Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/Demo*							
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	-	115.406	127.949	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
634920: *Flight Vehicle Tech Integration*	-	28.807	56.969	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
634926: *High Speed Systems Integ & Demo*	-	77.479	48.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
634927: *Aerospace Power & Flight Control Integ & Demo*	-	9.120	22.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program supports Department of Defense (DoD) priorities for demonstrations in hypersonics and manned/unmanned systems, respectively. This effort integrates and demonstrates advanced flight vehicle technologies that improve the performance and supportability of existing and future aerospace vehicles. System level integration brings together aerospace vehicle technologies along with avionics, propulsion, and weapon systems for demonstration in a near-realistic operational environment. Integration and technology demonstrations reduce the risk and time required to transition technologies into operational aircraft. Projects in this program have been coordinated through the DoD Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

In the FY 2021, the Air Force is consolidating its existing thirteen Advanced Technology Development (ATD), Research Development Test and Evaluation (RDT&E), Budget Activity 03 (BA 03) PEs into five new capability focused RDT&E BA 03 PEs to better align with the Air Force Science and Technology (S&T) Strategy signed by the SECAF in April 2019. This consolidation will improve and accelerate delivery of integrated transformational, multidisciplinary, collaborative technology solutions necessary to enable new Air Force warfighting capabilities that support of the National Defense Strategy. This new structure will provide the Air Force and Congress with a clearer understanding and increased transparency of integrated technology solutions and demonstrations key to enabling the Air Force future force design.

In FY 2021, Project 634920, Flight Vehicle Tech Integration, and Project 634927, Aerospace Power & Flight Control Integ & Demo, non-Vanguard efforts and activities will be transferred from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603033F, Next Gen Platform Dev/Demo. Skyborg Vanguard activities under these Projects will be consolidated and transferred in FY 2021 from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards.

In FY 2021, the entirety of Project 634926, High Speed Systems Integ & Demo, will be transferred from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603033F, Next Gen Platforms Dev/Demo.

All these transfers detailed above are part of the Air Force RDT&E BA 03 PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force S&T Strategy, April 2019. This is an administrative realignment and not a new start. This work will continue to be executed by the Air Force Research Laboratory Aerospace Systems Technology Directorate located in Wright Patterson Air Force Base, Ohio.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/Demo*

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science and technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601SF, and 0602298F.

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	126.002	102.949	79.994	0.000	79.994
Current President's Budget	115.406	127.949	0.000	0.000	0.000
Total Adjustments	-10.596	25.000	-79.994	0.000	-79.994
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	25.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.966	0.000			
• Other Adjustments	-6.630	0.000	-79.994	0.000	-79.994

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 634920: *Flight Vehicle Tech Integration*		
Congressional Add: *Program increase - aircraft winglets and drag reduction devices*	4.843	0.000
Congressional Add: *Unfunded Requirement - Agility Prime*	0.000	25.000
Congressional Add Subtotals for Project: 634920	4.843	25.000
Congressional Add Totals for all Projects	4.843	25.000

Change Summary Explanation

Decrease in FY 2019 of $6.630 million in Other Adjustments is due to realignment of funds to PE 0602212F to support Research and Development Projects, 10 U.S.C. Section 2358

Decrease in FY 2021 of $79.994 million is due to the following:

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/Demo*

1) Realignment of the entirety of Project 634926, High Speed Systems Integ & Demo to PE 0603033F, Next Gen Platforms Dev/Demo.

2) Realignment of Project 634920, Flight Vehicle Tech Integration, and Project 634927, Aerospace Power & Flight Control Integ & Demo non-Vanguard efforts and activities will be transferred from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603033F, Next Gen Platforms Dev/Demo. Skyborg Vanguard activities under these Projects will be consolidated and transferred in FY 2021 to PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards.

These FY 2021 transfers are all part of the Air Force RDT&E BA 03 PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force S&T Strategy, April 2019.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634920 / *Flight Vehicle Tech Integration*	

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
634920: *Flight Vehicle Tech Integration*	-	28.807	56.969	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project demonstrates advanced aerospace vehicle technologies. Aerospace Vehicle Technology Integration efforts are accomplished through integration of various technologies to include avionics, advanced propulsion, and weapon systems for demonstration in near-realistic operational environments. Advanced Aerospace Structures Technologies are demonstrated to enhance the capability of current and future aerospace vehicles.

In FY 2021, Project 634920, Flight Vehicle Tech Integration Non-Vanguard efforts and activities will be transferred from PE 0603211F, Aerospace Technology Dev/ Demo, to PE 0603033F, Next Gen Platform Dev/Demo. Skyborg Vanguard activities under this Project will be consolidated and transferred in FY 2021 from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards. These transfers are part of the Air Force RDT&E BA 03 PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force S&T Strategy, April 2019. The Project and associated Non-Vanguard efforts and activities will continue to be executed by the Air Force Research Laboratory Aerospace Systems Technology Directorate located in Wright Patterson Air Force Base, Ohio. This is an administrative realignment for consolidation, and not a new start.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Aerospace Vehicle Technology Integration	8.984	15.052	0.000
Description: Develop, simulate, and demonstrate integrated technologies to improve the performance of aerospace platform capabilities.			
FY 2020 Plans: Continue integrated full flow path demonstration of a medium bypass embedded engine for next generation mobility. Continue the flight demonstration of a low cost unmanned aerospace systems capable of interoperations with different unmanned aerospace systems assets; completing a sensor extension variant in FY 2020 and initiating an off-board weapons station variant. Continue propulsion integration component validation tests for Air Superiority 2030 requirements. Initiate flight demonstrations of practical laminar flow for swept wing aircraft designs.			
FY 2021 Plans: For FY 2021 and future years, non-Vanguard work is performed under the Aerospace Vehicle Technology Integration effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 634920, Flight Vehicle Tech Integration. Skyborg Vanguard work is performed under the Skyborg effort in PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634920 / *Flight Vehicle Tech Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
FY 2021 decreased compared to FY 2020 by $15.052 million. Funding decreased due to the transfer and realignment of this work to the High Power Aircraft Subsystems Technology effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 633035, Aerospace Power Technology; and PE 0603032F Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards as part of the Air Force RDT&E BA 03 PE consolidation.			
Title: Advanced Aerospace Structure Technologies ***Description:*** Develop and demonstrate affordable, lightweight, adaptive, and multifunctional structural concepts integrated into aerospace systems. ***FY 2020 Plans:*** Continue low cost airframe design and manufacturing demonstrations: completing rapid manufacturing demonstrations of airframe components in FY 2020, and initiating fully automated manufacturing demonstrations of large airframe structures. Complete low cost attritable aircraft flight demonstration analysis and support. Continue structural life extension demonstration of legacy fleet metallic structures. Initiate validation tests of life extension and durability methods for legacy fleet composite structures in support of aircraft Service Life Extension programs. ***FY 2021 Plans:*** For FY 2021 and future years, non-Vanguard work is performed under the Advanced Aerospace Structure Technologies effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 634920, Flight Vehicle Tech Integration. Skyborg Vanguard work is performed under the Skyborg effort in PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $16.917 million. Funding decreased due to the transfer and realignment of this work to the Advanced Aerospace Structure Technologies effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 633035, Aerospace Power Technology, and PE 0603032F Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards, as part of the Air Force RDT&E BA 03 PE consolidation.	14.980	16.917	0.000
Accomplishments/Planned Programs Subtotals	23.964	31.969	0.000

	FY 2019	FY 2020
Congressional Add: Program increase - aircraft winglets and drag reduction devices ***FY 2019 Accomplishments:*** Conducted Congressionally directed efforts ***FY 2020 Plans:*** Not Applicable	4.843	0.000
Congressional Add: Unfunded Requirement - Agility Prime	0.000	25.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634920 / *Flight Vehicle Tech Integration*

	FY 2019	FY 2020
FY 2019 Accomplishments: Not Applicable ***FY 2020 Plans:*** Conduct Congressionally directed efforts		
Congressional Adds Subtotals	4.843	25.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634926 / *High Speed Systems Integ & Demo*	

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
634926: *High Speed Systems Integ & Demo*	-	77.479	48.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops, integrates and demonstrates, via simulations, ground, and flight tests, advanced flight vehicle technologies that improve the performance and supportability of future high speed/hypersonic vehicles. System level integration brings together air vehicle technologies with avionics, propulsion, and warheads and other aerospace subsystems for demonstration in a near-realistic operational environment. Integration and technology demonstrations reduce the risk and time required to transition technologies into operational systems.

In 2021, the entirety of Project 634926, High Speed/Hypersonic Integration & Demonstrations will be transferred to PE 0603033F, Next Gen Platform Demo, Project 634926, High Speed/Hypersonic Integration & Demonstrations, as part of the Air Force RDT&E BA 03 PE consolidation in order to realign technology areas that better support the National Defense Strategy, Air Force Future Operating Concept and Air Force Science and Technology Strategy, April 2019. This is an administrative realignment for consolidation, and not a new start. The Project and associated efforts will continue to be executed by the Air Force Research Laboratory Aerospace Systems Technology Directorate in Wright Patterson Air Force Base, Ohio.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: High Speed/Hypersonic Vehicle Technologies	77.479	48.959	0.000
Description: Develop, simulate, and demonstrate integrated vehicle technologies to enable and improve the performance of future high-speed and hypersonic systems.			
FY 2020 Plans: Continue development and demonstration of tactically-relevant long-range high-speed strike technologies including ground and flight demonstrations needed. Complete Hypersonic Air-breathing Weapon Concept (HAWC) and Tactical Boost Glide (TBG) integration, assembly, test, and checkout. Continue some flight test activities for both HAWC and TBG.			
FY 2021 Plans: For FY 2021 and future years, this work is performed under the High Speed/ Hypersonic Vehicle Technologies effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 634926, High Speed/Hypersonic Integration & Demo.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634926 / *High Speed Systems Integ & Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
FY 2021 decreased compared to FY 2020 by $48.959 million. Funding decreased due to the transfer and realignment of this work to the High Speed/Hypersonic Vehicle Technologies effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 634926, High Speed Systems Integ & Demo, as part of the Air Force RDT&E BA 03 PE consolidation.-			
Accomplishments/Planned Programs Subtotals	77.479	48.959	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634927 / *Aerospace Power & Flight Control Integ & Demo*	

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
634927: *Aerospace Power & Flight Control Integ & Demo*	-	9.120	22.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program integrates and demonstrates advanced control technologies that improve the performance, reliability, safety, and survivability of existing and future, manned and unmanned, aerospace systems. Enhanced capabilities are enabled by control, automation, and system level integration of subsystems and systems such as propulsion, airframes, avionics, power & thermal management, weapons, communications, and operator interfaces. Modeling and simulation, integration, and technology demonstrations in a near-operational environment reduce the risk and time required to transition technologies into existing and future aerospace systems.

In FY 2021, Project 634927, Flight Systems Control Non-Vanguard efforts and activities will be transferred from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603033F, Next Gen Platform Dev/Demo. Skyborg Vanguard activities under this Project will be consolidated and transferred in FY 2021 from PE 0603211F, Aerospace Technology Dev/Demo, to PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards. These transfers are part of the Air Force RDT&E BA 03 PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force S&T Strategy, April 2019. The Project and associated Non-Vanguard efforts and activities will continue to be executed by the Air Force Research Laboratory Aerospace Systems Technology Directorate located in Wright Patterson Air Force Base, OH. This is an administrative realignment for consolidation, and not a new start.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Autonomous Systems Control	9.120	22.021	0.000
Description: Develop, simulate, and demonstrate advanced automation and control-enabled capabilities for manned or unmanned aerospace platforms. Develop, simulate, and demonstrate autonomous flight controls for safe flight and cooperative operations between manned and remotely piloted air platforms.			
FY 2020 Plans: Continue development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Incorporate autonomous and safe airspace interoperability for manned and remotely piloted aircraft systems, airborne control of teams of unmanned aircraft, and unmanned sense-and-avoid technologies for ground and air operations to the autonomy spiral demonstrations. Complete development and demonstration of reduced crew operations of future mobility aircraft. Continue development of technologies to reduce risk for transition of collision avoidance technologies to 4th and 5th-gen aircraft. Continue development of foundational autonomy for unmanned systems and spiral demonstrations of capability, including safe airspace interoperability and sense and avoid for air and ground operations. Initiated spiral autonomy			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634927 / *Aerospace Power & Flight Control Integ & Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
demonstration of manned-unmanned teaming capability incorporating the above technology transitions, including pilot-directed autonomous control. ***FY 2021 Plans:*** For FY 2021 and future years, non-Vanguard work is performed under the Autonomous Systems Control effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 634927, Flight Systems Control. Skyborg Vanguard work is performed under the Skyborg effort in PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $22.021 million. Funding decreased due to the transfer and realignment of this work to the Autonomous Systems Control effort in PE 0603033F, Next Gen Platform Dev/Demo, Project 634927, Aerospace Power & Flight Control Integ & Demo; and PE 0603032F Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards, as part of the Air Force RDT&E BA 03 PE consolidation.			
Accomplishments/Planned Programs Subtotals	9.120	22.021	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A