Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force											Date: May 2017	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0401134F / *Large Aircraft IR Countermeasures (LAIRCM)*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	-	5.802	5.166	5.283	0.000	5.283	5.367	5.465	5.560	5.674	Continuing	Continuing
674942: *Large Aircraft Infrared Counter Measures (LAIRCM)*	-	5.802	5.166	5.283	0.000	5.283	5.367	5.465	5.560	5.674	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 (CIU) or control interface unit replacement (CIUR) 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 was first fielded on the C-17 aircraft.

The baseline program development is complete and consists of the small laser transmitter assembly (SLTA), ultra-violet MWS, processor, CIU and a repeater (on some aircraft) to meet the need for advanced IR countermeasures. The Guardian Laser Transmitter Assembly (GLTA) is an upgrade to the baseline transmitter equipment to improve reliability, enhance performance, address obsolescence issues, reduce mass and improve overall functionality. First production GLTA delivery occurred in June 08.

Development of the Next Generation Missile Warning System (NexGen MWS) is complete and includes new hardware that improves capability. Baseline equipment (ultra-violet MWS) will be retrofitted with the NexGen MWS as it becomes available. Developmental test/operational test (DT/OT) was conducted in FY10 with initial operational test and evaluation (IOT&E) in FY11.

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.

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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.

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.

Program management and administration efforts consist of, but are not limited to, contract services and government costs.

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.

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B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	6.802	5.166	5.267	0.000	5.267
Current President's Budget	5.802	5.166	5.283	0.000	5.283
Total Adjustments	-1.000	0.000	0.016	0.000	0.016
• 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	-1.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.016	0.000	0.016

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: LAIRCM Threat Analysis	3.682	2.055	2.150

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 2016 Accomplishments:
Worked on Threat Analysis in the Guided Weapon Evaluation Facility (GWEF), and Dynamic Infrared Missile Evaluation Facility (DIME) Lab.

GWEF:
Evaluated Hardware In The Loop (HITL) effectiveness for LAIRCM against a new threat; Modernized radiometer calibration station for improved field radiometer accuracy; and Improve seeker rate table characterization capability.

DIME:
Evaluated “hybrid” jam code; Provided characterization of the LAIRCM laser; Evaluated new laser technology for possible future uses; Completed development of a threat hybrid simulation; Verified operation of a threat modified to support static testing; Collected test data of modified threat to support digital model development; completed initial characterization and countermeasure testing of the threat system; and Developed/validated the MOSIAC IRCM Digital simulation system.

FY 2017 Plans:
Continue to work on Threat analysis in the GWEF, to include purchase of assets, and DIME Lab.

FY 2018 Plans:

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Continue to work on Threat analysis in the GWEF, to include purchase of assets, and DIME Lab.			
Title: LAIRCM Modeling, Simulation and Emulation Testing ***Description:*** Activities that verify and validate the information obtained from threat analysis activities. ***FY 2016 Accomplishments:*** Continue work in Modeling, Simulation and Emulation Tests. This is a continued effort from LAIRCM Development in previous years. VSIL 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 2017 Plans:*** Will continue to work in Modeling, Simulation and Emulation Tests. This is a continued effort from LAIRCM Development in previous years. ***FY 2018 Plans:*** Will continue to work in Modeling, Simulation and Emulation Tests. This is a continued effort from LAIRCM Development in previous years.	0.877	0.911	0.887
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 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Will continue to make 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.	0.000	0.207	-
Title: LAIRCM Virtual SIL Development	0.000	1.429	1.396

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
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 2016 Accomplishments:*** N/A ***FY 2017 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 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.			
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 2016 Accomplishments:*** Completed the Product Support (PS) Business Case Analysis (BCA) which is a regulatory requirement to review and validate the program's overarching sustainment strategy. Initiated the best Value IR Sensor Study which provides Headquarters Air Mobility Command (HQ AMC) with an IR sensor comparison of the current IR sensor and the newly developed advanced threat warning (ATW) sensor; purpose of analysis is to determine the best value IR sensor solution. ***FY 2017 Plans:*** Will initiate an engineering focused LAIRCM system Critical Program Information (CPI) Assessment and Review Study. ***FY 2018 Plans:*** Will initiate an engineering focused LAIRCM system Critical Program Information (CPI) Assessment and Review Study.	1.243	0.564	0.850
Accomplishments/Planned Programs Subtotals	5.802	5.166	5.283

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D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• APAF: BA05: Line Item	84.335	135.801	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	233.295
# LAIRCM: *Large Aircraft Infrared Countermeasures*											

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.