Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force										**Date:** February 2018	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force I* BA 7: *Operational Systems Development*						**R-1 Program Element (Number/Name)** PE 0401134F *I Large Aircraft IR Countermeasures (LAIRCM)*					
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	5.011	5.283	4.334	0.000	4.334	5.424	5.518	5.633	5.735	Continuing	Continuing
674942: *Large Aircraft Infrared Counter Measures (LAIRCM)*	-	5.011	5.283	4.334	0.000	4.334	5.424	5.518	5.633	5.735	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Large Aircraft Infrared Countermeasures (LAIRCM) system is an evolutionary acquisition program that provides significantly improved defensive systems capability for DoD aircraft to counter the infrared (IR) man-portable air-defense systems (MANPADS) missile threat. The current LAIRCM system configuration [AN/AAQ-24V] consists of missile warning sensors (MWS), a laser transmitter assembly, control interface unit and processors to detect, track, jam and counter incoming IR missiles. The number of sensors and transmitter assemblies per aircraft is determined by the size and signature of the aircraft. The system is fully automatic following system power-up. LAIRCM requirements are documented in the multi-command Operational Requirements Document (ORD) LAIRCM ORD 314-92, validated on 03 Aug 98. The system is currently installed on 54+ aircraft types and over 1200 aircraft.

The baseline program development is complete. Follow-on efforts are addressing integration onto new aircraft types, design changes to address Reliability Maintainability & Availability and system improvements to counter new and emerging threats.

LAIRCM upgrades include, but are not limited to hardware and software upgrades and testing of the LAIRCM system to maintain defensive capability against new and emerging threats.

Current and future efforts include Threat Analysis; Modeling, Simulation and Emulation Test; Hardware, Software and Firmware Upgrades; Virtual System Integration Lab (SIL) Development; and Studies and Analysis.

Threat Analysis: Threat analysis encompasses the activities to support threat exploitation analysis of a variety of threats (both known and emerging) against the current LAIRCM jam code with the intent of determining if jam code updates are required. Typical threat analysis activities include: Threat seeker characterization; model development for advanced threat IR seekers; development and testing of new infrared countermeasures concepts, techniques, and hardware; new technology assessment for potential incorporation into the LAIRCM system, and the evaluation/exploitation of new threats and threat characteristics relative to IRCM.

Modeling, Simulation, and Emulation Testing: Modeling, simulation, and emulation activities verify and validate the information obtained from the threat analysis activities. These activities include: Evaluation of infrared countermeasures (IRCM) techniques used in defeating real threat hardware; developing and evaluating jam code; validating and verifying integration of LAIRCM system components to newly developed jam codes, software or hardware; evaluating system effectiveness; performing platform integration support tests; and conducting predictive risk reduction tests prior to Live Missile Fire Test (LMFT) or on aircraft flight testing.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2019 Air Force		**Date:** February 2018
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0401134F *I Large Aircraft IR Countermeasures (LAIRCM)*	

Hardware, Software, and Firmware Upgrades: Includes changes of any kind to any LAIRCM hardware components/ support equipment with the purpose of adding capability, features, and enhancements which do not presently exist to ensure the LAIRCM system remains viable against current and emerging threats.
-----Hardware upgrade activities include engineering tasks required to design, develop, test and produce new capabilities, features, and enhancements, and changes of any kind to any portion of LAIRCM hardware with the purpose of adding capability, features and enhancements which do not presently exist.
-----Software upgrade activities include engineering tasks required to design, develop, and test the new or modified code that result in new capabilities, features, and enhancements and changes of any kind to any portion of LAIRCM software with the purpose of adding capability, features and enhancements which do not presently exist. Software upgrades can occur in any of the Line Replaceable Unit (LRU) Operation Flight Programs as well as any of the software residing in other LAIRCM associated components including those systems which support development and test or the LAIRCM support equipment.
-----Firmware upgrade activities include engineering tasks required to design, develop, and test the upgrades and those changes resulting from hardware and software updates/modifications as well as firmware upgrades which add new features.

Virtual SIL Development: Incrementally design, develop, integrate, and test software code and purchase associated infrastructure (i.e., computers, servers, commercial off-the-shelf (COTS) software, etc.) necessary to develop and implement a virtual SIL providing a critical capability for testing the LAIRCM system to ensure continued effectiveness against current and emerging threats.

Studies and Analysis: Includes logistics, programmatic, and engineering studies and analysis activities to ensure continued system viability and sustainability and compliance with acquisition directives. These activities may include the evaluation of low cost/high payback opportunities to reduce software development/ implementation cost, enhance production efficiency, and improve life cycle costs through increased reliability and reduced repair and return cost.

The FY 2019 funding request was reduced by $1.033 million to account for the availability of prior year execution balances.

Program management and administration efforts consist of, but are not limited to, contract services and government costs. This program element may include necessary civilian pay expenses required to manage, execute, and deliver Aircraft Survivability 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, and 0605898F, and 0605833F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force				Date: February 2018	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force I* BA 7: *Operational Systems Development*			**R-1 Program Element (Number/Name)** PE 0401134F *I Large Aircraft IR Countermeasures (LAIRCM)*		

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	5.166	5.283	5.367	0.000	5.367
Current President's Budget	5.011	5.283	4.334	0.000	4.334
Total Adjustments	-0.155	0.000	-1.033	0.000	-1.033
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.155	0.000			
• Other Adjustments	0.000	0.000	-1.033	0.000	-1.033

Change Summary Explanation

The FY 2019 funding request was reduced by $1.033 million to account for the availability of prior year execution balances

C. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: LAIRCM Threat Analysis	2.012	1.850	2.410	-	2.410
Description: Encompasses the activities to support threat exploitation analysis of a variety of threats against the current LAIRCM jam code with the intent of determining if jam code updates are required. **FY 2018 Plans:** Continue to work on Threat analysis in the GWEF, to include purchase of assets, and DIME Lab. **FY 2019 Base Plans:** Continue to work on Threat analysis in the GWEF, to include purchase of assets, and DIME Lab. **FY 2018 to FY 2019 Increase/Decrease Statement:** Funding increased for additional analysis planned for FY19.					
Title: LAIRCM Modeling, Simulation and Emulation Testing	0.502	0.787	0.758	-	0.758
Description: Activities that verify and validate the information obtained from threat analysis activities. **FY 2018 Plans:**					

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force				Date: February 2018	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force I* BA 7: *Operational Systems Development*			**R-1 Program Element (Number/Name)** PE 0401134F *I Large Aircraft IR Countermeasures (LAIRCM)*		

C. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Will continue to work in Modeling, Simulation and Emulation Tests. This is a continued effort from LAIRCM Development in previous years. ***FY 2019 Base Plans:*** Will continue to work in Modeling, Simulation and Emulation Tests. This is a continued effort from LAIRCM Development in previous years. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding decreased due to inflation adjustments.					
Title: LAIRCM Hardware/Software/Firmware Upgrades ***Description:*** Hardware/Software/Firmware Upgrades include changes of any kind to any LAIRCM hardware components/support equipment with the purpose of adding capability, features, and enhancements which do not presently exist to ensure the LAIRCM system remains viable against current and emerging threats. ***FY 2018 Plans:*** LAIRCM will continue to make changes to LAIRCM hardware and software components/support equipment as necessary for the purpose of adding capability and feature enhancements which do not presently exist to ensure the LAIRCM system remains viable against current and emerging threats. ***FY 2019 Base Plans:*** LAIRCM will continue to make changes to LAIRCM hardware and software components/support equipment as necessary for the purpose of adding capability and feature enhancements which do not presently exist to ensure the LAIRCM system remains viable against current and emerging threats. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increased to provide for increased software evaluation.	0.000	0.250	0.649	-	0.649
Title: LAIRCM Virtual SIL Development ***Description:*** VSIL incrementally designs, develops, integrates, and tests software code and purchases associated infrastructure (i.e., computers, servers, COTS software, etc.) necessary to develop and implement a virtual SIL providing a critical capability for testing the LAIRCM system to ensure continued effectiveness against current and emerging threats. ***FY 2018 Plans:***	1.070	1.507	0.267	-	0.267

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force				Date: February 2018	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force I* BA 7: *Operational Systems Development*			**R-1 Program Element (Number/Name)** PE 0401134F *I Large Aircraft IR Countermeasures (LAIRCM)*		

C. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Will continue to design, develop, integrate, and test software code and purchase associated infrastructure (i.e., computers, servers, COTS software, etc.) necessary to develop and implement a virtual SIL providing a critical capability for testing the LAIRCM system to ensure continued effectiveness against current and emerging threats. ***FY 2019 Base Plans:*** Will continue to design, develop, integrate, and test software code and purchase associated infrastructure (i.e., computers, servers, COTS software, etc.) necessary to develop and implement a virtual SIL providing a critical capability for testing the LAIRCM system to ensure continued effectiveness against current and emerging threats. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding for this effort is incremental in nature and follows a "bell curve" approach to fund the contractor in real time.					
Title: LAIRCM Studies and Analysis ***Description:*** Includes logistics, programmatic, and engineering studies and analysis activities to ensure continued system viability and sustainability and compliance with acquisition directives. These activities may include the evaluation of low cost/high payback opportunities to reduce software development/implementation cost, enhance production efficiency, and improve life cycle costs through increased reliability and reduced repair and return cost. ***FY 2018 Plans:*** Will initiate studies to address and/or assess various planned suggested efforts and projects to continue strategies that enhance and/or update LAIRCM activities ***FY 2019 Base Plans:*** Will initiate an engineering focused LAIRCM system Critical Program Information (CPI) Assessment and Review Study. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding decreased for reduced studies planned for FY19.	1.427	0.889	0.250	-	0.250
Accomplishments/Planned Programs Subtotals	5.011	5.283	4.334	-	4.334

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force										Date: February 2018	

| Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force I* BA 7:
Operational Systems Development | | | | | | R-1 Program Element (Number/Name)
PE 0401134F *I Large Aircraft IR Countermeasures (LAIRCM)* | | | | | |

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• APAF 05 Line Item LAIRCM: *Large Aircraft Infrared Countermeasures*	135.801	4.046	0.000	149.778	149.778	-	-	-	-	0.000	289.625

Remarks

E. Acquisition Strategy

Efforts awarded on an annual basis, exercising existing contract options, support threat analysis and system effectiveness. The LAIRCM program office partners with the Air Force Research Laboratory (AFRL) and the 782d Test Squadron to conduct threat analysis research and Modeling, Simulation, and Emulation Testing. AFRL contracts with the Guided Weapon Evaluation Facility (GWEF) to provide hardware-in-the-loop developmental test simulation capability on a level-of-effort (LOE) basis. AFRL's Dynamic Infrared Missile Evaluation (DIME) Laboratory performs threat analysis. The existing LAIRCM contract may be used to award the various study efforts.

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.

Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2019 Air Force | **Date:** February 2018

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0401134F / Large Aircraft IR Countermeasures (LAIRCM)	Project (Number/Name) 674942 / Large Aircraft Infrared Counter Measures (LAIRCM)

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LAIRCM ETA Hardware/ Software/Firmware Upgrades	SS/TBD	NGC : Rolling Meadows, IL	-	-		0.250	Apr 2018	0.260	Apr 2019	-		0.260	Continuing	Continuing	-
LAIRCM ETA Virtual SIL Development	SS/TBD	NGC : Rolling Meadows, IL	-	0.481	Nov 2017	1.896	Feb 2018	0.623	Feb 2019	-		0.623	Continuing	Continuing	-
LAIRCM ETA Studies and Analysis	Various	Various : Various, NV	-	1.966	Mar 2017	0.500	Mar 2018	0.250	Mar 2019	-		0.250	Continuing	Continuing	-
Subtotal			-	2.447		2.646		1.133		-		1.133	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LAIRCM ETA Threat Analysis/Guided Weapon Evaluation Facility	PO	GWEF : Eglin AFB, FL	-	0.060	Jan 2017	0.450	Jan 2018	0.912	Jan 2019	-		0.912	Continuing	Continuing	-
LAIRCM ETA Modeling, Simulation and Emulation Test	MIPR	AFRL/RYF-Omni Sentinel : WPAFB, OH	-	0.140	Apr 2017	0.627	Nov 2017	0.629	Apr 2019	-		0.629	Continuing	Continuing	-
LAIRCM ETA Threat Analysis/Dynamic Infrared Missile Evaluation (DIME)	MIPR	AFRL/RYF-DIME : WPAFB, OH	-	1.851	Jan 2017	1.100	Jan 2018	1.100	Jan 2019	-		1.100	Continuing	Continuing	-
LAIRCM ETA Threat Analysis/ MSIC	MIPR	United States Army : Huntsville, AL	-	0.101	Mar 2017	-		-		-		-	Continuing	Continuing	-
LAIRCM ETA Treat Analysis/ Asset Buys	MIPR	TBD : TBD	-	-		0.300	Jan 2018	0.400	Jan 2019	-		0.400	Continuing	Continuing	-
Subtotal			-	2.152		2.477		3.041		-		3.041	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force			Date: February 2018

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0401134F / Large Aircraft IR Countermeasures (LAIRCM)	Project (Number/Name) 674942 / Large Aircraft Infrared Counter Measures (LAIRCM)

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LAIRCM ETA Government Travel	Various	Government Employees : WPAFB, OH	-	0.160		0.160		0.160		-		0.160	Continuing	Continuing	-
LAIRCM ETA A&AS	SS/CPFF	COLSA Corp. : Warner Robins, GA	-	0.252	Mar 2017	-		-		-		-	Continuing	Continuing	-
Subtotal			-	0.412		0.160		0.160		-		0.160	Continuing	Continuing	N/A

Remarks

 LAIRCM ETA A&AS: FY17 and FY18 A&AS support is being funded by APAF, LAIRCM: Large Aircraft Infrared Countermeasures.

	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	5.011	5.283	4.334	-	4.334	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 I 7	**R-1 Program Element (Number/Name)** PE 0401134F I *Large Aircraft IR Countermeasures (LAIRCM)*	**Project (Number/Name)** 674942 I *Large Aircraft Infrared Counter Measures (LAIRCM)*

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
LAIRCM																												
Threat Analysis																												
Modeling, Simulation, and Emulation Testing																												
Virtual SIL Development																												
Studies and Analysis																												
Hardware/Software/Firmware Upgrades																												

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0401134F / Large Aircraft IR Countermeasures (LAIRCM)	**Project (Number/Name)** 674942 / Large Aircraft Infrared Counter Measures (LAIRCM)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	**Year**	**Quarter**	**Year**
LAIRCM				
Threat Analysis	1	2017	4	2023
Modeling , Simulation, and Emulation Testing	1	2017	4	2023
Virtual SIL Development	1	2017	4	2023
Studies and Analysis	1	2017	4	2023
Hardware/Software/Firmware Upgrades	1	2017	4	2023