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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604735F I Combat Training Ranges							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	75.981	43.895	37.365	0.000	37.365	8.915	23.995	24.428	171.510	Continuing	Continuing
652286: Combat Training Range Equipment	-	75.981	43.895	37.365	0.000	37.365	8.915	23.995	24.428	171.510	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Combat Training Ranges (CTR) programs 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 Gen) and for joint, coalition, and Live Virtual Constructive (LVC) training events.

The Advanced Radar Threat System (ARTS) programs develop, design, build and test threat system simulators 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 that challenge the Air Force's asymmetric advantage. The ARTS programs also fund development of high fidelity surrogate targets matching simulated threat systems to stress 5th generation sensor fusion capabilities.

The Legacy Range Threat Systems Low Cost Mod (LRTSLCM) efforts fund development of modifications for legacy threat systems to provide continued combat training relevancy and enhanced systems capabilities. Legacy range threat systems 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 legacy Joint Threat Emitter (JTE) systems. 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 Digital Threat Relevancy (DTR) 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 a lower cost EW simulator, enabling greater on-range threat density of advanced SAM radars.

P5 Combat Training System (P5 CTS) program addresses new capability requirements for the fielded P5 system, to include continued operations in a GPS-contested environment. Lastly, this program funds ongoing analyses, studies, risk reduction efforts, and/or technology development to enhance Operational Training Infrastructure (OTI), such as combat training range equipment integration into a blended training (Live, Virtual, Constructive) architecture, communication and GPS jammers, weapon drop scoring systems and infrastructure networks. These enhancements add a critical dimension to exercises and optimize warfighter training.

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Live Mission Operations Capability (LMOC) will create an efficient, integrated, and high-fidelity range capability in direct support of F-22 and F-35 live-fly qualification and continuation training requirements. LMOC will standardize and connect federated range systems with the goal of providing a seamless training environment to operators and support personnel.

In FY19 Live Mission Operations Capability (LMOC) was a new start.

This program element 0604735F may include necessary civilian pay expenses required to manage, execute, and deliver Combat Training Range weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

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)	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	87.350	35.895	31.165	0.000	31.165
Current President's Budget	75.981	43.895	37.365	0.000	37.365
Total Adjustments	-11.369	8.000	6.200	0.000	6.200
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-9.500	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	6.000	8.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-5.199	0.000			
• SBIR/STTR Transfer	-2.670	0.000			
• Other Adjustments	0.000	0.000	6.200	0.000	6.200

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

Project: 652286: *Combat Training Range Equipment*

Congressional Add: *Test Range Threat Systems*

Congressional Add: *F-35 Advanced Threat Simulator*

<u>FY 2018</u>	<u>FY 2019</u>
6.000	0.000
0.000	8.000

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Congressional Add Details (\$ in Millions, and Includes General Reductions)		FY 2018	FY 2019
Congressional Add Subtotals for Project: 652286		6.000	8.000
Congressional Add Totals for all Projects		6.000	8.000
Change Summary Explanation FY2018 \$6M Congressional Program Increase for "Test Range Threat Systems"; \$9.5M Congressional Reduction for "Forward Financing"; a BTR for Air-launched Rapid Response Weapon (ARRW)for -\$5.199M FY2019 Congressional Add of \$8M for F-35 advanced threat simulator FY2020 \$6.2M increase to support Live Mission Operations Capability efforts			
C. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: P5 Combat Training System (CTS) 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 2019 Plans: Funding supports initiation of GPS-contested training operations capability development for the P5 Combat Training System, including program documentation. FY 2020 Plans: Funding will be used to continue GPS-contested training operations capability development for the P5 Combat Training System FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to the application of an inflation cost factor.	0.499	0.175	0.200
Title: Legacy Range Threat Systems Description: The Legacy Range Threat Systems Low Cost Mod (LRTSLCM) efforts fund development of modifications for legacy threat systems to provide continued combat training relevancy and enhanced systems capabilities. Legacy range threat systems 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 (Band Sim), Unmanned Modular Threat Emitter (UMTE) system, legacy Joint Threat Emitter (JTE) systems, and other radar systems fielded throughout the combat training range enterprise. 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	0.000	0.000	0.150

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C. Accomplishments/Planned Programs (\$ in Millions) threats. The Digital Threat Relevancy (DTR) 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 a lower cost EW simulator, enabling greater on-range threat density of advanced SAM radars. FY 2019 Plans: FY2018 and FY2019 funding for Legacy Threat Systems efforts captured under Digital Threat Relevancy (DTR). Beginning in FY20, all Legacy Threat System efforts, to include DTR funds will be captured in this major thrust area. FY 2020 Plans: Funding will support preparation for Mini-MUTES modification for improved threat relevance and required relevancy upgrades to support JPARC legacy systems. FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to emerging Legacy System Modification requirements.		FY 2018	FY 2019	FY 2020
Title: Advanced Radar Threat System (ARTS-V1) Description: ARTS-V1 program will develop, design, build and test threat system simulators based on advanced strategic, long-range, re-locatable foreign fielded 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. Various aircraft platforms may train against ARTS-V1, but the most stringent requirements for ARTS-V1 come from 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. FY 2019 Plans: ARTS-V1 funding is being used to support the development of a Production Representative Article (PRA) and preparation for integration and testing. It also supports efforts to build a technical data package. Additionally funding is supporting ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures. FY 2020 Plans: ARTS-V1 funding will support the development of a PRA and prepare for integration and testing, along with finalization of the technical data package. Additionally, funding is supporting ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures. FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to additional test and continuing PRA development work.		24.157	3.788	13.100
Title: Advanced Radar Threat System (ARTS-V2)		32.989	31.182	10.200

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Description: The ARTS-V2 program will develop, design, build and test a threat system simulator based on an advanced tactical, mobile, short/medium range foreign fielded SAM radar threat system. Various aircraft platforms may train against ARTS-V2, but the most stringent requirements placed on ARTS-V2 design come from 5th generation aircraft capabilities. Additionally, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V2 and other systems into LVC architectures.				
FY 2019 Plans: Funds are being used for development (technical design reviews, integration, fabrication and testing) of a PRA under the Engineering and Manufacturing Development (EMD) contract. Additionally, funding is supporting ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.				
FY 2020 Plans: ARTS-V2 funding will support completion of the development (technical design reviews, integration, fabrication and testing) of a PRA under the EMD contract. Additionally, funding will support ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased due to the program progressing through EMD and shifting from design and article build to test.				
Title: Advanced Radar Threat System (ARTS-V3) Development		9.700	0.000	5.183
Description: The ARTS-V3 program will develop, design, build and test an advanced surface-to-air threat simulation 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 will provide an A2/AD environment for CAF test and training with a highly reactive threat systems that provides immediate feedback to aircrews. The ARTS-V3 system will create a relevant combat training threat system that is dynamic and reconfigurable to represent a modern and dynamic adversary force.				
FY 2019 Plans: ARTS-V3 funds are being used to continue to establish the program foundation to include intelligence and requirements support, early research, studies, support technology maturation, and planning to support a Milestone decision. Funds are supporting intelligence data to ensure emulation of the real world system is relevant and realistic.				
FY 2020 Plans:				

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
ARTS-V3 funding will continue intelligence and requirements support, early research, studies, risk reduction, and support technology maturation and reduce program risk. Funds are supporting intelligence data to ensure emulation of the real world system is relevant and realistic.				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to a ramp in threat intelligence studies and risk reduction efforts in preparation for system development.				
Title: Advanced Radar Threat System (ARTS-V4) Description: The ARTS-V4 program will develop, design, build and test a modern surface-to-air threat simulation system(s) 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. ARTS-V4 will leverage existing DoD training resource development programs to reduce non-recurring development cost, schedule risk, and promote range interoperability between test and training. The ARTS-V4 system will create a relevant combat training threat system that is dynamic and reconfigurable to represent a dynamic adversary force. Additionally funding will support ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.		2.500	0.000	1.540
FY 2019 Plans: ARTS-V4 funds are being used to continue to establish the program foundation to include intelligence and requirements support, early research, studies, support technology maturation, and planning to support a Milestone B decision. Funding will be used to support intelligence data to ensure emulation of the real world system is relevant and realistic.				
FY 2020 Plans: ARTS-V4 funding will support finalizing program foundation to include intelligence and requirements support, early research, studies, support technology maturation and demonstration, and planning to support a Milestone B decision. Funding will be used to support intelligence data to ensure emulation of the real world system is relevant and realistic.				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to program support costs ramping towards system development.				
Title: Digital Threat Relevancy (DTR) Description: DTR will conduct RDT&E to modernize the Range Threat family of systems, focusing on the Band Sim System and MTE System. Foreign fielded SAM threat systems have undergone major modernization programs to replace aging analog technology with modern digital electronics. This program requires the development of digital electronics upgrades to provide realistic electronic warfare training to combat aircrews. This effort will improve threat fidelity (ensuring threat-representative Radio Frequency (RF) emissions), increase reliability, maintainability, supportability, system mobility, and support remote operations		0.136	0.400	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
with Digital Integrated Air Defense Systems (DIADS). This effort supports warfighter development of new tactics, techniques, and procedures in a relevant, realistic combat environment.				
FY 2019 Plans: DTR funding will support solicitation and source selection through contract award to design and build a prototype of an MTE 450V Power Supply as a first step in upgrading aging threat systems to replicate modernized foreign threat systems. Efforts are focusing on replacing analog technology with digital electronics.				
FY 2020 Plans: N/A				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased due to efforts under this thrust area transitioning to the Legacy Range Threat Systems thrust area.				
Title: Live Mission Operations Capability (LMOC)		0.000	0.350	6.992
Description: LMOC will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th generation aircrew and provide comprehensive training support for all warfighters. It will provide a node-based enterprise that integrates range system capabilities in a multi-level secure environment to enable blended live-synthetic training for combat and combat support units including F-22 and F-35. It will address three combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable Live Virtual Constructive training operations.				
FY 2019 Plans: Funds are supporting risk reduction, pre-solicitation for development and fielding efforts, Milestone B preparation, initial stand-up of a hardware-in-the-loop lab, and associated acquisition efforts to include logistics, testing, and cyber security planning. Additionally, funds are supporting the continuation of requirements documentation development and early system studies and the start of a system integration laboratory.				
FY 2020 Plans: Funding will support initial stand-up of a system integration laboratory and further risk reduction activities and requirement documentation development.				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to ramping up of early risk reduction and planning efforts in preparation for Milestone Decision.				
Accomplishments/Planned Programs Subtotals		69.981	35.895	37.365

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I</i> BA 5: <i>System Development & Demonstration (SDD)</i>					R-1 Program Element (Number/Name) PE 0604735F <i>I Combat Training Ranges</i>						
										FY 2018	FY 2019
Congressional Add: Test Range Threat Systems FY 2018 Accomplishments: Funds support development of an ARTS-V2 PRA under the EMD contract. FY 2019 Plans: N/A										6.000	0.000
Congressional Add: F-35 Advanced Threat Simulator FY 2018 Accomplishments: N/A FY 2019 Plans: Funding is being used to study enhancements to legacy systems capable of providing advanced SAM threats through integration of commercial off-the-shelf or previously developed technology into existing systems at Joint Pacific Alaska Range Complex.										0.000	8.000
Congressional Adds Subtotals										6.000	8.000
D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPAF 03 Line Item 834190: <i>Combat Training Ranges</i>	89.776	235.198	233.993	-	233.993	193.955	222.772	175.130	178.283	Continuing	Continuing
• OPAF 05 Line Item 861900: <i>Spares and Repair Parts</i>	8.188	6.435	2.322	-	2.322	8.252	19.100	11.428	0.738	Continuing	Continuing
• APAF 07 Line Item 000075: <i>Other Production Charges</i>	0.000	8.332	0.300	-	0.300	3.500	0.300	0.300	0.300	Continuing	Continuing
Remarks											
E. Acquisition Strategy											
The acquisition strategy varies by effort. Overall strategy is competition focused, with both cost plus and fixed price contracts.											
F. Performance Metrics											
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0604735F / Combat Training Ranges				Project (Number/Name) 652286 / Combat Training Range Equipment					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 System-Variant 3 (ARTS-V3) Development	MIPR	Various : Huntsville, AL	-	5.700	Dec 2017	-		-		-		-	Continuing	Continuing	-
Advanced Radar Threat System-Variant 1 (ARTS-V1) Development	Various	Various : Pax River, MD	-	20.700	Mar 2018	3.788	Jun 2019	9.000	Dec 2019	-		9.000	Continuing	Continuing	-
Advanced Radar Threat System-Variant 2 (ARTS-V2) Development	C/FPIF	Lockheed Martin : Grand Prairie, TX	-	36.500	Jun 2018	28.000	Jan 2019	8.600	Nov 2019	-		8.600	Continuing	Continuing	-
Advanced Radar Threat System-Variant 4 (ARTS-V4) Development	Various	Various : Hill AFB, UT	-	2.500	May 2018	-		0.840	Nov 2019	-		0.840	Continuing	Continuing	-
Live Mission Operation Capability (LMOC)	Various	Various : Hill AFB, UT	-	-		0.350	Mar 2019	6.192	Jun 2020	-		6.192	Continuing	Continuing	-
Subtotal			-	65.400		32.138		24.632		-		24.632	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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)	Various	Various : Various, NV	-	4.000	Feb 2019	-		5.183	Dec 2019	-		5.183	Continuing	Continuing	-
Subtotal			-	4.000		-		5.183		-		5.183	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	-		-		2.600	Jun 2020	-		2.600	Continuing	Continuing	-
Subtotal			-	-		-		2.600		-		2.600	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0604735F / Combat Training Ranges				Project (Number/Name) 652286 / Combat Training Range Equipment					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	5.946	Jun 2018	3.182	Jun 2019	3.800	May 2020	-		3.800	Continuing	Continuing	-
P5 CTS (PMA/A&AS)	Various	AFLCMC/AZS : Hill AFB, UT	-	0.499	Mar 2018	0.175	Jun 2019	0.200	Feb 2020	-		0.200	Continuing	Continuing	-
Live Mission Operations Capability (LMOC) (PMA/ A&AS)	Various	AFLCMC/AZS : Hill AFB, UT	-	-		-		0.800	Feb 2020	-		0.800	Continuing	Continuing	-
Digital Threat Relevancy (PMA/A&AS)	Various	AFLCMC/AZS : Hill AFB, UT	-	0.136	Jan 2019	8.400	Jun 2019	-		-		-	Continuing	Continuing	-
Legacy Range Threat Systems Low Cost Mod (LRTSLCM) (PMA/A&AS)	Various	AFLCMC/AZS : Hill AFB	-	-		-		0.150	Apr 2020	-		0.150	Continuing	Continuing	-
Subtotal			-	6.581		11.757		4.950		-		4.950	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	75.981		43.895		37.365		-		37.365	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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																												
-- Develop First Article (PRA)																												
-- Factory Acceptance Test																												
--DT-E AND OT-E																												
-- Milestone C																												
Advanced Radar Threat System-Variant 2 (ARTS-V2) EMD Phase																												
-- ARTS-V2 Contract																												
-- ARTS-V2 PDR																												
-- ARTS-V2 CDR																												
-- ARTS-V2 DT-E and OT-E																												
-- ARTS-V2 Milestone C																												
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition																												
--ARTS-V3 First Intel Assessment																												
-- ARTS V-3 Second Intel Assessment																												
-- ARTS V-3 Risk Reduction																												
-- ARTS V-3 PRA Development Decision																												
Advanced Radar Threat System-Variant 4 (ARTS-V4) Pre-milestone B																												
-- ARTS-V4 Milestone B																												

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										FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
										1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
-- ARTS-V4 Development																																					
-- ARTS-V4 Milestone C																																					
Digital Threat Relevancy (DTR), Emitter Development																																					
Live Mission Operations Capability (LMOC)																																					

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Combat Training Range Equipment</i>				
P5CTS Development	3	2019	4	2022
-- P5 CTS GPS-Contested Training Operation Capability	3	2019	4	2022
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase	1	2018	4	2022
-- Develop First Article (PRA)	1	2018	2	2021
-- Factory Acceptance Test	2	2021	2	2021
--DT-E AND OT-E	3	2021	2	2022
-- Milestone C	2	2023	2	2023
Advanced Radar Threat System-Variant 2 (ARTS-V2) EMD Phase	1	2018	4	2022
-- ARTS-V2 Contract	1	2018	4	2021
-- ARTS-V2 PDR	3	2018	3	2018
-- ARTS-V2 CDR	1	2019	1	2019
-- 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	2018	2	2022
--ARTS-V3 First Intel Assessment	1	2018	4	2019
-- ARTS V-3 Second Intel Assessment	3	2020	2	2022
-- ARTS V-3 Risk Reduction	3	2019	2	2021
-- ARTS V-3 PRA Development Decision	2	2021	2	2021
Advanced Radar Threat System-Variant 4 (ARTS-V4) Pre-milestone B	1	2018	3	2020
-- ARTS-V4 Milestone B	2	2021	2	2021
-- ARTS-V4 Development	3	2021	4	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
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>

	Start		End	
Events by Sub Project	Quarter	Year	Quarter	Year
-- ARTS-V4 Milestone C	4	2024	4	2024
Digital Threat Relevancy (DTR), Emitter Development	3	2019	2	2020
Live Mission Operations Capability (LMOC)	2	2019	4	2023