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Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Air Force **Date:** February 2016

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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	-	9.812	11.795	77.409	0.000	77.409	53.485	35.032	10.721	10.912	Continuing	Continuing
652286: <i>Combat Training Range Equipment</i>	-	9.812	11.795	77.409	0.000	77.409	53.485	35.032	10.721	10.912	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 This program, BA 05 PE 0604735F, project 652286, Digital Threat Relevancy, is a new start.

A. Mission Description and Budget Item Justification

The Combat Training Range (CTR) program provides equipment and support to Air Force units and combat training ranges for 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 electronic warfare training capabilities to include P5 Combat Training Systems (P5CTS), threat emitters, advanced radar threat systems, communication jammers, instrumentation equipment/systems, and evolutionary upgrades to facilitate standardization and integration across all platforms to include coalition and 5th Generation aircraft. The CTR program also includes the development of advanced threat emitters. The Joint Threat Emitter (JTE) program continues the development of a comprehensive suite of threat signals for aircrew tactics and electronic combat training for simulated penetrations of hostile airspace with nonproprietary software and removal of obsolete components. The Advanced Radar Threat System (ARTS) programs will develop, design, build and test threat system simulators based on advanced foreign fielded surface-to-air missile (SAM) radar threat systems. ARTS is designed to 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. The ARTS-Variant 1 (ARTS-V1) is focused on long-range, re-locatable radar threat systems while ARTS-Variant 2 (ARTS-V2) is focused on mobile, short/medium-range radar threat systems. The ARTS program will also support early research, studies, and planning for next-generation long-range threat systems. The ARTS programs also fund development of high fidelity surrogate targets matching the ARTS-V1 and ARTS-V2 threat systems necessary for 5th generation aircrew training. The CTR program funds development of modifications for Legacy Range Threat Systems to extend the systems' service life through threat relevancy and enhanced systems capabilities. Legacy Systems include the Multiple Threat Emitter System (MUTES), the Miniature Multiple Threat Emitter System (Mini-MUTES), the Modular Threat Emitter (MTE) system, the Tactical Radar Threat Generator (TRTG) system, the Band Simulator, and the Unmanned Modular Threat Emitter (UMTE) system. Enhancements focus on upgrading threat systems to match the latest fielded modifications for foreign threat systems faced by combat aircrews. The Double Digit Threat Emitter (DDTE) effort will leverage existing COTS and technology developed under this funding to provide this advanced threat capability. Lastly, this program funds ongoing analyses, studies, risk reduction efforts, and technology development to enhance range systems, 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.

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.

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B. Program Change Summary (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	10.129	15.795	34.338	0.000	34.338
Current President's Budget	9.812	11.795	77.409	0.000	77.409
Total Adjustments	-0.317	-4.000	43.071	0.000	43.071
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-4.000			
• 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	-0.317	0.000			
• Other Adjustments	0.000	0.000	43.071	0.000	43.071

Change Summary Explanation

FY2017 funding request was increased \$34.87 million to initiate development of an strategic advanced radar threat system training simulator and to restructure the tactical advanced radar threat system to be consistent with the current development schedule. Additionally, \$8.2 million was added to initiate development of upgrades of legacy threat simulators to replace analog sub-systems with digital systems to increase performance and enable them to be logistically supportable.

FY2016 funding was reduced \$4M "Improving funding management: forward financing"

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

	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: P5 Combat Training System (CTS)	7.777	8.803	5.221	0.000	5.221
Description: P5 CTS funding supports Air Combat Training Systems (ACTS) capabilities and includes the development, integration and testing of future software/hardware upgrades, aircraft/pod integration, upgrades for range applications, and pod service life extension analysis and studies. Additionally, funding supports efforts to enable an initial training capability with 5th Generation aircraft via Ground Subsystem (GS) decryption of secure (encrypted, single-level security) Time, Space Position Information (TSPI) data.					
FY 2015 Accomplishments: P5 CTS funding supported ACTS capabilities and included the development, integration and testing of software/hardware upgrades, aircraft/pod integration, and upgrades for range applications. Additionally, funding supported initial efforts to enable a training capability with 5th Generation aircraft including relay of secure (encrypted, single-level security) TSPI data to the GS.					
FY 2016 Plans:					

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C. Accomplishments/Planned Programs (\$ in Millions)					
Funding will support development, integration and testing of future software/hardware upgrades, aircraft/pod integration, and upgrades for range applications, and pod service life extension analysis and studies.					
FY 2017 Base Plans: P5 CTS funding will support development, integration and testing of future software/hardware upgrades, aircraft/pod integration, and upgrades for range applications.					
FY 2017 OCO Plans: N/A					
Title: Joint Threat Emitter (JTE)					
Description: The Joint Threat Emitter (JTE) is designed to train aircrews to survive in a combat environment against Surface-to-Air Missile (SAM) and Anti-Aircraft Artillery (AAA) threats. The JTE simulates SA-2, SA-3, SA-6, SA-13 and AAA threat signals which interact with the aircraft Radar Warning Receiver and Electronic Countermeasure system to provide realistic Electronic Warfare training environments for pilots and crewmembers. The JTE is intended to reduce range manpower and resource requirements by replacing legacy systems as they face increasing supportability issues. The JTE leverages Commercial-Off-The-Shelf (COTS) where possible. The JTE system consists of a Threat Emitter Unit (TEU) and either a mobile command and control unit (MC2U) or a Fixed Command and Control Unit (FC2U).					
FY 2015 Accomplishments: Continued development and testing of a new software baseline to eliminate proprietary issues and to create an organic software sustainment capability. Additionally, continued studies to identify system capability modifications to simulate new threat signals.					
FY 2016 Plans: N/A					
FY 2017 Base Plans: N/A					
FY 2017 OCO Plans: N/A					
Title: Legacy Range Threat Systems					
	0.150	0.000	0.000	0.000	0.000
	0.000	0.000	8.789	0.000	8.789

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
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<p>Description: The Legacy Systems program develops, integrates, and tests modifications for radar threat simulators such as the Joint Threat Emitter, Unmanned Modular Threat Emitter (UMTE) and the Mini- Multiple Threat Emitter (mini-MUTES). The Common Electronic Attack Receiver (CEAR) modification enables radar threat simulators to realistically react to electronic counter measures, expendable counter measures, maneuvers, and terrain masking initiated by aircrew during electronic combat training for simulated penetrations of hostile airspace. CEAR also enables the recording of aircrew reactions for playback and debriefing.</p> <p>FY 2015 Accomplishments: N/A</p> <p>FY 2016 Plans: N/A</p> <p>FY 2017 Base Plans: Funding will be used to integrate the current CEAR design onto the Mini-MUTES system while maintaining commonality across all three platforms (JTE, UMTE, Mini-MUTES). Funding will be used to study enhancements to legacy systems capable of providing advanced SAM threats through integration of COTS or previously developed technology into existing systems.</p> <p>FY 2017 OCO Plans: N/A</p>					
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<p>Title: Advanced Radar Threat Systems (ARTS V1) Development</p> <p>Description: The Advanced Radar Threat System Variant 1 (ARTS-V1) program will develop, design, build and test threat system simulators based on advanced strategic, long-range, re-locatable foreign fielded surface-to-air missile (SAM) radar threat systems. ARTS-V1 is designed to be used at Department of Defense (DoD) training ranges for 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. Various aircraft platforms may train against ARTS-V1, but the most stringent requirements placed on ARTS-V1 design come from fifth 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 a Live Virtual Constructive architecture.</p> <p>FY 2015 Accomplishments:</p>	0.000	0.000	9.000	0.000	9.000
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C. Accomplishments/Planned Programs (\$ in Millions)					
N/A					
FY 2016 Plans: N/A					
FY 2017 Base Plans: ARTS V1 and V2 were is the same Major Thrust in the FY16 PB; but are being broken out separately now to provide additional visibility. ARTS-V1 funding supports risk reduction, pre-solicitation, and all acquisition efforts required for development, integration, and testing of ARTS-V1. Market research will be performed in preparation for the Draft Request for Proposal (RFP) and associated documentation will be developed for release to industry in order to validate industry capability. Additionally, funding supports ongoing analyses and studies focused on integrating ARTS-V1 and other systems into a Live Virtual Constructive architecture.					
FY 2017 OCO Plans: N/A					
Title: Advanced Radar Threat System (ARTS V2) Development					
Description: The Advanced Radar Threat System-Variant 2 (ARTS-V2) Program will develop, design, build and test a threat system simulator based on an advanced tactical, mobile, short/medium range foreign fielded surface-to-air missile (SAM) radar threat system. ARTS-V2 is designed to be used at Department of Defense (DoD) training ranges for 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. Various aircraft platforms may train against ARTS-V2, but the most stringent requirements placed on ARTS-V2 design come from fifth generation aircraft capabilities. Additionally, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V2 and other systems into a Live Virtual Constructive architecture.					
FY 2015 Accomplishments: ARTS-V2 funding supported risk reduction, pre-solicitation, and source selection activities for the development, integration, and testing of ARTS-V2. Risk reduction efforts have included the completion of an extensive intelligence study and report that ensures the accurate development of a high fidelity threat and technical studies on electronically-scanned-array design approaches. Draft Request for Proposal (RFP) was released. Funding					
	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
	1.885	2.992	46.099	0.000	46.099

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C. Accomplishments/Planned Programs (\$ in Millions)					
supported ongoing analyses and studies focused on integrating ARTS-V2 and other systems into a Live Virtual Constructive architecture.					
FY 2016 Plans: ARTS-V2 funding will support preparation for Milestone B, solicitation, and source selection through pre-contract award. Additionally, funding will support ongoing analyses and studies focused on integrating ARTS into a Live Virtual Constructive architecture.					
FY 2017 Base Plans: ARTS-V2 funding will support Milestone B and contract award. The contract will be awarded for Engineering and Manufacturing Development (EMD), to include development, integration and testing. Additionally funding will support ongoing analyses and studies focused on integrating ARTS into a Live Virtual Constructive architecture.					
FY 2017 OCO Plans: N/A					
Title: Digital Threat Relevancy					
Description: Digital Threat Relevancy will conduct RDT&E to modernize the Range Threat family of systems. Foreign fielded surface to air (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 faithful RF emissions), increase reliability, maintainability, supportability, system mobility, and support remote operations 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 2015 Accomplishments: N/A					
FY 2016 Plans: N/A					
FY 2017 Base Plans: Digital Threat Relevancy funding will be used to design and build a prototype of a Mobile MPS-T1 threat system, as a first step in upgrading aging threat systems to replicate modernized foreign threat systems. Efforts will focus on replacing analog technology with digital electronics in both the control and emitter subsystems of the MPS-T1					
	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
	0.000	0.000	8.300	0.000	8.300

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
threat system. This will allow for local or remote operation, operations for two pedestals simultaneously, control from DIADS, and passing video and parametric data to the Command Operations Center for aircrew debriefing of tactics, techniques, and procedures.					
FY 2017 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	9.812	11.795	77.409	0.000	77.409

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017 Base</u>	<u>FY 2017 OCO</u>	<u>FY 2017 Total</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF: BA03: Line Item # 834190: <i>Combat Training Ranges</i>	56.580	33.606	34.850	0.000	34.850	130.677	150.192	192.678	152.259	Continuing	Continuing
• OPAF: BA05: Line Item # 861900: <i>Spares and Repair Parts</i>	0.900	0.101	5.930	0.000	5.930	6.868	0.674	0.686	0.698	Continuing	Continuing
• APAF: BA07: Line Item # 000075: <i>Other Production Charges</i>	0.000	0.000	1.662	0.000	1.662	1.200	0.000	9.043	22.637	Continuing	Continuing
• APAF: BA06: Line Item # 000999: <i>Initial Spares/Repair Parts</i>	0.000	1.995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Remarks

E. Acquisition Strategy
The acquisition 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 2017 Air Force **Date:** February 2016

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 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
JTE Increment II - Advanced Radar Threat System (JI2-ARTS) - Pre-Milestone A Activities	MIPR	Various : Various	-	0.560	May 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	-
Advanced Radar Threat System-Variant 1 (ARTS-V1) Development	Various	Not specified. : Hill AFB, UT	-	0.000		0.000		7.500	Mar 2017	0.000		7.500	Continuing	Continuing	-
Advanced Radar Threat System-Variant 2 (ARTS-V2) Development	C/Various	Not specified. : HILL AFB, UT	-	0.000		2.017	Sep 2016	45.818	Dec 2016	0.000		45.818	Continuing	Continuing	-
JTE Increment I Development	Various	Not specified. : Hill AFB, UT	-	0.000		0.000		0.000		0.000		0.000	Continuing	Continuing	-
Legacy System Improvements	Various	Not specified. : TBD	-	0.000		0.000		7.370	Apr 2017	0.000		7.370	Continuing	Continuing	-
JSF Encrypted Pass-Through Development (P5CTS)	Various	Various : Various	-	6.508	Sep 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	-
Block 5 Upgrades (P5CTS)	Various	Various : Various	-	0.000		6.152	Jul 2016	0.000		0.000		0.000	Continuing	Continuing	-
Future Block Upgrades (P5CTS)	Various	Various : Various	-	0.000		0.000		3.502	Jun 2017	0.000		3.502	Continuing	Continuing	-
Digital Threat Relevancy Development (Legacy & RTS Systems)	PO	NTTR : Nellis AFB, NV	-	0.000		0.000		8.300	Mar 2017	0.000		8.300	Continuing	Continuing	-
Subtotal			-	7.068		8.169		72.490		0.000		72.490	-	-	-

Support (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
AFLCMC/HBZC, Hill AFB (Direct Msn Support)	Various	Various : Various	-	0.820	Jul 2015	0.350	Jul 2016	1.250	May 2017	0.000		1.250	0.000	2.420	0.000

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Air Force												Date: February 2016			
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 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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
AFLCMC/EBYC, Eglin AFB - Direct Msn Spt	Various	TBD : TBD	-	0.151	Dec 2015	0.587	Oct 2015	0.021	Mar 2017	0.000		0.021	Continuing	Continuing	-
Subtotal			-	0.971		0.937		1.271		0.000		1.271	-	-	-
Test and Evaluation (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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
Block I/II Flight Test, 46 Test Wing	Various	Eglin AFB : FL	-	0.000		0.075	Sep 2016	0.226	Mar 2017	0.000		0.226	Continuing	Continuing	-
Subtotal			-	0.000		0.075		0.226		0.000		0.226	-	-	-
Management Services (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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
AFLCMC/HBZC, Hill AFB (PMA)	Various	Not specified : TBD	-	0.655	Sep 2015	0.625	Sep 2016	1.950	May 2017	0.000		1.950	Continuing	Continuing	-
AFLCMC/EBYC (PMA/ A&AS)	C/FFP	Jacobs/Oasis/ Odyssey : Eglin AFB, FL	-	1.118	Mar 2015	1.989	Mar 2016	1.472	Mar 2017	0.000		1.472	Continuing	Continuing	-
Subtotal			-	1.773		2.614		3.422		0.000		3.422	-	-	-
Project Cost Totals			-	9.812		11.795		77.409		0.000		77.409	-	-	-
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2017 Air Force **Date:** February 2016

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	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	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

-- CEAR UMTE Test Article Development and Integration																												
Legacy RTS Digital Threat Relevancy																												
-- Pre-Development Analysis																												
-- Control System Development																												
-- Emitter System Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2017 Air Force		Date: February 2016
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
P5CTS Development	2	2015	4	2020
-- JSF Encrypted Pass-Through	4	2015	4	2017
-- Block 5 Upgrades	4	2016	4	2018
-- Future Block Upgrades	3	2017	4	2020
JTE S/W Development	1	2015	3	2016
ARTS-V1	1	2017	4	2019
-- Develop PRA and Test	2	2017	1	2019
-- High-Fidelity Surrogate Target Development	2	2017	1	2019
-- RFP Prep	2	2018	2	2019
--Production Contract Award	1	2020	1	2020
ARTS-V2	1	2015	4	2020
-- Advanced Radar Threat System-Variant 2 (ARTS-V2) RFP Prep	1	2015	1	2016
-- Advanced Radar Threat System-Variant 2 (ARTS-V2) Development Contract	1	2017	2	2020
-- Advanced Radar Threat System-Variant 2 (ARTS-V2) PDR	3	2017	3	2017
-- Advanced Radar Threat System-Variant 2 (ARTS-V2) CDR	2	2018	2	2018
-- Advanced Radar Threat System-Variant 2 (ARTS-V2) Production Contract Award	3	2020	2	2021
-- Advanced Radar Threat System-Variant 2 (ARTS-V2) DT-E and OT-E	1	2018	2	2020
Legacy RTS CEAR Development	1	2015	4	2019
-- CEAR Mini-MUTES Development and Integration	3	2017	3	2019
-- CEAR UMTE Test Article Development and Integration	2	2015	1	2017
Legacy RTS Digital Threat Relevance	2	2017	2	2020
-- Pre-Development Analysis	3	2015	1	2017

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Exhibit R-4A, RDT&E Schedule Details: PB 2017 Air Force		Date: February 2016
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Events	Start		End	
	Quarter	Year	Quarter	Year
-- Control System Development	2	2017	2	2019
-- Emitter System Development	2	2018	2	2020

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