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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</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	-	52.678	23.854	23.980	0.000	23.980	-	-	-	-	-	-
652286: <i>Combat Training Range Equipment</i>	-	52.678	23.854	23.980	0.000	23.980	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This program, BA 5, PE 0604735F, project 652286, Modernization Range Threat Systems (RTS), is a new start.

A. Mission Description and Budget Item Justification

The Combat Training Ranges (CTR) program provides equipment and support to Air Force units and combat training ranges for Electronic Warfare (EW) mission testing, training, and evaluation of aircrews, as well as operational testing of weapon systems and tactics under simulated combat conditions. This program provides funding for the development and integration of EW training capabilities to include: Air Combat Training Systems (ACTS); threat emitters; advanced radar threat systems; communication jammers; command and control and debrief capability; and instrumentation equipment/systems. These systems and capabilities support integrated training operations for all aircraft (including 5th Generation) and for Joint, Coalition, and Live, Virtual, Constructive (LVC) training events.

The Advanced Radar Threat System (ARTS) programs design, develop, build, and test threat systems based on advanced foreign fielded surface-to-air missile (SAM) radar threat systems. The ARTS variants will be used at Department of Defense (DoD) training ranges for 4th and 5th Generation aircrew training and tactics development to increase combat effectiveness and aircrew survivability by training aircrews to engage or defend against an advanced SAM threat before encountering it in actual combat to stress their tactics, techniques and procedures. The ARTS programs support early research, studies, technology development, and planning for next-generation threat systems. The ARTS programs also fund development of high-fidelity surrogate targets matching simulated threat systems to stress 5th Generation sensor fusion capabilities.

The Modernization Range Threats Systems (RTS) efforts fund development of modifications for range threat systems to provide continued combat training relevancy and enhanced systems capabilities. RTS efforts include Multiple Threat Emitter System (MUTES), Miniature Multiple Threat Emitter System (Mini-MUTES), Modular Threat Emitter (MTE) system, Tactical Radar Threat Generator (TRTG) system, Band Simulator, Unmanned Modular Threat Emitter (UMTE) system, and Joint Threat Emitter (JTE) system. Enhancements focus on upgrading threat systems to match fielded modifications for foreign threat systems faced by combat aircrews. The Common Electronic Attack Receiver (CEAR) provides reactive training and enhanced debriefs using legacy threats. The CEAR is being expanded to the Mini-MUTES and MUTES to provide commonality and reactive training and enhance debriefs using legacy threats. The Modernization Systems effort upgrades Band Simulator and other legacy emitters with modern electronics to improve threat relevance and sustainability. The Double Digit Threat Emitter (DDTE) effort leverages JTE to provide greater on-range threat density of advanced SAM radars. The B-Pedestal modification will provide double-digit threat capability to Mini-MUTES B-Pedestals.

The P5 Combat Training System (P5 CTS) program addresses new capability requirements for the fielded P5 system, to include continued operations in a global positioning system (GPS)-contested environment. This will enable ongoing analyses, studies, risk reduction efforts, and/or technology development to enhance

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Operational Training Infrastructure (OTI), such as combat training range equipment integration into a blended training architecture, communication and GPS jammers, weapon drop scoring systems, and infrastructure networks. These enhancements will add a critical dimension to exercises and optimize warfighter training throughout the program's lifecycle through 2030. The P6 Combat Training System (P6 CTS) will focus on Time-Space-Position Information (TSPI) infrastructure to support emitters, EW, and live training for 4th and 5th Gen participants. The Air Force will leverage the Department of the Navy's Tactical Combat Training System Increment II (TCTS II) program to satisfy P6 CTS requirement and replace the P5 CTS.

The Live Mission Operations Capability (LMOC) program will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th Generation aircraft and aircrew and provide comprehensive training support for warfighters. It will provide a node-based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended training for combat and combat support units, including F-35. It will address three combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable LVC training operations. LMOC will field in three strategic steps: 1) Deliver a common hardware software platform called "WarRoom" to each training location. 2) Link each site via a Live Mission Operations Network (LMON) to the LMOC System Integration Lab (SIL) which is the only DoD run software factory dedicated to Operational Test and Training Infrastructure (OTTI). 3) Field a Multi-Level Security (MLS) architecture that enables LMOC to connect all live training systems, co-locate training data, and securely allow access at the individual security classification level of each user.

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 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	52.365	8.898	23.959	0.000	23.959
Current President's Budget	52.678	23.854	23.980	0.000	23.980
Total Adjustments	0.313	14.956	0.021	0.000	0.021
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	15.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.999	0.000			
• SBIR/STTR Transfer	-1.686	0.000			
• Other Adjustments	0.000	-0.044	0.021	0.000	0.021

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Congressional Add Details (\$ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 652286: <i>Combat Training Range Equipment</i>		
Congressional Add: <i>F-35 Advanced Threat Simulator</i>	15.000	0.000
Congressional Add: <i>Training Range Instrumentation</i>	0.000	15.000
Congressional Add Subtotals for Project: 652286		
	15.000	15.000
Congressional Add Totals for all Projects		
	15.000	15.000

Change Summary Explanation

FY21 Congressional Add: These funds will be used to advance and develop systems that will directly support the Gulf of Mexico range. This development will enable critical systems to be fielded in the Gulf of Mexico area sooner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: P5 Combat Training System (CTS)	0.350	0.500	0.000
Description: P5 CTS funding supports ACTS capabilities and includes the development, integration and testing of future software/hardware upgrades, aircraft/pod integration, upgrades for range applications, and associated studies. Additionally, funding supports efforts to enable initial training interoperability with 5th Generation aircraft via Ground Subsystem (GS) decryption of secure (encrypted) Time, Space, Position Information (TSPI), weapon simulation, and other training data.			
FY 2021 Plans: Funding supports the study, development and test of a Production Representative Article (PRA) for GPS-contested training upgrade for P5 CTS. Funding will also be used to study optimization of message format and priority in support of Performance Based Training (PBT) objectives.			
FY 2022 Plans: Funding will support completion of GPS Contested mod kit pre-production testing and/or to study optimization of P5 message format/priority in support of PBT objectives.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to the transition of the GPS-contested training upgrade to production.			

Title: Modernization Range Threat Systems (RTS)	0.000	0.000	0.100
Description: Modernization Systems efforts fund development of modifications for range threat systems to provide continued combat training relevancy and enhanced systems capabilities. Range threat systems include MUTES, Mini-MUTES, MTE system, TRTG system, Band Sim, UMTE system, legacy JTE system, and other radar systems fielded throughout the combat training			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>range enterprise. Enhancements focus on upgrading threat systems to match fielded modifications for foreign threat systems faced by combat aircrews. The CEAR provides reactive training and enhanced debriefs using legacy threats. The CEAR is being expanded to the Mini-MUTES and MUTES to provide commonality and reactive training and enhance debriefs using legacy threats. The Modernization Systems effort upgrades the Band Sim and other legacy emitters with modern electronics to improve threat relevance and sustainability. The Double Digit Threat Emitter (DDTE) effort leverages JTE to provide greater on-range threat density of advanced SAM radars. The B-Pedestal modification will provide double-digit threat capability to Mini-MUTES B-Pedestals.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Funding will support RDT&E effort for Mini-MUTES modification upgrades to existing hardware and software to enable improved threat relevance to support combat training missions to include but not limited to simulated surface to air missiles (SAM) warfare training.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased to support B-Pedestal modification.</p>				
<p>Title: Advanced Radar Threat System-Variant 1 (ARTS-V1)</p> <p>Description: ARTS-V1 program will design, develop, build and test radar threat systems based on advanced strategic, long-range, re-locatable foreign fielded Surface-to-Air Missile (SAM) radar threat systems. ARTS-V1 will leverage an existing DoD test resource development program to reduce non-recurring development cost, minimize schedule risk, and promote range interoperability between test and training. While various aircraft platforms will train against ARTS-V1, the focus of the program is to develop realistic radar threat systems meant to stress 5th Generation aircraft capabilities. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS and other systems into regional range and LVC architectures.</p> <p>FY 2021 Plans: Funding supports final development (including but not limited to technical design reviews, integration, fabrication and testing) of a Production Representative Article (PRA) along with finalization of the technical data package (TDP). Additionally, funding supports ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p>FY 2022 Plans:</p>		6.069	6.124	0.314

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Funding will support initial PRA spares, and further development, above threshold requirements, including but not limited to objective threat capabilities and radar cross section shells. Program is transitioning from PRA development to low rate initial production in FY22.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to transition from PRA development to production in FY22.</p>				
<p>Title: Advanced Radar Threat System-Variant 2 (ARTS-V2)</p> <p>Description: ARTS-V2 program will design, develop, build and test radar threat systems based on an advanced tactical, mobile, short/medium range foreign fielded SAM radar threat system. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V2 and other systems into LVC architectures.</p> <p>FY 2021 Plans: Funding supports completion of the development (technical design reviews, integration, fabrication and testing) of a PRA under the engineering manufacturing development (EMD) contract. Additionally, funding supports ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p>FY 2022 Plans: Funding will support, but not limited to, additional testing events.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to transition from PRA development to production in FY22.</p>		22.100	1.151	0.100
<p>Title: Advanced Radar Threat System-Variant 3 (ARTS-V3)</p> <p>Description: ARTS-V3 program will design, develop, build and test advanced surface-to-air threat systems replicating strategic/tactical threat(s) at the fidelity necessary to stress current EW systems, 5th Generation and beyond air platform engagements and be integrated into a future Combat Air Forces (CAF) LVC system. ARTS-V3 is intended to be a modular system with growth capability to add future advanced Surface-to-Air-Missile (SAM) threats. ARTS-V3 will provide an anti-access area denied (A2/AD) environment for CAF test and training with highly reactive threat systems that provide immediate feedback to aircrews. The ARTS-V3 system will create a relevant combat training threat system that is dynamic and represent a modern and dynamic adversary force. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V3 and other systems into LVC architectures.</p> <p>FY 2021 Plans:</p>		2.149	0.879	23.266

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Funding supports, but is not limited to intelligence and requirements support, early research, studies, risk reduction, technology maturation, and prototyping to reduce program risk. Funds will also support intelligence data to ensure emulation of the real world system is relevant and realistic.</p> <p>FY 2022 Plans: Funding will support further technology maturation leading to full PRA development. Activities that include but are not limited to technical design reviews, integration, fabrication and testing of a PRA.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased to start Model Based System Engineering (MBSE) effort to develop a V3 digital model in support of full PRA development.</p>				
<p>Title: Advanced Radar Threat System-Variant 4 (ARTS-V4)</p> <p>Description: ARTS-V4 program will design, develop, build, and test modern surface-to-air threat systems replicating tactical highly mobile threats at the fidelity necessary to stress current EW systems, 5th Generation and beyond air platform engagements, and be integrated into a future CAF LVC system. The ARTS-V4 system will create a relevant combat training threat system that is dynamic and represents adversary forces. Additionally funding will support ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p>FY 2021 Plans: Funding supports intelligence and requirement support, early research, studies, risk reduction, technology maturation, prototyping to reduce program risk. Funding also supports intelligence data to ensure emulation of the real work system is relevant and realistic.</p> <p>FY 2022 Plans: Funding will support intelligence and requirement support, early research, studies, risk reduction, technology maturation and prototyping to reduce program risk. Funding also supports intelligence data to ensure emulation of the real work system is relevant and realistic.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>		2.554	0.100	0.100
<p>Title: Live Mission Operations Capability (LMOC)</p> <p>Description: LMOC will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th Generation aircraft and aircrew and provide comprehensive training support for all warfighters. It will provide a node-based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended live-synthetic training for combat and combat support units including F-35. It will address three</p>		4.456	0.100	0.100

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable LVC training operations.			
<i>FY 2021 Plans:</i> Funding supports delivering a common hardware software platform called "WarRoom" to each training location, link each site via a Live Mission Operations Network (LMON) to the LMOC System Integration Lab (SIL) which is the only DoD run software factory dedicated to Operational Test and Training Infrastructure (OTTI) and field a Multi-Level Security (MLS) architecture that enables LMOC to connect all live training systems, co-locate training data all in one place, and allow access at the individual security classification level of each user.			
<i>FY 2022 Plans:</i> Funding continues to deliver a common hardware software platform called "WarRoom" to each training location, link each site via a Live Mission Operations Network (LMON) to the LMOC SIL and field a MLS architecture. Funding will also be used for a government Special Access Programs Security Officer dedicated to OTI training systems.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	37.678	8.854	23.980

	FY 2020	FY 2021
<i>Congressional Add:</i> F-35 Advanced Threat Simulator	15.000	0.000
<i>FY 2020 Accomplishments:</i> FY20 funding will be used to design, develop, and install digital upgrades to improve the fidelity and Electronic Warfare (EW) scenarios for F-35 and other aircrews during Live, Virtual and Constructive test and training events, increasing warfighter interoperability and survivability.		
<i>FY 2021 Plans:</i> N/A		
<i>Congressional Add:</i> Training Range Instrumentation	0.000	15.000
<i>FY 2020 Accomplishments:</i> N/A		
<i>FY 2021 Plans:</i> FY21 funding will be used for the following efforts: --ARTS-V3 funds will support live SAM-threat test and combat training missions to be delivered to the Gulf Coast Range Complex.		

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	FY 2020	FY 2021
--P5 to P6 funds will focus on TSPI infrastructure to support emitters, electronic warfare, and live training for 4th and 5th Gen participants. The main effort will be on USAF unique requirements for the P6 to fully replace P5 capability and meet USAF unique mission-sets. --LMOC funds will develop live and constructive training infrastructure within the region to support all aspects of live training for 4th and 5th Gen platforms.		
Congressional Adds Subtotals	15.000	15.000

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 834190: <i>Combat Training Ranges</i>	264.482	193.185	240.194	-	240.194	-	-	-	-	-	-
• OPAF 05 Line Item 861900: <i>Spares and Repair Parts</i>	20.910	8.241	2.866	-	2.866	-	-	-	-	-	-
• APAF 07 Line Item 000075: <i>Other Production Charges</i>	0.300	3.495	0.294	-	0.294	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The acquisition strategy varies by effort. Overall strategy is competition focused, with the use of but not limited to other transaction authority, cost plus and fixed price contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Advanced Radar Threat System-Variant 1 (ARTS-V1) Development	Various	Various : Pax River, MD	-	4.240	Dec 2019	4.847	Oct 2020	0.251	Nov 2021	-		0.251	-	-	-
Advanced Radar Threat System-Variant 2 (ARTS-V2)	C/FPIF	Lockheed Martin : Grand Prairie, TX	-	15.431	Nov 2019	0.246	Sep 2021	0.080	Dec 2021	-		0.080	-	-	-
Advanced Radar Threat System-Variant 3 (ARTS-V3)	C/TBD	Various : TBD	-	-		11.200	Aug 2021	18.706	Jan 2022	-		18.706	-	-	-
Advanced Radar Threat System-Variant 3 (ARTS-V3) Development	Various	Various : Hill AFB, UT	-	1.500	Mar 2020	0.420	Sep 2021	-		-		-	-	-	-
Advanced Radar Threat System-Variant 4 (ARTS-V4) Development	Various	Various : Hill AFB, UT	-	2.048	Nov 2019	0.310	May 2021	0.081	Nov 2021	-		0.081	-	-	-
P6 CTS	Various	Various : Hill AFB, UT	-	-		1.200	May 2021	-		-		-	-	-	-
P5 CTS GPS Contested	SS/FFP	Cubic Defense Agency : San Diego, CA	-	0.200	May 2020	0.215	Jan 2021	-		-		-	-	-	-
Modernization Systems	Various	Various : Hill AFB, UT	-	-		-		0.080	Nov 2021	-		0.080	-	-	-
Live Mission Operation Capability (LMOC)	Various	Various : Hill AFB, UT	-	3.754	Mar 2020	1.000	May 2021	-		-		-	-	-	-
Subtotal			-	27.173		19.438		19.198		-		19.198	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Advanced Radar Threat Systems (Direct Msn Spt)	Various	Various : Various	-	2.526	Dec 2019	2.092	Dec 2020	1.150	Dec 2021	-		1.150	-	-	-

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Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 5				PE 0604735F / Combat Training Ranges				652286 / Combat Training Range Equipment								
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	
Subtotal			-	2.526		2.092		1.150		-		1.150	-	-	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	
Advanced Radar Threat Systems (Direct Msn Spt)	C/Various	Not specified. : TBD	-	3.236	Jun 2020	0.770	Oct 2020	1.473	Oct 2021	-		1.473	-	-	-	
Subtotal			-	3.236		0.770		1.473		-		1.473	-	-	N/A	
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	
Advanced Radar Threat Systems (PMA/A&AS)	Various	Various : Hill AFB, UT	-	3.741	May 2020	1.265	May 2021	2.050	May 2022	-		2.050	-	-	-	
Live Mission Operations Capability (LMOC) (PMA/A&AS)	Various	AFLCMC/XA : Hill AFB, UT	-	0.702	Feb 2020	-		0.100	Dec 2021	-		0.100	-	-	-	
P5 (PMA/A&AS)	Various	Various : Hill AFB, UT	-	0.150	Feb 2021	-		-		-		-	-	-	-	
Modernization Systems (PMA/A&AS)	Various	AFLCMC/XA : Hill AFB, UT	-	15.000	Jun 2020	-		-		-		-	-	-	-	
Modernization Systems (RTS) (PMA/A&AS)	Various	AFLCMC/XA : Hill AFB, UT	-	0.150	Apr 2020	0.289	Jun 2021	0.009	Oct 2021	-		0.009	-	-	-	
Subtotal			-	19.743		1.554		2.159		-		2.159	-	-	N/A	
Project Cost Totals			-	52.678		23.854		23.980		-		23.980	-	-	N/A	

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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks
 FINANCIAL PERFORMANCE: Combat Training Ranges is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the ARTS-V2 development contract is an FPIF contract with progress payments. 20 percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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

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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

Combat Training Range Equipment																												
P5CTS Development																												
-- P5 CTS GPS-Contested Training Operation Capability																												
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase																												
-- ARTS-V1 PRA Contract																												
-- ARTS-V1 DT-E and OT-E																												
-- ARTS-V1 Milestone C																												
Advanced Radar Threat System-Variant 2 (ARTS-V2) EMD Phase																												
-- ARTS-V2 PRA Contract																												
-- ARTS-V2 DT-E and OT-E																												
-- ARTS-V2 Milestone C																												
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition																												
-- ARTS-V3 Second Intel Assessment																												
-- ARTS-V3 Future Intel Assessment																												
-- ARTS-V3 Risk Reduction																												
-- ARTS-V3 PRA Development Decision																												
Advanced Radar Threat System-Variant 3 (ARTS-V3) Development																												
Advanced Radar Threat System-Variant 4 (ARTS-V4) Pre-milestone B																												
-- ARTS-V4 Milestone B																												
-- ARTS-V4 Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Combat Training Range Equipment				
P5CTS Development	1	2020	4	2022
-- P5 CTS GPS-Contested Training Operation Capability	1	2020	4	2022
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase	1	2020	1	2022
-- ARTS-V1 PRA Contract	1	2020	3	2021
-- ARTS-V1 DT-E and OT-E	3	2021	1	2022
-- ARTS-V1 Milestone C	2	2021	2	2021
Advanced Radar Threat System-Variant 2 (ARTS-V2) EMD Phase	1	2020	4	2021
-- ARTS-V2 PRA Contract	1	2020	4	2021
-- ARTS-V2 DT-E and OT-E	3	2020	3	2021
-- ARTS-V2 Milestone C	4	2021	4	2021
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition	1	2020	4	2021
-- ARTS-V3 Second Intel Assessment	2	2020	4	2021
-- ARTS-V3 Future Intel Assessment	2	2022	1	2024
-- ARTS-V3 Risk Reduction	1	2020	4	2022
-- ARTS-V3 PRA Development Decision	4	2022	4	2022
Advanced Radar Threat System-Variant 3 (ARTS-V3) Development	4	2022	1	2026
Advanced Radar Threat System-Variant 4 (ARTS-V4) Pre-milestone B	1	2020	1	2021
-- ARTS-V4 Milestone B	1	2024	1	2024
-- ARTS-V4 Development	1	2022	4	2024
Modernization Systems	1	2020	2	2020
-- Mini-MUTES B-PED Upgrade	3	2022	3	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Live Mission Operations Capability (LMOC)	1	2020	4	2022

Note
ARTS-V2: Please note, there are minor additional testing events in FY22 not listed under the sub-projects of the schedule.