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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	10.334	14.624	23.660	0.000	23.660	23.973	24.412	24.858	25.326	Continuing	Continuing
65412A: <i>Life Support Systems</i>	-	10.334	14.624	23.660	0.000	23.660	23.973	24.412	24.858	25.326	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program saves Airmen's lives and improves aircrew performance through better aircrew flight equipment and airman combat systems. Air Force acquisition teams lead the upgrade and fielding of new equipment/systems by assessing deficiencies in existing equipment, identifying and assessing existing products or developing new technology, and conducting required Safe-to-Fly tests, certifications, and studies. Program efforts include, but are not limited to, the following projects: directed energy protective equipment; flight helmets and visors; oxygen breathing systems for aircrew; radios and locator beacons; support equipment; nuclear flash blindness protection; night vision devices; noise reduction devices; anti-gravity (anti-G) suits; flame resistant, retardant and blast/ballistic protective gear; aircraft seating; impact protection equipment; flotation devices; parachutes; ejection seats; physiological monitoring devices and other aircrew/life support/ground crew systems required by the warfighter.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Life Support capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	8.919	8.624	18.701	0.000	18.701
Current President's Budget	10.334	14.624	23.660	0.000	23.660
Total Adjustments	1.415	6.000	4.959	0.000	4.959
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	6.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.415	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	4.959	0.000	4.959

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Congressional Add Details (\$ in Millions, and Includes General Reductions)		FY 2019	FY 2020	
Project: 65412A: <i>Life Support Systems</i>				
Congressional Add: <i>Next Generation Ejection Seat Congressional Add</i>		0.000	6.000	
Congressional Add Subtotals for Project: 65412A		0.000	6.000	
Congressional Add Totals for all Projects		0.000	6.000	
Change Summary Explanation				
FY19-Below threshold reprogramming to support female aircrew flight equipment				
FY20-Congressional add in support of Next Generation Ejection Seat				
FY21 increase to fund Female flight gear				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Title: Aircrew Performance Studies/Technology Projects and Minor Development Efforts		5.583	5.002	8.655
Description: Air Force Life Cycle Management Center's Aircrew Performance Branch is the single USAF focal point for Aircrew Flight Equipment (AFE) Safe-to-Fly (STF) testing certification, addressing Safety Investigation Board (SIB) recommendations, along with studies and analysis. In addition, funding is for efforts that are responses to real-time capability gaps identified by the warfighter which may be satisfied by testing and qualifying commercial-off-the-shelf (COTS) products and/or performing minor development efforts that require less than \$10M per year related to aircrew flight equipment and life support equipment. Previous successful efforts may evolve into enduring capabilities as other users / MAJCOMs seek to incorporate these STF assets into their inventory. Aircrew Body Armor (ABA), BA-X Low Profile Parachute (LPP) and Nuclear Flash Blindness Goggles (NFBG) are currently the active programs within Life Support Systems (LSS). Funds may be used to address associated emerging aircrew/ ground crew/egress requirements and for program management activities.				
FY 2020 Plans: Perform STF testing and certification of COTS products. Address SIB recommendations. Continue the development/test efforts of aircrew laser eye protection (ALEP), radio upgrades, next generation fixed wing helmet, next generation nuclear flash blindness technology, and improvement of parachute/flotation devices.				
FY 2021 Plans: Perform STF testing and certification of COTS products. Address SIB recommendations. Continue the development/test efforts of aircrew laser eye protection (ALEP) for the visor option, radio upgrades, next generation fixed wing helmet, next generation nuclear flash blindness technology, and improvement of parachute/flotation devices.				
FY 2020 to FY 2021 Increase/Decrease Statement:				

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Increase in funding due to the increase in work on the ALEP Block 3 program as well as Next Generation Fixed Wing Helmet and female airmen received a plus up in FY21 making funds available to expedite these efforts.				
<p>Title: Integrated Aircrew Ensemble (IAE)</p> <p>Description: The Integrated Aircrew Ensemble (IAE) is a multi-layer battle ready system of protective clothing, survival equipment, and anti-G protection equipment worn by aircrew members. The ensemble can layer up to seven (7) components allowing for flexible combinations depending on aircraft type, mission, and threat. Each component design is unique but engineered as a single integrated ensemble to improve mobility by reducing bulk, reducing aircrew fatigue from thermal stress using new breathable materials, and increasing overall system performance. The ensemble components are: 1) outer flight layer, 2) Environmental Protection Layer (EPL) with gloves, 3) Chemical Biological Radiological Layer (CBRL) with glove inserts, 4) Life Preserver Unit (LPU), 5) Counter Chest Pressure Bladder (CCPB), 6) survival vest, and 7) G-suit.</p> <p>FY 2020 Plans: Begin initial work on the IAE G-Suit deficiency correction.</p> <p>FY 2021 Plans: Complete work on the IAE G-Suit deficiency correction and related testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: RDT&E for IAE is schedule to complete in FY20</p>		0.737	0.197	0.000
<p>Title: Advanced Concept Ejection Seat</p> <p>Description: Ejection Seat upgrade for first platform</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: N/A</p>		0.005	0.000	0.000
<p>Title: Next Generation Ejection Seat</p> <p>Description: The new ejection seat escape system shall safely accommodate greater variation in aircrew minimum/maximum weights, a minimum aircrew sitting height of 31 inches, and the use of Helmet Mounted Displays. It shall reduce the risk of injuries to the arms and legs (especially limb flail), neck, and spinal column throughout the entire ejection event.</p> <p>FY 2020 Plans:</p>		0.464	0.000	10.000

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Congressional Add Description above				
<p>FY 2021 Plans: Continuing EMD contract effort awarded as part of Congressional add to begin qualification testing of selected seat and receive long lead items.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Planned increase to continue EMD contract effort awarded as part of Congressional add to begin qualification testing of selected seat and receive long lead items.</p>				
<p>Title: Female Airmen Equipment</p> <p>Description: Air Force Life Cycle Management Center's Aircrew Performance Branch is the single USAF focal point for Female Airmen Equipment (AFE) Safe-to-Fly (STF) testing certification, addressing Safety Investigation Board (SIB) recommendations, along with studies and analysis. In addition, funding is for efforts that are responses to real-time capability gaps identified by the warfighter which may be satisfied by testing and qualifying commercial-off-the-shelf (COTS) products and/or performing minor development efforts that require less than \$10M per year related to aircrew flight equipment and life support equipment. Funds development of organizational issued equipment (OCIE) & personal protective equipment (PPE) for female Airmen to enhance mission performance while improving safety and survival.</p> <p>FY 2020 Plans: Continue testing and development of female flight equipment. Female flight suit development is anticipated to begin, additional efforts will be worked as requirements are defined.</p> <p>FY 2021 Plans: Continue testing and development of female flight equipment. Items anticipated to be worked, but not limited to, include the female flight suit development, new female flight harness, and bladder relief.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Not a new start, female aircrew efforts were previously worked in the "Aircrew Performance Studies/Technology Projects and Minor Development Efforts" line. However, with a plus up in FY21 it is appropriate to provide more specificity.</p>		3.545	3.425	5.005
Accomplishments/Planned Programs Subtotals		10.334	8.624	23.660
		FY 2019	FY 2020	
Congressional Add: Next Generation Ejection Seat Congressional Add		0.000	6.000	

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	FY 2019	FY 2020
FY 2019 Accomplishments: Continuing program costs associated with pre-award EMD contract effort to begin qualification testing of selected seat and receive long lead items. Cost captured under Next Generation Ejection Seat Major Thrust.		
FY 2020 Plans: Award EMD contract for initial platform qualification testing		
Congressional Adds Subtotals	0.000	6.000

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 842990: <i>Items Less Than \$5 Million</i> <i>(Safety and Rescue Equipment)</i>	33.473	40.540	24.407	-	24.407	116.102	138.835	54.072	55.085	Continuing	Continuing

Remarks

E. Acquisition Strategy

The majority of efforts funded in this project employ a streamlined acquisition approach. Whenever practical, Government-Off-The-Shelf/Commercial-Off-The-Shelf (GOTS/COTS) items are tested and evaluated as candidates for solutions to user needs. This normally involves characterization, verification, and qualification testing to ensure GOTS/COTS equipment is properly certified and adapted for military purposes. However, acquisition strategies may be carried out at the project level for traditional Engineering and Manufacturing Development (EMD), e.g., Integrated Aircrew Ensemble (IAE) and Aircrew Laser Eye Protection (ALEP) Block III. Funds may be used to address associated emerging aircrew/ground crew/egress requirements and for program management activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Aircrew Performance Studies/Technology Projects/Minor Development Efforts	Various	Multiple Contractors : TBD	-	3.366		3.044		6.344		-		6.344	Continuing	Continuing	-
Integrated Aircrew Ensemble (IAE)	C/FPIF	Tiax : Lexington, MA	-	0.767	Feb 2019	0.180	Jan 2020	0.081	Jan 2021	-		0.081	Continuing	Continuing	-
Next Generation Ejection Seat	SS/FPIF	Collins Aerospace : Colorado Springs, CO	-	0.650	Apr 2019	6.000	Feb 2020	9.450	Oct 2020	-		9.450	Continuing	Continuing	-
Female Flight Equipment	Various	Multiple Contractors : TBD	-	3.425	Aug 2019	3.425	Dec 2019	4.815	Dec 2020	-		4.815	Continuing	Continuing	-
Subtotal			-	8.208		12.649		20.690		-		20.690	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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 Tests (IAE, ACES, NGFWH, etc.)	Various	Various : Various, NV	-	1.325		1.250		1.650		-		1.650	Continuing	Continuing	-
Subtotal			-	1.325		1.250		1.650		-		1.650	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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 Management Administration (PMA)	TBD	AFLCMC : Wright-Patterson AFB, OH	-	0.801		0.725		1.320		-		1.320	Continuing	Continuing	-
Subtotal			-	0.801		0.725		1.320		-		1.320	Continuing	Continuing	N/A

Remarks
PMA Description: Program Management Support and Travel.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
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

<i>Life Support Systems RDTE Efforts</i>																												
IAE [Initial Operational Test & Evaluation]																												
IAE [G-Suit Redesign]																												
Next Generation Ejection Seat Pre-Contract Award Activities																												
Next Generation Ejection Seat Contract Award																												
Next Generation Ejection Seat Qualification Effort																												
Aircrew Performance Aircrew Laser Eye Protection Day Development																												
Aircrew Performance Aircrew Laser Eye Protection Night Development																												
Aircrew Performance Aircrew Laser Eye Protection Ballistic Specs																												
Aircrew Performance Next Generation Fixed Wing Helmet Development Award																												
Continue projects in support of Aircrew Performance/Female Equipment																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Life Support Systems RDTE Efforts</i>				
IAE [Initial Operational Test & Evaluation]	1	2019	4	2019
IAE [G-Suit Redesign]	1	2020	3	2021
Next Generation Ejection Seat Pre-Contract Award Activities	1	2019	4	2020
Next Generation Ejection Seat Contract Award	4	2020	4	2020
Next Generation Ejection Seat Qualification Effort	4	2020	4	2025
Aircrew Performance Aircrew Laser Eye Protection Day Development	1	2020	3	2020
Aircrew Performance Aircrew Laser Eye Protection Night Development	2	2020	2	2021
Aircrew Performance Aircrew Laser Eye Protection Ballistic Specs	3	2021	3	2022
Aircrew Performance Next Generation Fixed Wing Helmet Development Award	1	2020	1	2021
Continue projects in support of Aircrew Performance/Female Equipment	1	2019	4	2025