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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force **Date:** February 2019

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 0604270F / <i>Electronic Warfare Development</i>							
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	-	2.159	1.909	2.066	0.000	2.066	2.102	2.145	2.185	43.580	Continuing	Continuing
653891: <i>Adv Infrared Counter Measures(Aircm)</i>	-	2.159	1.909	2.066	0.000	2.066	2.102	2.145	2.185	43.580	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Advanced Infrared Countermeasure (AIRCМ) project contains related aircraft self-protection efforts aimed at increasing aircraft survivability against the increasing threat of sophisticated surface-to-air and air-to-air missiles. These missiles may employ sophisticated next-generation Electro-Optics (EO), Infrared (IR), Radio Frequency (RF), dual-mode (i.e. IR and RF), or multi-mode seekers. AIRCM will provide advanced expendable countermeasures and/or techniques that will be functionally compatible with existing dispenser systems and employed across multiple USAF weapons systems. This also explicitly includes any and all flare, chaff, decoy, and associated components development and testing that may be demanded or needed in current operations supporting the war on terrorism regardless of aircraft platform. Similar activities that are supplementary to this effort may be accomplished ad hoc using platform specific funding or through other activities such as joint services or NATO test groups.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Advanced Infrared Countermeasure 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.

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.

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B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	2.241	1.909	2.066	0.000	2.066
Current President's Budget	2.159	1.909	2.066	0.000	2.066
Total Adjustments	-0.082	0.000	0.000	0.000	0.000
• 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	-0.082	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>				Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>			
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
653891: <i>Adv Infrared Counter Measures(Aircm)</i>	-	2.159	1.909	2.066	0.000	2.066	2.102	2.145	2.185	43.580	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Infrared Countermeasure (AIRCМ) project contains related aircraft self-protection efforts aimed at increasing aircraft survivability against the increasing threat of sophisticated surface-to-air and air-to-air missiles. These missiles may employ sophisticated next-generation Electro-Optics (EO), Infrared (IR), Radio Frequency (RF), dual-mode (i.e. IR and RF), or multi-mode seekers. AIRCM will provide advanced expendable countermeasures and/or techniques that will be functionally compatible with existing dispenser systems and employed across multiple USAF weapons systems. This also explicitly includes any and all flare, chaff, decoy, and associated components development and testing that may be demanded or needed in current operations supporting the war on terrorism regardless of aircraft platform. Similar activities that are supplementary to this effort may be accomplished ad hoc using platform specific funding or through other activities such as joint services or NATO test groups.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Advanced Infrared Countermeasure (AIRCМ) 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.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Countermeasure Testing	2.159	1.909	2.066	0.000	2.066
Description: Testing and qualification of EO, IR, and RF countermeasures on aircraft					
FY 2019 Plans: Activities include testing and qualification of expendable countermeasure cocktails on various aircraft.					
FY 2020 Base Plans: Activities include testing and qualification of expendable countermeasure cocktails on various aircraft.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase minimal.					
Accomplishments/Planned Programs Subtotals	2.159	1.909	2.066	0.000	2.066

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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>			<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• PAAF 01 Line Item 356010: <i>Flares</i>	127.481	137.402	0.000	129.388	129.388	143.459	101.435	104.392	77.404	Continuing	Continuing
• PAAF 01 352010: <i>Cartridges</i>	205.853	188.277	0.000	193.091	193.091	186.551	171.852	168.021	149.779	Continuing	Continuing

Remarks

Qualified flares, if not in AF inventory, will be procured under program 0208030F War Reserve Munitions, Flares.

D. Acquisition Strategy

Contracts are awarded through the Department of Defense Ordnance Technology Consortium (DOTC). DOTC facilitates collaborative Government, Industry, and Academic ordnance technology development and prototyping initiatives. It serves as a single point contracting agent for development/technology demonstrations needed to advance and expand our military technological superiority.

E. 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 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>
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Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Pulse Kinematic Development	C/CPFF	DOTC : ARDEC, PA	-	-		-		0.896	Jun 2020	-		0.896	Continuing	Continuing	-
IR/UV	C/CPAF	DOTC : ARDEC, PA	-	-		-		0.300	Jun 2020	-		0.300	Continuing	Continuing	-
Subtotal			-	-		-		1.196		-		1.196	Continuing	Continuing	N/A

Remarks
Development of Advanced Expendable Countermeasures to defeat currently fielded threats from which aircraft are not sufficiently protected.

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Aircraft/Unit Support	MIPR	AATC : Tucson, AZ	-	0.300	Jun 2018	0.260	Jun 2019	-		-		-	Continuing	Continuing	-
Mission Planning	MIPR	MTSI : Las Vegas, NV	-	0.300	Jun 2018	0.260	Jun 2019	-		-		-	Continuing	Continuing	-
Subtotal			-	0.600		0.520		-		-		-	Continuing	Continuing	N/A

Remarks
AATC supports ACC/CAF in coordinating and managing aircraft use to conduct advanced expendable countermeasure testing (this does not support other AMC or AFSOC)

Mission planning: Provides for programming of mission data required for each airframe and each expendable countermeasure or flare cocktail; this does not support AMC or AFSOC

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Modeling and Simulation	MIPR	Air Force Research Laboratory : WPAFB, OH	-	0.330	Jun 2018	0.245	Jun 2019	0.850	Jun 2020	-		0.850	Continuing	Continuing	-
Range Test	MIPR	96th Test Wing : Eglin AFB, FL	-	1.089	Jun 2018	1.016	Jun 2019	-		-		-	Continuing	Continuing	-

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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>
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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Test Support	MIPR	Various : NV	-	0.120	Jun 2018	0.108	Jun 2019	-		-		-	Continuing	Continuing	-
Subtotal			-	1.539		1.369		0.850		-		0.850	Continuing	Continuing	N/A

Remarks
 Modeling and simulation
 - This entails performance of modeling and simulation (to include threat hardware in-the-loop) which helps to predict advanced expendable countermeasure effectiveness and develop and define Air Force requirements
 - Performing activity varies; conducted by AFRL and GTRI

Range Test
 - This is the cost to use the range for testing (Radiometric, Captive Seeker, Flight, etc.)
 - Performing Activity & Location varies; 96th Test Wing, Eglin AFB, FL, White Sands Missile Range, NM, Gila Bend, AZ

Test Support
 - This includes but is not limited to Seeker Test Vans (multiple vans required for Captive Seeker), duo chrome camera, and other test equipment
 - Activities/support during testing (i.e. communications/electric/security)
 - Performing Activity & Location should remain "Various: TBD", multiple activities are included

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Program Office/ Government Support	Various	Air National Guard Air Force Reserve Command Test Center : Tucson, AZ	-	0.020	May 2018	0.020	May 2019	0.020	May 2020	-		0.020	Continuing	Continuing	-
Subtotal			-	0.020		0.020		0.020		-		0.020	Continuing	Continuing	N/A

Remarks
 AATC provides all the management, preparation and coordination of advanced expendable countermeasure testing efforts for ACC/CAF (this does not include support for AMC or AFSOC)

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force								Date: February 2019			
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	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	-	2.159	1.909	2.066	-	2.066	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

	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
Advance IR Aircm																												
First FY18 Semi-Annual Test Event		■																										
Second FY18 Semi-Annual Test Event				■																								
First FY19 Semi-Annual Test Event					■																							
Second FY19 Semi-Annual Test Event							■																					
First FY20 Semi-Annual Test Event								■																				
Second FY20 Semi-Annual Test Event									■																			
First FY21 Semi-Annual Test Event										■																		
Second FY21 Semi-Annual Test Event											■																	
First FY22 Semi-Annual Test Event												■																
Second FY22 Semi-Annual Event													■															
First FY23 Semi-Annual Test Event														■														
Second FY23 Semi-Annual Test Event															■													
First FY24 Semi-Annual Test Event																■												
Second FY24 Semi-Annual Test Event																	■											

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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 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Advance IR Aircm</i>				
First FY18 Semi-Annual Test Event	2	2018	2	2018
Second FY18 Semi-Annual Test Event	4	2018	4	2018
First FY19 Semi-Annual Test Event	2	2019	2	2019
Second FY19 Semi-Annual Test Event	4	2019	4	2019
First FY20 Semi-Annual Test Event	2	2020	2	2020
Second FY20 Semi-Annual Test Event	4	2020	4	2020
First FY21 Semi-Annual Test Event	2	2021	2	2021
Second FY21 Semi-Annual Test Event	4	2021	4	2021
First FY22 Semi-Annual Test Event	2	2022	2	2022
Second FY22 Semi-Annual Event	4	2022	4	2022
First FY23 Semi-Annual Test Event	2	2023	2	2023
Second FY23 Semi-Annual Test Event	4	2023	4	2023
First FY24 Semi-Annual Test Event	2	2024	2	2024
Second FY24 Semi-Annual Test Event	4	2024	4	2024