor LRU of APR-39A(V) RWR implemented to ensure that the currently fielded system remains viable until affordable improved RF ASE capability can be pursued in Phases 2 and 3.

Phase 2A is RWR Modernization begins by adopting the United States Navy APR-39D(V)2 system. APR-39D(V)2 will significantly improve the RF threat coverage, automatic detection and identification of threat types, bearing, and lethality. Phase 2B, the APR-39E(V)2, MRWR, is an Army ECP to APR-39D(V)2, approved in the ADM signed June 24, 2019. This ECP will implement enhanced hardware and software upgrades to keep APR-39 technically relevant against new and emerging agile threats. APR-39E(V)2 is part of the suite of ASE mission equipment for the FVL platforms.

Phase 3 adds active RF-ECM capability for selected aircraft with MDD planned in the future.

Justification: FY 2023 Base RDT&E funding of \$12.083 million supports APR-39E(V)2 hardware and software system development, system government qualification, and performance testing.

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

	FY 2021	FY 2022	FY 2023
Title: Phase 2 Radio Frequency Countermeasure (CM)	31.323	36.930	12.083
Description: Phase 2A is RWR Modernization begins by adopting the United States Navy APR-39D(V)2 system. APR-39D(V)2 will significantly improve the RF threat coverage, automatic detection and identification of threat types, bearing, and lethality. Phase 2B, the APR-39E(V)2, MRWR, is an Army ECP to APR-39D(V)2, approved in the ADM signed June 24, 2019. This ECP will implement enhanced hardware and software upgrades to keep APR-39 technically relevant against new and emerging agile threats. APR-39E(V)2 is part of the suite of ASE mission equipment for the FVL platforms.			
FY 2022 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER7 / Aircraft Survivability Equipment Development

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Will fund APR-39E(V)2 hardware and software system development, platform integration, systems engineering and program management, initial system government qualification and performance testing. Supports preliminary analysis for FVL A-Kit development and integration. FY 2023 Plans: Will fund APR-39E(V)2 hardware and software system development, systems engineering and program management, initial system government qualification and performance testing. Supports preliminary analysis for integration of ASE systems on FVL FARA and FLRAA platforms. FY 2022 to FY 2023 Increase/Decrease Statement: The reduction is due to the completion of the Army lead platform development.			
Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) FY 2022 Plans: SBIR/STTR Transfer. FY 2022 to FY 2023 Increase/Decrease Statement: FY22 SBIR/STTR Transfer	-	1.399	-
Accomplishments/Planned Programs Subtotals	31.323	38.329	12.083

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• AZ3511: Radio Frequency CM	36.890	54.841	158.883	-	158.883	144.028	75.963	92.497	92.126	3,257.349	3,912.577

Remarks

D. Acquisition Strategy

Army RF ASE is managed by Project Manager ASE (PM ASE) for development, testing, procurement, integration and installation on Army rotary wing and fixed wing Special Electronic Mission Aircraft (SEMA) aviation platforms. PM ASE proposed a three-phased path forward commensurate with user priorities and affordability considerations. The MDA approved Phases 1 and 2 of a 3-phased path forward.

Phase 1, APR-39C(V)1/4, serves as an obsolescence / sustainment upgrade to the Processor LRU of APR-39A(V) RWR implemented to ensure that the currently fielded system remains viable until affordable improved RF ASE capability can be pursued in Phases 2 and 3.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / <i>Aircraft Survivability Development</i>	Project (Number/Name) ER7 / <i>Aircraft Survivability Equipment Development</i>
<p>Phase 2A is RWR Modernization begins by adopting the United States Navy APR-39D(V)2 system. APR-39D(V)2 will significantly improve the RF threat coverage, automatic detection and identification of threat types, bearing, and lethality. Phase 2B, the APR-39E(V)2, MRWR, is an Army ECP to APR-39D(V)2, approved in the ADM signed June 24, 2019. This ECP will implement enhanced hardware and software upgrades to keep APR-39 technically relevant against new and emerging agile threats. APR-39E(V)2 is part of the suite of ASE mission equipment for the FVL platforms.</p> <p>Phase 3 adds active RF-ECM capability for selected aircraft with MDD planned in the future.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0605051A / Aircraft Survivability Development				ER7 / Aircraft Survivability Equipment Development							
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Threat Management/SEPM	Various	Various : -	11.412	1.022	Nov 2020	1.910	Nov 2021	1.167	Nov 2022	-		1.167	Continuing	Continuing	-
Project Management	Various	Various : -	1.926	-		-		-		-		-	Continuing	Continuing	-
NDAA SEC 825 MDAP Cost Overrun	Various	Various : Various	0.028	-		-		-		-		-	0.000	0.028	-
SBIR/STTR Transfer	C/TBD	Various : Various	-	-		1.399	Oct 2021	-		-		-	Continuing	Continuing	-
Subtotal			13.366	1.022		3.309		1.167		-		1.167	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Digital Radar Warning Receiver (RWR) (D(V)2)	Various	Lab Demo / Study : Various	10.634	-		-		-		-		-	Continuing	Continuing	-
APR-39E(V)2 SW & HW Development	Various	OGA : Aberdeen Proving Grounds, MD	90.158	24.703	Oct 2020	18.400	Oct 2021	5.773	Oct 2022	-		5.773	Continuing	Continuing	-
Threat and Vulnerability Analysis/Sil Updates	MIPR	I2WD : Aberdeen Proving Grounds, MD	2.547	-		-		-		-		-	Continuing	Continuing	-
Depot Standup	MIPR	Tobyhanna : Tobyhanna, PA	1.063	-		-		-		-		-	0.000	1.063	-
APR-39E(V)2 Platform Integration	Various	Multiple : -	5.943	2.046	Jan 2021	-		-		-		-	Continuing	Continuing	-
Subtotal			110.345	26.749		18.400		5.773		-		5.773	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Contractor Support	Various	Various : -	4.685	-		-		-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER7 / Aircraft Survivability Equipment Development

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Phase 2B APR-39E(V)2 Software and Hardware Development	██████████				██████████				██████████																			
Phase 2B APR-39E(V)2 Government System Test and Evaluation	██████████				██████████				██████████																			
Phase 2B APR-39E(V)2 DT/OT	██████████				██████████				██████████																			
Phase 2B APR-39E(V)2 Platform Integration	██████████				██████████				██████████																			
Threat Management	██████████				██████████				██████████				██████████				██████████				██████████							

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER7 / Aircraft Survivability Equipment Development

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Threat Vulnerability Analysis//SIL Updates	3	2016	4	2017
Phase 2B APR-39E(V)2 Software and Hardware Development	2	2018	3	2023
Phase 2B APR-39E(V)2 Government System Test and Evaluation	3	2021	1	2024
Phase 2B APR-39E(V)2 DT/OT	2	2022	3	2023
Phase 2B APR-39E(V)2 Platform Integration	2	2020	4	2022
Threat Management	4	2020	4	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development				Project (Number/Name) ER8 / Common Missile Warning System (CMWS)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
ER8: Common Missile Warning System (CMWS)	-	68.080	23.439	7.040	-	7.040	8.154	5.321	4.917	4.964	0.000	121.915
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The CMWS program is a missile warning system that cues both flare and laser-based countermeasures to defeat incoming IR seeking missiles and will alert aircrews to the presence of certain incoming unguided munitions. The B-Kit consists of the components which perform the missile detection and aircrew notification, unguided munitions detection and aircrew notification, false alarm rejection, and countermeasure employment/cueing functions of the system. The CMWS ECU receives UV missile detection data from EOMS, which detect UV signals, and sends a missile alert signal to warn aircrews via on-board avionics. Tier 1 threat missiles detected and tracked by the CMWS are subsequently defeated by a combination of missile seeker countermeasures, including decoy flares and IR Laser Jamming (currently CIRCM and ATIRCM equipped CH-47 platform only). In addition, the CMWS ECU receives from the EOMS unguided munitions detection data which it also passes to the aircrew through aural and visual alerts. The aircrew then applies the appropriate TTPs to break contact or engage the enemy with own-ship ordnance. The CMWS Generation 3 (Gen 3) ECU in conjunction with ongoing software development efforts will address outstanding materiel release conditions and ensure protection against emerging IR-guided missile threats. Due to evolving threats, CMWS will remain in the Army inventory beyond 2040 and must remain relevant against emerging threats.

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Phase 4 LIMWS QRC addresses the HQDA Directed Requirement to provide a greater capability than CMWS, the current Program of Record (POR), to bridge the gap between CMWS and the future POR. LIMWS is required to provide increased detection range, improved detection in clutter, more agile algorithms to rapidly respond to emerging threats, and eliminates the need for sensor alignments. To maintain overmatch of quickly emerging threat technology and tactics, LIMWS will explore and develop system modifications and performance improvements.

CMWS: FY 2023 Base RDTE dollars in the amount of \$7.040 million will fund Future Sensor and Algorithm Analysis, Threat and Vulnerability Analysis, SEPM, and MBSE.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER8 / Common Missile Warning System (CMWS)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Title: CMWS Product Development and Management Services</p> <p>Description: RDTE funding supports continuing development engineering threat and vulnerability analysis, SEPM, and integration with other ASE Systems.</p> <p>FY 2022 Plans: FY 2022 Base RDTE dollars in the amount of \$6.610 million will fund Future Sensor and Algorithm Analysis, Threat and Vulnerability Analysis, SEPM, and MBSE.</p> <p>FY 2023 Plans: FY 2023 Base RDTE dollars in the amount of \$7.040 million will fund Future Sensor and Algorithm Analysis, Threat and Vulnerability Analysis, SEPM, and MBSE.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 includes decreased funding for Future Sensor and Algorithm Analysis, Threat and Vulnerability Analysis, SEPM, and MBSE.</p>		3.455	6.368	7.040
<p>Title: Phase 4 LIMWS QRC</p> <p>Description: Phase 4 LIMWS is a follow-on bridging solution to the JUONS SO-0010 to provide a greater capability than the current POR, CMWS, until the future POR is available. LIMWS is a Chief of Staff of the Army approved Directed Requirement issued by Army G-8 on March 26, 2017. LIMWS QRC provides an enhanced missile warning system to detect emerging and evolving enemy Man Portable Air Defense Systems (MANPADS) threats.</p> <p>FY 2022 Plans: FY 2022 Direct War/Enduring Operation RDTE dollars in the amount of \$13.829 million fund development and testing of software and A-Kits for integration onto Army and Special Operations Aircraft as well as software, firmware, and hardware updates for Conventional Army Aircraft. Supports preliminary analysis for FVL integration.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY23 funding is not requested.</p>		64.625	13.829	-
<p>Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)</p> <p>FY 2022 Plans: SBIR/STTR Transfer.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>		-	0.242	-

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER8 / Common Missile Warning System (CMWS)
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY22 SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	68.080	20.439	7.040

	FY 2021	FY 2022
Congressional Add: Program Increase - Aviation Artificial Intelligence Virtual Training Environment	-	3.000
FY 2022 Plans: FY 2022 RDTE Base funding in the amount of \$3.000 million will fund the development of an Aviation Artificial Intelligence Virtual Training Environment.		
Congressional Adds Subtotals	-	3.000

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• AZ3517: CMWS	159.729	148.570	107.112	-	107.112	13.797	5.315	14.507	14.502	706.012	1,169.544

Remarks

D. Acquisition Strategy
 CMWS: Procurement of US Government CMWS A-Kit and B-Kits are complete. CMWS is managed as Mission Equipment for deploying units and fielded as directed by HQDA G-3/5/7. The CMWS program will continue to be supported through a five year services-only Cost Plus Fixed Fee or Cost Plus Incentive Fee contract, with services which began on July 31, 2019.

Phase 2a JUONS DoN LAIRCM and Phase 3 CIRCM QRC: JUONS S0-0010 acquisition strategy includes aircraft prime contractor engineering support contracted to a Government test organization. Aircraft integration for JUONS will be handled through government operated organizations and industry partners.

Phase 4 LIMWS QRC: Acquisition strategy included a full and open competition for selection of prime vendor for development of B-Kits, development of A-Kits, and support testing for the lead program. Additional platform A-Kit development will be completed by government organizations, small business and industry partners.

Threat and Vulnerability analysis efforts will be used to determine if an algorithm update is required to maintain missile warning threat overmatch and provide input to improve US Government authoritative threat modeling updates.

Future Sensor and Algorithm Analysis development equally supports MANPADS and Hostile Fire overmatch through evaluation of emerging sensor technologies and advances in algorithm techniques. This analysis identifies opportunities to optimize performance and modernize fielded systems in order to maintain relevance for the future.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / <i>Aircraft Survivability Development</i>	Project (Number/Name) ER8 / <i>Common Missile Warning System (CMWS)</i>

CMWS SEPM is necessary due to the nature of emerging and current threat(s). Threat(s) analyses include, when required, collaboration support with intelligence organizations, course of action planning, root cause investigations, threat and laboratory hardware maintenance, and lab tools upgrade to support specific performance analyses.

Development of MBSE models of CMWS and LIMWS will align to Program Executive Office Aviation (PEO AVN) system engineering models. Continued MBSE development supports improved performance, weight reduction and testing.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER8 / Common Missile Warning System (CMWS)
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
CMWS Systems Engineering Program Management	Various	Various : PM ASE, HSV, AL	10.020	0.754	Jan 2020	0.800	Jan 2022	0.814	Jan 2023	-		0.814	Continuing	Continuing	Continuing
Advanced Missile Warning System Systems Engineering Program Management	TBD	TBD : TBD	2.000	-		-		-		-		-	0.000	2.000	-
JUONS SO-0010 Systems Engineering Program Management	Various	Various : PM ASE, HSV, AL	1.627	-		-		-		-		-	0.000	1.627	-
CIRCM QRC Systems Engineering Program Management	Various	Various : PM ASE, HSV, AL	8.144	-		-		-		-		-	0.000	8.144	-
LIMWS - SEPM	Various	Various : PM ASE, HSV, AL	6.856	-		-		-		-		-	0.000	6.856	-
SBIR / STTR Transfer	TBD	Various : Various	0.212	-		0.242		-		-		-	0.000	0.454	-
Subtotal			28.859	0.754		1.042		0.814		-		0.814	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
CMWS tier 2/3 Upgrades	Various	Various : -	2.000	-		-		-		-		-	0.000	2.000	-
CMWS Threat Analysis Database Design	Various	BAE : Various	0.455	-		-		-		-		-	0.000	0.455	-
CMWS Threat Analysis Database (TAD)	Various	BAE : Various	6.119	-		-		-		-		-	0.000	6.119	-
CMWS Enhanced Sensor Study & Evaluation	Various	Various : -	11.466	-		-		-		-		-	0.000	11.466	-
CMWS Data Modeling	TBD	Various : Various	0.688	-		-		-		-		-	0.000	0.688	-
CMWS Future Sensor and Algorithm Analysis	Various	Various : TBD	6.670	1.154	Mar 2020	1.570	Mar 2022	2.753	Mar 2023	-		2.753	0.000	12.147	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER8 / Common Missile Warning System (CMWS)
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
CMWS Prime Contractor-- Integration Engineering	TBD	TBD, TBD : TBD	7.787	-		-		-		-		-	0.000	7.787	-
CMWS Aircraft Integration	TBD	Various : Various	19.974	-		-		-		-		-	0.000	19.974	-
CMWS Software	TBD	Various : Various	3.000	-		-		-		-		-	0.000	3.000	-
JUONS SO-0010 Prime Contractor -- Integration Engineering	Various	Various : Various	8.842	-		-		-		-		-	0.000	8.842	-
JUONS SO-0010 Software	Various	Various : Various	1.534	-		-		-		-		-	0.000	1.534	-
JUONS SO-0010 Training	Various	Various : Various	0.200	-		3.000		-		-		-	0.000	3.200	-
CIRCM QRC Development Engineering	Various	Northrup Grumman : Rolling Meadow, IL	5.100	-		-		-		-		-	0.000	5.100	-
CIRCM QRC System Development and Qualification	Various	Various : Various	53.474	-		-		-		-		-	0.000	53.474	-
CIRCM QRC Aircraft Integration	Various	Various : Various	24.223	-		-		-		-		-	0.000	24.223	-
Limited Interim Missile Warning System (LIMWS) - Development Engineering	Various	Various : PM ASE, HSV, AL	166.242	45.585	Mar 2021	5.485	Mar 2022	-		-		-	Continuing	Continuing	Continuing
CMWS Threat and Vulnerability Analysis	Various	Various : TBD	8.349	1.547	Mar 2020	3.998	Mar 2022	3.473	Mar 2023	-		3.473	Continuing	Continuing	Continuing
Subtotal			326.123	48.286		14.053		6.226		-		6.226	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
LIMWS - Matrix Support	Various	Various : PM ASE, HSV, AL	6.839	2.170	Jan 2021	-		-		-		-	0.000	9.009	-
LIMWS - Contractor Support	Various	Various : PM ASE, HSV, AL	6.032	3.797	Jan 2021	2.000	Jan 2022	-		-		-	0.000	11.829	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0605051A / Aircraft Survivability Development				ER8 / Common Missile Warning System (CMWS)							
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Subtotal			12.871	5.967		2.000		-		-		-	0.000	20.838	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
CMWS Test and Evaluation	TBD	Various : Various	16.156	-		-		-		-		-	0.000	16.156	-
JUONS SO-0010 Test and Evaluation	Various	Various : Various	26.709	-		-		-		-		-	0.000	26.709	-
CIRCM QRC Test and Evaluation/Tech Manuals	Various	Various : Various	35.050	-		-		-		-		-	0.000	35.050	-
LIMWS - Government Testing	Various	Various : PM ASE, HSV, AL	60.788	13.073	Mar 2021	6.344	Mar 2022	-		-		-	Continuing	Continuing	Continuing
Subtotal			138.703	13.073		6.344		-		-		-	Continuing	Continuing	N/A
Project Cost Totals			506.556	68.080		23.439		7.040		-		7.040	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER8 / Common Missile Warning System (CMWS)

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
CMWS Threat and Vulnerability Analysis	[Redacted]																											
CMWS Future Sensor and Algorithm Analysis	[Redacted]																											
Phase 4 LIMWS QRC Development Engineering and Test	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605051A / Aircraft Survivability Development	Project (Number/Name) ER8 / Common Missile Warning System (CMWS)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CMWS System Dev/Tier 2 and 3 Upgrades	2	2011	4	2019
CMWS Gen 3 Production	3	2012	4	2016
CMWS Threat Analysis Database (TAD)	2	2012	4	2019
CMWS Vulnerability Analysis and Assessment of Technology	2	2015	4	2019
CMWS Threat and Vulnerability Analysis	1	2020	4	2030
CMWS Future Sensor and Algorithm Analysis	1	2017	4	2030
Phase 3 ATW/CIRCM QRC Engineering, Integration, and Test	2	2016	1	2020
Phase 4 LIMWS QRC Development Engineering and Test	3	2017	4	2022