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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army **Date:** March 2023

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0607148A / AN/TPQ-53 Counterfire Target Acquisition Radar System
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	46.009	61.559	54.167	-	54.167	33.213	8.574	8.665	8.761	Continuing	Continuing
BY8: AN/TPQ-53 Counterfire Target Acquisition Radar Sys	-	46.009	61.559	54.167	-	54.167	33.213	8.574	8.665	8.761	Continuing	Continuing

A. Mission Description and Budget Item Justification

This funding line is a key enabler of the Army Long Range Precision Fires (LRPF) Modernization Priority in support of the AN/TPQ-53 Counterfire target Acquisition Radar program. The AN/TPQ-53 Counterfire Target Acquisition Radar System is a highly mobile radar set that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) and replaces the AN/TPQ-36 and AN/TPQ-37 Firefinder Radars. The AN/TPQ-53 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-53 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-53 currently supports contingency operations to include Operation Inherent Resolve (OIR) and is provided to Brigade Combat Teams (BCTs), Field Artillery Brigades (FABs) and Division Artilleries (DIVARTYS).

Fiscal Year (FY) 2024 research, development, test and evaluation (RDT&E) funds in the amount of \$54.167 million supports the design and development of a hardware/software Multi Domain Operation (MDO) digitization upgrade kit for Distributed Digital Receiver Exciter (DDREX) Capability Set #1 and Capability Set #2 to enhance system survivability, electronic protection (EP), bandwidth agility, and an integrated fires capability in a peer/near-peer threat environment. This includes development, integration, and providing a capability beyond the current range and location accuracy requirements. Funding also supports efforts required to counter indirect fire and improve survivability against electronic warfare threats identified in the Validated Online Lifecycle Threat (VOLT).

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	47.752	62.559	55.312	-	55.312
Current President's Budget	46.009	61.559	54.167	-	54.167
Total Adjustments	-1.743	-1.000	-1.145	-	-1.145
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.743	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-1.145	-	-1.145

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<u>Change Summary Explanation</u> Decreased funding to support higher Army priorities.		

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607148A / AN/TPQ-53 Counterfire Target Acquisition Radar System				Project (Number/Name) BY8 / AN/TPQ-53 Counterfire Target Acquisition Radar Sys			
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BY8: AN/TPQ-53 Counterfire Target Acquisition Radar Sys	-	46.009	61.559	54.167	-	54.167	33.213	8.574	8.665	8.761	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is a key enabler of the Army Long Range Precision Fires (LRPF) Modernization Priority in support of the AN/TPQ-53 Counterfire target Acquisition Radar program. The AN/TPQ-53 Counterfire Target Acquisition Radar System is a highly mobile radar set that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) and replaces the AN/TPQ-36 and AN/TPQ-37 Firefinder Radars. The AN/TPQ-53 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-53 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-53 currently supports contingency operations to include Operation Inherent Resolve (OIR) and is provided to Brigade Combat Teams (BCTs), Field Artillery Brigades (FABs) and Division Artilleries (DIVARTYs).

Fiscal Year (FY) 2024 research, development, test and evaluation (RDT&E) funds in the amount of \$54.167 million supports the design and development of a hardware/software Multi Domain Operation (MDO) digitization upgrade kit for Distributed Digital Receiver Exciter (DDREX) Capability Set #1 and Capability Set #2 to enhance system survivability, electronic protection (EP), bandwidth agility, and an integrated fires capability in a peer/near-peer threat environment. This includes development, integration, and providing a capability beyond the current range and location accuracy requirements. Funding also supports efforts required to counter indirect fire and improve survivability against electronic warfare threats identified in the Validated Online Lifecycle Threat (VOLT).

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

	FY 2022	FY 2023	FY 2024
Title: MDO Digitization / Distributed Digital Receiver Exciter (DDREX)	35.760	48.003	47.057
Description: MDO Digitization / Distributed Digital Receiver Exciter (DDREX) is a modification-in-service Engineering Change Proposal (ECP) that provides increased force protection by addressing emerging and evolving electronic attack threats, improving electronic protection capabilities against Cyber Electromagnetic Activity (CEMA), and improving performance in a congested spectrum/environment via waveform diversity, spectrum agility and broadening the operational bandwidth. The system is also less susceptible to directed energy, jamming and anti-radiation missiles and provides improved extended range capability to enable timely and accurate targetable data in support of Long Range Precision Fires (LRPF).			
FY 2023 Plans:			
FY 2023 research, development, test and evaluation (RDT&E) funds in the amount of \$48.003 million supports the continuation of DDREX modification kit design, architecture and interface definition, hardware/software design and development in support			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>of Capability Set #1 and Capability Set #2, and the procurement, delivery, integration, and testing of four DDREX Engineering Development Models (EDMs). This digitization upgrade kit will enhance system survivability (electronic protect (EP)) in a peer/near-peer threat environment and provide a capability that supports the latest range and location accuracy requirements. These Capability Sets, which include development of DDREX hardware and software to enable advanced survivability capability, will increase Counterfire Target Acquisition (CTA) performance and radar survivability.</p> <p>FY 2024 Plans: FY 2024 research, development, test and evaluation (RDT&E) funds in the amount of \$47.057 million supports the continuation of DDREX modification kit design and the integration, and testing of four DDREX Engineering Development Models (EDMs) in support of Capability Set #1 and Capability Set #2. These Capability Sets, which include development of DDREX hardware and software to enable advanced survivability capability, will increase Counterfire Target Acquisition (CTA) performance and radar survivability.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2023 efforts center around hardware EDM development. FY 2024 efforts focus on hardware testing as well as DDREX software development. The net reduction in costs from FY 2023 to FY 2024 is a result of decreased material procurement costs and increased software development and testing costs.</p>				
<p>Title: Modernization Development Efforts and Emerging Threats</p> <p>Description: Modernization Development Efforts and Emerging Threats provides the ability to address upcoming threats on the battlefield by countering indirect fire and improving survivability against electronic warfare threats identified in the Validated Online Lifecycle Threat (VOLT). These efforts will continue to address complex evolving threats through advanced survivability development.</p> <p>FY 2023 Plans: FY 2023 research, development, test and evaluation (RDT&E) funds in the amount of \$8.288 million supports the Modernization Development Efforts and Emerging Threats. This requirement provides the ability to address upcoming threats on the battlefield by countering indirect fire and improving survivability against electronic warfare threats identified in the VOLT.</p> <p>FY 2024 Plans: FY 2024 research, development, test and evaluation (RDT&E) funds in the amount of \$4.272 million continues to support the Modernization Development Efforts and Emerging Threats. This requirement will continue to allow the ability to address evolving threats on the battlefield that are in the VOLT. This requirement is necessary to allow continued survivability capability.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement:</p>		8.453	8.288	4.272

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
Decrease in FY 2024 funding is the direct result of reduced hardware engineering requirements during FY 2024.			
Title: Program Management Support Description: Program management efforts include engineering, integration, and test support associated with DDREX development and modernization efforts addressing new and emerging threats. FY 2023 Plans: FY 2023 funding of \$3.021 million supports program management requirements. FY 2024 Plans: FY 2024 funding of \$2.838 million supports program management requirements. FY 2023 to FY 2024 Increase/Decrease Statement: The net reduction in costs from FY 2023 to FY 2024 is a result of a reduced number of operating facilities and associated support and travel utilized by the DDREX program in FY 2024.	1.796	3.021	2.838
Title: FY23 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC §638. FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638. FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638.	-	2.247	-
Accomplishments/Planned Programs Subtotals	46.009	61.559	54.167

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• B05310: AN/TPQ-53 Counterfire Target Acquisition Radar	298.000	91.233	0.000	-	0.000	-	-	228.181	199.960	0.000	817.374
• BA5315: AN/TPQ-53 MOD-IN-SERVICE LINE	26.664	70.975	99.782	-	99.782	117.038	117.957	244.108	303.029	Continuing	Continuing

Remarks

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D. Acquisition Strategy

Army approved a Total Army Analysis (TAA) force structure change, activating eight new Army National Guard Division Artilleries (ARNG DIVARTYs) with two AN/TPQ-53 radars each. In April 2022, the program AAO increased by 16 systems from 189 to 205 systems. In conjunction with Ukraine Assistance funds, the program is awarding an FRP Lot 4 production contract in FY 2023 for 16 systems to outfit the eight new ARNG DIVARTYs. The last FRP Lot 4 system will deliver in FY 2025.

The AN/TPQ-53 full Distributed Digital Receiver Exciter (DDREX) development began in FY 2022. This effort builds upon GaN, SDP 2.0, extended range (ER), electronic protection (EP), and secure contractor facilitization efforts. The initial development task order took place on the FRP Indefinite Delivery Indefinite Quantity (IDIQ) contract in FY 2022 and includes engineering development, design, prototyping, subsystem integration, and survivability software (electronic protect). A second task order will award in FY 2023 to develop and harden the survivability software. All development efforts will culminate in a series of tests leading to an Operational Test in the 4Q FY 2025. Initial production representative assets with an initial survivability capability will undergo a DDREX Live Fire Soldier Touch Point in 1Q FY 2025 to support a procurement decision for 60 DDREX mod kits. The program will utilize procurement funds in FY 2025 to support DDREX mod kit buys, organic depot facilitization, and updates to technical manuals and training materials. Supply transition and full material release are planned for FY 2026. The program will re-field systems with DDREX mod kits beginning in FY 2027. In the same year, the DDREX configuration will transition to organic hardware and software sustainment.

The AN/TPQ-53 program is a component of an integrated fires development effort that includes survivability, resiliency, and effectiveness improvements against advanced threats from near-peer adversaries. This effort includes integration with an evolving common fires mission command, common development tools and processes, and annual test and evaluation to provide data to support program assessments and progress toward closure of performance gaps.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Army												Date: March 2023				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 7				PE 0607148A / AN/TPQ-53 Counterfire Target Acquisition Radar System				BY8 / AN/TPQ-53 Counterfire Target Acquisition Radar Sys								
Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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	
FY23 SBIR/STTR Transfer	TBD	Various : Various	-	-		2.247	Feb 2023	-		-		-	0.000	2.247	-	
Subtotal			-	-		2.247		-		-		-	0.000	2.247	N/A	
Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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	
Modernization Development Efforts and EmergingThreats	SS/CPFF	Lockheed Martin : Syracuse, NY	-	8.453	Mar 2022	8.288	Dec 2022	4.272	Dec 2023	-		4.272	0.000	21.013	Continuing	
MDO Digitization / Distributed Digital Receiver Exciter (DDREX)	SS/CPFF	Lockheed Martin : Syracuse, NY	-	35.760	Mar 2022	48.003	Dec 2022	47.057	Dec 2023	-		47.057	0.000	130.820	Continuing	
Subtotal			-	44.213		56.291		51.329		-		51.329	0.000	151.833	N/A	
Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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	
Program Management Support - Contractor	SS/ Various	Various : Various	-	0.880	Mar 2022	1.360	Nov 2022	1.277	Nov 2023	-		1.277	0.000	3.517	Continuing	
Program Management Support - Government	SS/ Various	Various : Various	-	0.916	Mar 2022	1.661	Nov 2022	1.561	Nov 2023	-		1.561	0.000	4.138	Continuing	
Subtotal			-	1.796		3.021		2.838		-		2.838	0.000	7.655	N/A	
Project Cost Totals			-	46.009		61.559		54.167		-		54.167	0.000	161.735	N/A	
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607148A / AN/TPQ-53 Counterfire Target Acquisition Radar System	Project (Number/Name) BY8 / AN/TPQ-53 Counterfire Target Acquisition Radar Sys	

Event Name	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	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
DDREX Material Release																	▲ 11											
DDREX Transition to Organic Depot Repair																	▲ 13											
DDREX Transition to Organic Software Support																	▲ 14											
Modernization, Emerging Threats and Testing (per VOLT)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607148A / AN/TPQ-53 Counterfire Target Acquisition Radar System	Project (Number/Name) BY8 / AN/TPQ-53 Counterfire Target Acquisition Radar Sys

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
DDREX System, Hardware and Software Development	1	2022	3	2025
DDREX System Integration and Test	3	2023	4	2025
DDREX System Critical Design Review	1	2023	1	2023
Developmental Test #1	2	2025	2	2025
Developmental Test #2	3	2025	3	2025
Soldier Touch Point #1 (CDR)	1	2023	1	2023
Soldier Touch Point #2 (EDM)	4	2024	4	2024
Soldier Touch Point #3 (Live Fire)	1	2025	1	2025
Soldier Touch Point #4 (Cooperative Vulnerability Penetration Assessment)	4	2025	4	2025
SoldierTouch Point #5 (Tech Manual Ver)	4	2025	4	2025
DDREX Operational Test	4	2025	4	2025
DDREX Adversarial Assessment	1	2026	1	2026
DDREX Transition to Organic Supply	2	2027	2	2027
DDREX Material Release	3	2026	3	2026
DDREX Transition to Organic Depot Repair	2	2027	2	2027
DDREX Transition to Organic Software Support	2	2027	2	2027
Modernization, Emerging Threats and Testing (per VOLT)	1	2022	4	2028