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* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/Demo*							
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	-	128.358	115.966	121.002	0.000	121.002	105.411	79.995	84.997	86.479	Continuing	Continuing
634920: *Flight Vehicle Tech Integration*	-	31.448	19.734	26.679	0.000	26.679	32.325	33.619	34.844	35.311	Continuing	Continuing
634926: *High Speed/Hypersonic Intgr and Demo*	-	82.097	78.762	78.324	0.000	78.324	48.959	21.592	22.031	22.476	Continuing	Continuing
634927: *Flight Systems Control*	-	14.813	17.470	15.999	0.000	15.999	24.127	24.784	28.122	28.692	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program supports Department of Defense (DoD) priorities for demonstrations in hypersonics and 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.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & 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, 0602601F, 0602602F, 0602605F, 0602788F, 1206601F, 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.

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* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/Demo*		
B. Program Change Summary ($ in Millions)	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**
Previous President's Budget	130.950	115.966	115.861	0.000	115.861
Current President's Budget	128.358	115.966	121.002	0.000	121.002
Total Adjustments	-2.592	0.000	5.141	0.000	5.141
• 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	0.906	0.000			
• SBIR/STTR Transfer	-3.498	0.000			
• Other Adjustments	0.000	0.000	5.141	0.000	5.141

Change Summary Explanation

Increase in FY 2019 due to realignment of composite certification work from PE 0603199F, Sustainment Science and Technology (S&T), Project 635351, Technology Sustainment, to PE 0603211F, Aerospace Technology Dev/Demo, Project 634920, Flight Vehicle Tech Integration.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
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 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
634920: *Flight Vehicle Tech Integration*	-	31.448	19.734	26.679	0.000	26.679	32.325	33.619	34.844	35.311	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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Aerospace Vehicle Technology Integration	16.527	10.371	10.342
Description: Develop, simulate, and demonstrate integrated technologies to improve the performance of aerospace platform capabilities. ***FY 2018 Plans:*** Complete risk reduction of exhaust systems component demonstration for future air superiority. Initiate next generation mobility vehicle technology experiments. ***FY 2019 Plans:*** Continue next generation mobility vehicle technology experiments. Initiate integrated full flow path demonstration of a medium bypass embedded engine for next generation mobility. Initiate the flight demonstration of a low cost unmanned aerospace systems (UAS) capable of interoperations with different UAS assets. Initiate propulsion integrations component validation tests for Air Superiority 2030 requirements. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 decreased compared to FY 2018 by $0.029 million. Justification for this decrease is described in the plans above.			
Title: Advanced Aerospace Structure Technologies	14.921	9.363	16.337
Description: Develop and demonstrate affordable, lightweight, adaptive, and multifunctional structural concepts integrated into aerospace systems. ***FY 2018 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
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 2017	FY 2018	FY 2019
Continue low cost airframe design and manufacturing demonstrations. Continue low cost attritable aircraft flight demonstration analysis and support. Complete an electronic warfare and passive radar flight demonstration of an integrated antenna into load-bearing structures for small remotely piloted aircraft. ***FY 2019 Plans:*** Continue low cost airframe design and manufacturing demonstrations. Continue low cost attritable aircraft flight demonstration analysis and support. Initiate structural life extension demonstration of legacy fleet metallic structures. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increase compared to FY 2018 by $6.974 million. Justification for this increase is due to realignment of composite certification work from Program Element 0603199F to Program Element 0603211F, Project 634920.			
Accomplishments/Planned Programs Subtotals	31.448	19.734	26.679

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634926 / *High Speed/Hypersonic Intgr and Demo*	

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
634926: *High Speed/Hypersonic Intgr and Demo*	-	82.097	78.762	78.324	0.000	78.324	48.959	21.592	22.031	22.476	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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: High Speed/Hypersonic Vehicle Technologies	82.097	78.762	78.324
Description: Develop, simulate, and demonstrate integrated vehicle technologies to enable and improve the performance of future high-speed and hypersonic systems. ***FY 2018 Plans:*** Initiate and complete critical design review for Hypersonic Air-breathing Weapon Concept (HAWC) and Tactical Boost Glide (TBG) demonstrations. Continue accelerated development and demonstration of tactically-relevant long-range high-speed strike technologies including ground and flight demonstrations needed for potential follow-on acquisition program. Continue advancement of high temperature materials and structures for hypersonic vehicles. ***FY 2019 Plans:*** Continue accelerated development and demonstration of tactically-relevant long-range high-speed strike technologies including ground and flight demonstrations needed. Initiate and complete HAWC and TBG integration, assembly, test, and checkout. Initiate flight test activities for both HAWC and TBG. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 decrease compared to FY 2018 by $0.483 million. Justification for this decrease is described in the plans above.			
Accomplishments/Planned Programs Subtotals	82.097	78.762	78.324

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634926 / *High Speed/Hypersonic Intgr and Demo*

D. Acquisition Strategy

N/A

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.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634927 / *Flight Systems Control*	

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
634927: *Flight Systems Control*	-	14.813	17.470	15.999	0.000	15.999	24.127	24.784	28.122	28.692	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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Autonomous Systems Control	14.813	17.470	15.999

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 2018 Plans:

Continue development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Continue demonstration of autonomous and safe airspace interoperability for manned and remotely piloted aircraft systems. Continue development and demonstration of airborne control of teams of unmanned aircraft. Continue development of small UAS for air-launch and off-board sensing in tactical environments. Initiate development and demonstration of reduced crew operations of future mobility aircraft. Initiate development of technologies to reduce risk for transition of collision avoidance technologies to 4th and 5th-gen aircraft. Initiate development of unmanned sense-and-avoid technologies for ground and air operations. Initiate development of foundational autonomy for unmanned systems and spiral demonstrations of capability.

FY 2019 Plans:

Continue development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Continue demonstration of autonomous and safe airspace interoperability for manned and remotely piloted aircraft systems. Continue development and demonstration of airborne control of teams of unmanned aircraft. Continue development and demonstration of reduced crew operations of future mobility aircraft. Continue development of unmanned sense-and-avoid technologies for ground and air operations. 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.

FY 2018 to FY 2019 Increase/Decrease Statement:

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634927 / *Flight Systems Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
FY 2019 decreased compared to FY 2018 by $1.471 million. Justification for this decrease is due to due to Department of Defense deflation.			
Accomplishments/Planned Programs Subtotals	14.813	17.470	15.999

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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.