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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force **Date:** February 2015

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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
Total Program Element	-	19.649	10.129	15.795	-	15.795	34.338	27.337	43.962	44.750	Continuing	Continuing
652286: <i>Combat Training Range Equipment</i>	-	19.649	10.129	15.795	-	15.795	34.338	27.337	43.962	44.750	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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, communication jammers, instrumentation equipment/systems, and evolutionary upgrades to facilitate standardization and integration across all platforms to include coalition and 5th Generation aircraft. The Encrypted Combat Training System (CTS), a collaborative development between USAF and USN, provides air combat training systems for the services at operational locations worldwide. Increments include: hardware and software upgrades; encrypted software communications architecture compliant data link to facilitate interoperability in a security environment and training with 5th Generation aircraft; internal pod replacement subsystems; integration of new aircraft Operational Flight Programs. The CTR program also includes the development of advanced threat emitters. The Joint Threat Emitter (JTE) continues the development of a comprehensive suite of threat signals for aircrew tactics and electronic combat training for simulated penetrations of hostile airspace. This program complements existing range threat simulators by emulating signals that simulate current and future air defense and threat radars. JTE awarded a follow-on production contract to improve the current baseline by removing obsolescence and proprietary software to enable full organic sustainment. The follow-on production contract includes the development of a non-proprietary software baseline and the procurement of that source code in addition to JTE systems, Mobile Command and Control Units (MC2U), Fixed Command and Control Units (FC2U), and additional spares. Consistent with an evolutionary acquisition strategy and documented ACC training requirements, development will continue with next generation threat systems. Future developments will continue to add additional capability to the warfighter's training ranges. The Advanced Radar Threat System (ARTS) program, formerly named JTE Increment 2, 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 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, but the most stringent requirements placed on ARTS design come from 5th generation aircraft capabilities. The ARTS-Variant 1 (ARTS-V1) is focused on strategic, long-range, re-locatable radar threat systems while ARTS-Variant 2 (ARTS-V2) is focused on tactical, mobile, short/medium-range radar threat systems. Since a similar ARTS-V1 capability is being developed through the Central Test and Evaluation Investment Program, ARTSV2 development is being accelerated. It was originally to start development after ARTS-V1 was in procurement. This program also funds development of replacement components for Legacy Range Threat Systems (due to obsolescence) to extend the system's service life. 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, the Common Electronic Attack Receiver (CEAR) and the Unmanned Modular Threat Emitter (UMTE) system. Additionally, 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

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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.

The FY16 funding request was reduced by \$3.911 million to account for the availability of prior execution balances.

B. Program Change Summary (\$ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	25.300	10.129	19.811	-	19.811
Current President's Budget	19.649	10.129	15.795	-	15.795
Total Adjustments	-5.651	-	-4.016	-	-4.016
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-4.815	-			
• SBIR/STTR Transfer	-0.836	-			
• Other Adjustments	-	-	-4.016	-	-4.016

Change Summary Explanation

The 2016 funding request was reduced by \$3.911 million to account for the availability of prior execution balances.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2014	FY 2015	FY 2016
Title: P5 Combat Training System (CTS)	8.660	8.183	7.539
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, and upgrades for range applications. Additionally, funding supports efforts to facilitate interoperability in a secure (encrypted, single-level security) environment to enable training with 5th Generation aircraft.			
FY 2014 Accomplishments: P5 CTS funding supported range instrumentation system improvements to include the development, integration and testing of software/hardware upgrades, aircraft/pod integration, and upgrades for range applications.			
FY 2015 Plans:			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015	FY 2016
<p>P5 CTS funding will support Air Combat Training Systems capabilities and include the development, integration and testing of software/hardware upgrades, aircraft/pod integration, and upgrades for range applications. Additionally, funding will support efforts to facilitate interoperability in a secure (encrypted, single-level security) environment to enable training with 5th Generation aircraft.</p> <p>FY 2016 Plans: P5 CTS funding will support Air Combat Training Systems (ACTS) capabilities and include the development, integration and testing of future software/hardware upgrades, aircraft/pod integration, and upgrades for range applications. Additionally, funding will support efforts to facilitate interoperability in a secure (encrypted, single-level security) environment to enable training with 5th Generation aircraft.</p>				
<p>Title: Encrypted Combat Training System (CTS)</p> <p>Description: Collaborative development between USAF and USN to provide interoperability with 5th generation aircraft in a secure (multi-level security) environment. Encrypted CTS will provide air combat training systems for the services at operational locations worldwide. Increments include: hardware and software upgrades; an encrypted software communications architecture compliant data link to facilitate interoperability in a security environment and training with 5th generation aircraft.</p> <p>FY 2014 Accomplishments: N/A</p> <p>FY 2015 Plans: N/A</p> <p>FY 2016 Plans: Encryption funding will be utilized to begin development of an Encrypted CTS (multiple levels of security), including development of internal pod replacement subsystems and integration and testing of 5th Generation aircraft.</p>		-	-	1.264
<p>Title: Joint Threat Emitter (JTE)</p> <p>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).</p> <p>FY 2014 Accomplishments:</p>		0.250	0.150	-

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015	FY 2016
<p>Funding supported the development of a new software baseline to eliminate proprietary issues and to create an organic software sustainment capability.</p> <p>FY 2015 Plans: Development and testing continues on a new software baseline to eliminate proprietary issues and to create an organic software sustainment capability. Additionally, studies continue to identify system capability modifications to simulate new threat signals.</p> <p>FY 2016 Plans: N/A</p>				
<p>Title: Legacy Range Threat Systems</p> <p>Description: The Legacy Systems program develops, integrates, tests, and builds a common component replacement for obsolete electronic attack receivers on radar threat simulators such as the Joint Threat Emitter and Unmanned Modular Threat Emitter (UMTE) instead of developing and sustaining unique replacements for those systems. Common Electronic Attack Receiver (CEAR) 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 2014 Accomplishments: CEAR funding supported continued engineering and manufacturing activities for development, integration, testing, and test articles. Development and testing continued on the JTE and UMTE production test articles.</p> <p>FY 2015 Plans: CEAR funding supports continued engineering and manufacturing activities for development, integration, testing, and production test articles.</p> <p>FY 2016 Plans: N/A</p>		4.241	0.350	-
<p>Title: Advanced Radar Threat System (ARTS) Development</p> <p>Description: The Advanced Radar Threat System (ARTS) program 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 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, but the most stringent requirements placed on ARTS design come from fifth generation aircraft capabilities. The ARTS-Variant 1 (ARTS-V1) is focused on strategic, long-range, re-locatable radar threat systems while ARTS-Variant 2 (ARTS-V2) is focused on tactical, mobile, short/medium-range radar threat systems.</p>		6.498	1.446	6.992

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2014	FY 2015	FY 2016
<p>Additionally, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS and other systems into a Live Virtual Constructive architecture.</p> <p>FY 2014 Accomplishments: ARTS funding supported risk reduction and pre-solicitation activities for the development, integration, and testing of ARTS-V2. Risk reduction efforts included 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. A draft request for proposal (RFP) and associated documentation was developed for release. Additionally, funding supported ongoing analyses and studies focused on integrating ARTS and other systems into a Live Virtual Constructive architecture.</p> <p>FY 2015 Plans: ARTS funding supports risk reduction, pre-solicitation, and source selection activities for the development, integration, and testing of ARTS-V2. Risk reduction efforts include 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. An RFP and associated documentation will be developed for release followed by a source selection. Additionally, funding supports ongoing analyses and studies focused on integrating ARTS and other systems into a Live Virtual Constructive architecture.</p> <p>FY 2016 Plans: ARTS funding supports risk reduction, pre-solicitation, and source selection through 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.</p>			
Accomplishments/Planned Programs Subtotals	19.649	10.129	15.795

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• OPAF: BA03: Line Item # 834190: <i>Combat Training Ranges</i>	15.939	56.580	33.606	-	33.606	36.025	43.812	17.112	17.416	Continuing	Continuing
• OPAF: BA05: Line Item # 861900: <i>Spares and Repair Parts</i>	3.102	0.900	0.102	-	0.102	1.595	1.180	0.685	0.697	Continuing	Continuing
• APAF: BA07: Line Item # 000075: <i>Other Production Charges</i>	0.300	-	-	-	-	-	-	25.000	25.000	Continuing	Continuing
• APAF: BA06: Line Item # 000999: <i>Initial Spares/Repair Parts</i>	-	1.489	2.074	-	2.074	2.148	0.081	-	-	Continuing	Continuing

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

<u>Line Item</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>FY 2016</u> <u>Base</u>	<u>FY 2016</u> <u>OCO</u>	<u>FY 2016</u> <u>Total</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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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 2016 Air Force												Date: February 2015			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 5				PE 0604735F / Combat Training Ranges				652286 / Combat Training Range Equipment							
Product Development (\$ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 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
JTE Increment II - Advanced Radar Threat System (JI2-ARTS) - Pre-Milestone A Activities	MIPR	Various : Various,	-	5.396	Apr 2014	0.471	May 2015	-		-		-	Continuing	Continuing	-
Advanced Radar Threat System (ARTS) Development	TBD	Not specified. : HILL AFB, UT	-	-		-		5.958	Sep 2016	-		5.958	Continuing	Continuing	-
JTE Increment I Development	Various	Not specified. : Hill AFB, UT	-	0.250	Apr 2014	-		-		-		-	Continuing	Continuing	-
Legacy System Improvements	MIPR	NAWCWD : China Lake, CA	-	4.000	Mar 2015	-		-		-		-	Continuing	Continuing	-
Encrypted CTS	C/FFP	TBD : TBD,	-	-		-		1.264	Apr 2016	-		1.264	Continuing	Continuing	-
JSF Encrypted Pass-Through Development (P5CTS)	TBD	Various : Various,	-	-		2.039	Sep 2015	2.277	Jul 2016	-		2.277	Continuing	Continuing	-
Weapon Simulation Input/Interface (P5CTS)	Various	Various : Various,	-	-		1.900	Sep 2015	-		-		-	Continuing	Continuing	-
Block Upgrades (P5CTS)	C/TBD	Not specified. : ,	-	6.768	Sep 2014	1.794	Jul 2015	3.354	Jul 2016	-		3.354	Continuing	Continuing	-
Subtotal			-	16.414		6.204		12.853		-		12.853	-	-	-
Support (\$ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 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 (Direct Msn Support)	MIPR	Various : Various,	-	0.667	Jul 2014	0.820	Jul 2015	0.350	Jul 2016	-		0.350	Continuing	Continuing	-
AFLCMC/EBYC, Eglin AFB - Direct Msn Spt	Various	TBD : TBD,	-	0.029	Dec 2014	0.879	Dec 2015	0.029	Oct 2015	-		0.029	Continuing	Continuing	-
Subtotal			-	0.696		1.699		0.379		-		0.379	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2016 Air Force		Date: February 2015
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	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
	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
P5CTS Development																												
--Block Upgrades (Block 5)																												
--JSF Encryption Pass-Through																												
Encrypted Combat Training System (CTS)																												
JTE Follow-On																												
-- JTE S/W Development																												
ARTS V2																												
-- Advanced Threat Simulator Risk Reduction																												
-- Advanced Threat Simulator RFP Prep																												
--Advanced Radar Threat System (ARTS) Development Contract																												
--Advanced Radar Threat System (ARTS) PDR																												
--Advanced Radar Threat System (ARTS) CDR																												
-- Advanced Radar Threat System (ARTS) Production Contract Award																												
--Advanced Radar Threat System (ARTS) DT-E and OT-E																												
Legacy RTS CEAR Development																												
-- CEAR Development																												
-- CEAR Integration Test																												
-- CEAR Test Articles																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2016 Air Force		Date: February 2015
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
P5CTS Development	2	2015	4	2020
--Block Upgrades (Block 5)	4	2015	2	2018
--JSF Encryption Pass-Through	1	2016	3	2017
Encrypted Combat Training System (CTS)	2	2016	2	2020
JTE Follow-On	1	2014	4	2020
-- JTE S/W Development	1	2014	3	2016
ARTS V2	1	2014	4	2020
-- Advanced Threat Simulator Risk Reduction	1	2014	1	2016
-- Advanced Threat Simulator RFP Prep	1	2014	4	2015
--Advanced Radar Threat System (ARTS) Development Contract	3	2016	2	2020
--Advanced Radar Threat System (ARTS) PDR	4	2017	4	2017
--Advanced Radar Threat System (ARTS) CDR	2	2018	2	2018
-- Advanced Radar Threat System (ARTS) Production Contract Award	3	2020	3	2020
--Advanced Radar Threat System (ARTS) DT-E and OT-E	1	2018	3	2020
Legacy RTS CEAR Development	1	2014	3	2016
-- CEAR Development	1	2014	2	2015
-- CEAR Integration Test	3	2014	1	2015
-- CEAR Test Articles	3	2015	3	2016