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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</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	-	0.000	39.742	12.010	0.000	12.010	0.000	0.000	0.000	0.000	0.000	51.752
641030: <i>GPS Receiver Development</i>	-	0.000	39.742	12.010	0.000	12.010	0.000	0.000	0.000	0.000	0.000	51.752

A. Mission Description and Budget Item Justification

PE 0604201F, Project 641030 covers the research, development, qualification, and testing of Enhanced Anti-Jam (EAJ) Military Code (M-Code) Global Positioning System (GPS) receivers for Air Force and joint weapon systems. This includes updates to weapon mission planning software to support new M-Code and EAJ receiver development. These acquisitions will enable the Air Force to increase its operational Positioning, Navigation, and Timing (PNT) resiliency while satisfying the DoD and civil mandates. Fielding of EAJ M-Code weapons requires research, development, qualification and testing of M-Code receivers across the Air Force Program Executive Officer (AFPEO) Weapons portfolio. Funds may be used to address emerging and short notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY21 0.0M was expended for civilian pay expenses in this program element, and in FY22 1.8M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	39.742	0.000	0.000	0.000
Current President's Budget	0.000	39.742	12.010	0.000	12.010
Total Adjustments	0.000	0.000	12.010	0.000	12.010
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	12.010	0.000	12.010

Change Summary Explanation

The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY 2023 cannot be made in a relevant manner.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements				Project (Number/Name) 641030 / GPS Receiver 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
641030: GPS Receiver Development	-	0.000	39.742	12.010	0.000	12.010	0.000	0.000	0.000	0.000	0.000	51.752
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This munitions receiver development project includes development of a GPS M-code receiver with EAJ and analysis efforts. M-code receivers with EAJ provide advanced Positioning, Navigation, and Timing (PNT) capabilities required for weapons to operate in Adversarial Anti-access/Area Denial (A2/AD) environments. M-Code receivers with EAJ also provide increased accuracy, better signal acquisition, and advanced security.

M-code receivers with EAJ capability assures continued weapon system precision and lethality.

Fielding EAJ M-Code weapons requires research, development, qualification, testing, and mission planning of M-Code receivers across the weapons portfolio. This will include all systems, subsystems, software, fuzing, and support activities associated with the development and implementation of M-Code receivers.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY21 0.0M was expended for civilian pay expenses in this program element, and in FY22 1.8M is forecasted for civilian pay expenses in this program element.

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

	FY 2021	FY 2022	FY 2023
Title: M-Code EAJ	0.000	39.742	12.010
Description: M-Code/EAJ receivers provide an enhanced anti-jam capability. M-Code/EAJ receivers provide the capability to operate in increasing adversarial A2/AD jamming environment. M-Code/EAJ receivers also provide increased accuracy, better signal acquisition, and advanced security.			
FY 2022 Plans: Perform design and development of High Anti-Jam Miniature M-Code Enhanced Receiver (HAMMER), and support design of Joint Air-to-Surface Standoff Missile (JASSM) Anti-Jam GPS Receiver (JAGR) M-Code capability.			
FY 2023 Plans: Continue performing design and development of High Anti-Jam Miniature M-Code Enhanced Receiver (HAMMER), and support design of JASSM Anti-Jam GPS Receiver (JAGR) M-Code capability.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Funding decreased due to engineering and schedule changes to the receiver design and development work in FY 2023.			
Accomplishments/Planned Programs Subtotals	0.000	39.742	12.010

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
• RDTE 07 0207327F: <i>Small Diameter Bomb (SDB)</i>	6.000	11.606	13.532	-	13.532	-	-	-	-	0.000	31.138
• RDTE 04 PE 0604327F, BPAC 645341: <i>Direct Strike Penetrators</i>	1.402	-	-	-	-	-	-	-	-	0.000	1.402
• RDTE 05 0604618F: <i>Joint Direct Attack Munition</i>	6.555	-	-	-	-	-	-	-	-	0.000	6.555
• RDTE 07 0207325F: <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>	0.000	0.000	0.000	0.000	0.000	-	-	-	-	0.000	0.000

Remarks

D. Acquisition Strategy

M-Code/EAJ effort uses a Family of Systems (FoS) approach where the weapons prime contractors develop receivers capable of operating in any of their Air Force weapons. The receivers are based on a common, internally-developed Interface Requirements Specification (IRS), Technology Requirement Document (TRD), and threat scenarios. This approach uses a combination of contract types based on acquisition phase (Technology Maturation & Risk Reduction (TMRR), Development, Production) and risk. The weapons system program offices share a common development Program Element (PE) to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational testing, and production. The M-Code/EAJ weapons receiver development effort leverages technology currently under development by the Military GPS User Equipment (MGUE) program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 0604201F / PNT Resiliency, Mods, and Improvements				641030 / GPS Receiver Development							
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
Common Weapons M-Code Receiver Development (SDB II)	Various	Raytheon : Tucson, AZ	-	-		20.354	Apr 2022	6.246	Jan 2023	-		6.246	0.000	26.600	-
Common Weapons M-Code Receiver Development (CAAP ASIC)	MIPR	DMEA/Global Foundries : Hopewell Junction, NY	-	-		4.273	Apr 2022	-		-		-	0.000	4.273	-
Common Weapons M-Code Receiver Development (JASSM C+ + Phase II)	Various	Lockheed Martin : Orlando, FL	-	-		1.397	Apr 2022	-		-		-	0.000	1.397	-
Common Weapons M-Code Receiver Development (JASSM MCU)	Various	Lockheed Martin : Orlando, FL	-	-		2.313	Apr 2022	-		-		-	0.000	2.313	-
Common Weapons M-Code Receiver Development (JASSM JAGR)	Various	Lockheed Martin : Orlando, FL	-	-		9.605	Apr 2022	5.764	Jan 2023	-		5.764	Continuing	Continuing	-
Subtotal			-	-		37.942		12.010		-		12.010	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
DCA CIV PAY	Allot	Allotment : Eglin AFB, FL	-	-		1.800	Apr 2022	-		-		-	0.000	1.800	-
Subtotal			-	-		1.800		-		-		-	0.000	1.800	N/A
Project Cost Totals			-	-		39.742		12.010		-		12.010	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
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	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

M-Code/EAJ Receivers	
M-Code/EAJ Research & Development	[REDACTED]
M-Code/EAJ Test and Qualification	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	Project (Number/Name) 641030 / <i>GPS Receiver Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>M-Code/EAJ Receivers</i>				
M-Code/EAJ Research & Development	1	2021	1	2025
M-Code/EAJ Test and Qualification	1	2021	4	2025