Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force											Date: March 2024	
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 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
Total Program Element	-	95.428	51.896	102.529	0.000	102.529	113.400	138.405	164.674	168.118	Continuing	Continuing
634093: *Missile Rocket Propulsion Integ & Demo*	-	0.000	0.000	6.079	0.000	6.079	5.692	5.809	6.018	6.144	Continuing	Continuing
634094: *Next Gen Platform Dev/ Demo*	-	13.914	6.591	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
634920: *Flight Vehicle Tech Integration*	-	24.920	13.008	38.172	0.000	38.172	24.316	24.569	46.688	47.653	Continuing	Continuing
634921: *Aircraft Propulsion Subsystems Int*	-	0.000	0.000	23.645	0.000	23.645	20.060	14.441	15.054	15.368	Continuing	Continuing
634926: *High Speed Systems Integ & Demo*	-	40.501	13.611	23.715	0.000	23.715	46.322	76.258	79.020	80.673	Continuing	Continuing
634927: *Flight Systems Control*	-	16.093	18.686	10.918	0.000	10.918	17.010	17.328	17.894	18.280	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program supports Department of Defense (DoD) priorities for Aerospace Systems demonstrations to include high-speed systems and autonomous collaborative platforms. System level integration and demonstration of advanced aerospace system technologies (autonomy, propulsion, power and thermal, air vehicle, fuels, etc.) in a near-realistic operational environment enhance performance and supportability of existing and future aerospace systems while reducing the risk and time required to transition technologies into operational aircraft. Additionally, this program supports the nuclear enterprise and nuclear deterrence through advanced component and technology demonstrations. Projects in this program have been coordinated through the DoD Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

The program has six current projects, each focusing on technologies with a high potential to enhance the performance of existing and future Air Force weapon systems per modeling, simulation, and analysis while utilizing digital engineering to accelerate and enhance the science and technology development.

- Missile Rocket Propulsion Integration and Demonstration: Develops and demonstrates innovative rocket propulsion technologies, propellants, and manufacturing techniques for strategic and tactical systems to reduce costs, schedule, and increase performance.

- Next Gen Platform Dev/Demo: Supports the nuclear enterprise and nuclear deterrence through advanced component and technology demonstrations.

- Flight Vehicle Tech Integration: Develops and demonstrates aerospace vehicle technology to enhance the capability of current and future aerospace systems with current focus on autonomous collaborative platform capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force	Date: March 2024
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*

- Aircraft Propulsion Subsystems Integration: Develops and demonstrates propulsion technology to increase warfighting capability by advancing engine operational reliability and durability, providing mission flexibility, and improved performance while reducing weight, fuel consumption, and cost of ownership.

- High Speed Systems Integration and Demonstration: Develops, demonstrates, and integrates high speed propulsion capability (to include hypersonic) to enhance and enable high speed system technology, increasing long range strike capabilities at the speed of critical warfighting capabilities required for near peer competition.

- Flight Systems Control: Develops and demonstrates adaptive power and thermal management components, controls and systems for high-power payloads enabling aerospace systems to deliver strike capabilities while integrating autonomy and control technologies to enable affordable mass in the fight and revolutionary autonomous collaborative platform capabilities.

- Advanced Aerospace Propulsion: Develops and demonstrates high speed propulsion capability (to include hypersonic) to enhance and enable long range strike capabilities at the speed of relevance for the Department of the Air Force.

In FY 2025, the RDT&E Budget Activity 03 (BA03) Aerospace Propulsion and Power Technology efforts and activities under PE 0603216F, are transferred to PE 0603211F, Aerospace Technology Dev/Demo for increased integration between airframe, flight control, propulsion, electrical, power and thermal management.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 633035 Aerospace Power Technology, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634927 Flight Systems Control.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 634093 Missile Rocket Propulsion Integ & Demo, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634093 Missile Rocket Propulsion Integ & Demo.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634921 Aircraft Propulsion Subsystems Int.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 635098 Advanced Aerospace Propulsion, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634926 High Speed Systems Integ & Demo.

Efforts in this program have been coordinated through the Department of Defense (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 program element would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602020, 0602102F, 0602201F, 0602202F,0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 0602298F, and 1206601SF.

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force	Date: March 2024
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 expenses to support the operation and maintenance of facilities to manage, execute, and deliver science and technology capabilities.

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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	95.267	51.896	77.684	0.000	77.684
Current President's Budget	95.428	51.896	102.529	0.000	102.529
Total Adjustments	0.161	0.000	24.845	0.000	24.845
• 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	-0.151	0.000			
• SBIR/STTR Transfer	-3.489	0.000			
• Other Adjustments	3.801	0.000	24.845	0.000	24.845

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: 634920: *Flight Vehicle Tech Integration*		
Congressional Add: *Unmanned adversary air platform*	9.404	-
Congressional Add: *Bonded unitized composites large scale structural demonstration*	9.234	-
Congressional Add: *Program increase - digital design studio*	1.926	-
Congressional Add: *Airborne missile defense beam Director development and Flight Environment Qualification*	0.963	-
Congressional Add Subtotals for Project: 634920	21.527	-
Project: 634926: *High Speed Systems Integ & Demo*		
Congressional Add: *Hypersonic aircraft rapid prototyping*	28.902	-
Congressional Add Subtotals for Project: 634926	28.902	-
Congressional Add Totals for all Projects	50.429	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force	Date: March 2024
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*

Change Summary Explanation

FY 2025 funding increased compared to FY 2024 by $50.633 million. The increase is due to the transfer of PE 63216F, Aerospace Propulsion & Power, efforts to PE 0603211F, Aerospace Technology Dev/Demo.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev /Demo*	Project (Number/Name) 634093 / *Missile Rocket Propulsion Integ & Demo*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
634093: *Missile Rocket Propulsion Integ & Demo*	-	0.000	0.000	6.079	0.000	6.079	5.692	5.809	6.018	6.144	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates technologies for strategic systems (including solid rocket motor boosters, post boost control, and aging and surveillance efforts) and tactical rockets. Characteristics such as environmental acceptability, affordability, manufacturability, reliability, responsiveness, reduced weight, and reduced operation and launch costs are emphasized. Rapid design, characterization, demonstration, and rapid manufacturing are key goals while ensuring increased life and performance. Technology areas investigated include ground demonstrations of compact, lightweight, advanced propulsion technologies and high-energy propellants. This project demonstrates next generation of physics-based modeling, simulation, and analysis (MS&A) tools for rapid and agile missile propulsion design, analysis, and production, as well as the digital engineering concepts to manage the entire process of design, test, and validation of solid rocket motors. The efforts in this project contribute to the sustainment of the rocket propulsion industry, providing rocket propulsion technology for the Department of Defense (DoD). The efforts in this project are reviewed by a DoD level steering committee annually for relevance to DoD missions.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 634093 Missile Rocket Propulsion Integ & Demo, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634093 Missile Rocket Propulsion Integ & Demo.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Missile Propulsion Technologies	0.000	0.000	6.079
Description: Develop and demonstrate missile propulsion technologies for ballistic missiles and tactical missiles. Research integrates digital design and test with novel manufacturing processes to support national defense needs for performance, effectiveness, and industrial manufacturing capability for missile propulsion.			
FY 2024 Plans: For FY 2024 and prior years, this work is performed under PE 0603216F, Aerospace Propulsion and Power Technology, Project 634093 Missile Rocket Propulsion Integ & Demo, Ballistic Missile Technologies effort.			
FY 2025 Plans: - Continue development and test of solid rocket motors relevant to defense needs such as large air-launched boosters for high speed weapon application.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev /Demo*	**Project (Number/Name)** 634093 / *Missile Rocket Propulsion Integ & Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
- Continue to design and develop modeling and simulation tools that more fully describe the physical processes that occur during manufacture and/or operation, and that reduce predictive uncertainty in design and analysis. - Continue development of advanced manufacturing processes for solid rocket motors including inert components, energetic components, fabrication systems and automated assembly operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $6.079 million. $0.034 million of the increase is due to increased emphasis in missile propulsion technologies. $6.045 million is due to transfer of Missile Propulsion Technologies effort from PE 0603216F, Aerospace Propulsion and Power Technology, Project 634093 Missile Rocket Propulsion Integ & Demo, effort Ballistic Missile Propulsion Technologies.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	6.079

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev /Demo*	Project (Number/Name) 634094 / *Next Gen Platform Dev/Demo*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
634094: *Next Gen Platform Dev/ Demo*	-	13.914	6.591	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project demonstrates advanced nuclear-related components and technologies in support of the nuclear enterprise and nuclear deterrence operations missions. Next Gen Platform Development/Demonstration efforts are accomplished through development, integration, testing, and evaluation of various technologies to include fuzes, aeroshells, inertial guidance, and nuclear-specific communications for demonstration in near-realistic operational environments.

This Project and associated efforts will continue to be executed by the Air Force Research Laboratory Space Vehicles Technology Directorate located in Kirtland Air Force Base, New Mexico.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Advanced Nuclear Components	13.914	6.591	0.000
Description: Develop next-generation solid state, radiation-hardened strategic advance inertial system components for hostile environment. ***FY 2024 Plans:*** Continue iterative development of inertial sensor systems, including gyroscope and accelerometer technologies for a nested sensor configuration insertion into an Inertial Measurement Unit (IMU), in coordination with PE 0603273 guidance technology development. Continue development of radiation hardened electronics/components supporting the nested sensor design. Continue laboratory and environmental testing of IMU components. Complete concept design and testing of radiation hardened solid-state gyroscope technology. Continue covariance analysis improvement through sensor/system test data inputs to predict IMU performance. ***FY 2025 Plans:*** In FY2025 funding and effort within this thrust was realigned to Budget Activity 03, Program 0603273F Science & Technology for Nuclear Re-entry Systems, Project 634094 Next Gen Platform Dev/ Demo. This was accomplished to better align complimentary Nuclear S&T Advanced Technology Development efforts to provide more traceability between these tightly coupled efforts. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 decreased compared to FY 2024 by $6.591 million due to realignment of funds into PE 0603273F Project 634094.			
Accomplishments/Planned Programs Subtotals	13.914	6.591	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev /Demo*	**Project (Number/Name)** 634094 / *Next Gen Platform Dev/Demo*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
• RDTE 03 0603273F: *Science & Technology for Nuclear Re-entry Systems*	39.431	70.162	87.945	-	87.945	118.933	155.791	161.244	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
634920: *Flight Vehicle Tech Integration*	-	24.920	13.008	38.172	0.000	38.172	24.316	24.569	46.688	47.653	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 2023	FY 2024	FY 2025
Title: Aerospace Vehicle Technology Integration	3.393	13.008	38.172
Description: Develop, simulate, and demonstrate integrated technologies to improve the performance of aerospace platform capabilities. ***FY 2024 Plans:*** Complete the fabrication and continue flight test of a sensor variant of a low cost unmanned aerospace system. Continue the development of technology demonstrations for a forward weapons employment derivative of a low cost unmanned aerospace system. Initiate build of the affordable weapons platform for future flight experimentation. ***FY 2025 Plans:*** - Initiate research for aircraft drag reduction efforts. - Initiate ground testing of the affordable unmanned weapons platform. - initiate integrated demonstrations of the sensor variant of the low-cost unmanned system. - Continue technology demonstration of a forward, weapons-capable low-cost unmanned aerospace system. - Complete the build of the affordable unmanned sensor platform. - Complete basic flight testing. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $25.164 million. Funding increased due to OUSD directed effort in drag reduction for aerospace systems and the acceleration of technology development of autonomous collaborative platform capability for low-cost unmanned aerospace systems, including forward sensing and weapons integration.			
Accomplishments/Planned Programs Subtotals	3.393	13.008	38.172

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
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 2023	FY 2024
Congressional Add: Unmanned adversary air platform ***FY 2023 Accomplishments:*** Conduct Congressionally directed efforts. This effort will be executed in Program 0603211F, Aerospace Technology Dev/Demo, Project 634920, Flight Vehicle Tech Integration.	9.404	-
Congressional Add: Bonded unitized composites large scale structural demonstration ***FY 2023 Accomplishments:*** Conduct Congressionally directed efforts. This effort will be executed in Program 0603211F, Aerospace Technology Dev/Demo, Project 634920, Flight Vehicle Tech Integration.	9.234	-
Congressional Add: Program increase - digital design studio ***FY 2023 Accomplishments:*** Conduct Congressionally directed efforts.	1.926	-
Congressional Add: Airborne missile defense beam Director development and Flight Environment Qualification ***FY 2023 Accomplishments:*** Conduct Congressionally directed efforts. This effort will be executed in Program 0603211F, Aerospace Technology Dev/Demo, Project 634920, Flight Vehicle Tech Integration.	0.963	-
Congressional Adds Subtotals	21.527	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev /Demo*	Project (Number/Name) 634921 / *Aircraft Propulsion Subsystems Int*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
634921: *Aircraft Propulsion Subsystems Int*	-	0.000	0.000	23.645	0.000	23.645	20.060	14.441	15.054	15.368	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates technology to increase military utility via turbine engine operational reliability, durability, mission flexibility, and performance while reducing weight, fuel consumption, and cost of ownership. The Aircraft Propulsion Subsystems Integration (APSI) project includes demonstrator engines that address military specific needs for manned systems, autonomous vehicles and munitions applications. This project also focuses on integration of inlets, nozzles, engine-to-airframe compatibility, and power and thermal management subsystems technologies.

This project includes the initiation and development of programs addressing DAF capability gaps and provides technologies for transformational future force capabilities. Transformational efforts will be identified through a competitive process and be responsive to DAF design priorities. Selected efforts will be designated as transformational, indicating enterprise-level priority.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634921 Aircraft Propulsion Subsystems Int.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Expendable/Autonomous Vehicle Engine Capability	0.000	0.000	14.671
Description: Design, fabricate, and test component technologies for non-man rated engine applications to improve the performance, durability, and affordability of autonomous vehicles and munitions.			
FY 2024 Plans: For FY 2024 and prior years, this work is performed under PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, Missile/Remotely Piloted Aircraft Engine Performance effort.			
FY 2025 Plans: - Complete operational benefits analysis for missile and unmanned aerial vehicle (UAV) systems. - Complete development of pervasive, hydrocarbon pressure gained propulsion fueled technologies. - Complete advanced development in rotating detonation engine technologies to advance powered munitions. - Continue new engine technologies to deliver reduced takeoff length, increased range, loiter, combat maneuverability, and lower cost for affordable UAS in contested environments; advancing novel augmentor technology design.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev /Demo*	**Project (Number/Name)** 634921 / *Aircraft Propulsion Subsystems Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
- Initiate military utility studies for autonomous vehicles powered by air breathing propulsion. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $14.671 million. $0.710 million of the increase is due to increased emphasis in autonomous vehicle engine capability. $13.961 million is due to transfer of Expendable/Autonomous Vehicle Engine Capability effort from PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, Missile/Remotely Piloted Aircraft Engine Performance effort.			
Title: Core Engine Technologies ***Description:*** Design, fabricate, and demonstrate performance predictions in core engines, using innovative engine cycles and advanced materials for turbine engines. ***FY 2024 Plans:*** For FY 2024 and prior years, this work is performed under PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, Core Engine Technologies effort. ***FY 2025 Plans:*** - Complete core tests for medium scale engines maturing key technologies. - Complete risk reduction component tests for medium- scale engine advanced fan and core. - Continue advanced propulsion air frame integration experiments to enable embedded propulsion systems; validating methodologies to enable embedded turbine engine propulsion. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $8.861 million. $6.889 million of the increase is due to increased emphasis in core engine technologies for advancing embedded engine turbofan designs. $1.972 million is due to transfer of Core Engine Technologies effort from PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, Core Engine Technologies effort.	0.000	0.000	8.861
Title: High Pressure Ratio Core Engine Technologies ***Description:*** Design, fabricate, and demonstrate high overall pressure ratio engine cores to provide increased durability and affordability with lower fuel consumption for turbofan and for turboshaft engines. ***FY 2024 Plans:*** For FY 2024 and prior years, this work is performed under PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, High Pressure Ratio Core Engine Technologies effort. ***FY 2025 Plans:***	0.000	0.000	0.113

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev /Demo*	**Project (Number/Name)** 634921 / *Aircraft Propulsion Subsystems Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
- Complete work and maturation of medium scale core technologies. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $0.113 million. Funding increased due to transfer of High Pressure Ratio Core Engine Technologies effort from PE 0603216F, Aerospace Propulsion and Power Technology, Project 634921 Aircraft Propulsion Subsystems Int, High Pressure Ratio Core Engine Technologies effort.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	23.645

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
634926: *High Speed Systems Integ & Demo*	-	40.501	13.611	23.715	0.000	23.715	46.322	76.258	79.020	80.673	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates, via modeling, simulations and analysis (MS&A), and ground and flight tests, advanced technologies that enable future high speed/hypersonic weapons and platforms (vehicles). System level integration brings together air vehicle technologies (including high speed structural solutions) with avionics, propulsion, 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. Digital engineering is utilized to develop and deliver an integrated digital environment (IDE) to assess technology, evaluate its impacts, and make capability-focused investment decisions. One key technology is a scramjet/dual-mode ramjet propulsion system. The development, integration, and demonstration of this propulsion system to a readiness level appropriate for full integration with other engine cycles (including turbine and rocket-based) is critical to provide the Air Force with revolutionary military capabilities. Multi-cycle engines will provide the propulsion systems for possible application to support aircraft and weapon platforms. Efforts include: scramjet flow-path (from inlet to nozzle) optimization to enable operation over the widest possible range of Mach numbers; active combustion control to assure continuous positive thrust (even during mode transition); robust flame-holding to maintain stability through flow distortions; maximized volume-to-surface area to minimize the thermal load imposed by the high-speed engine; thermal management systems (for example fuels, structural considerations, and power) play a vital role in scramjet and combined cycle engines, including considerations for protecting low speed propulsion systems (e.g., turbine engines) during hypersonic flight.

In FY 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 635098 Advanced Aerospace Propulsion, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634926 High Speed Systems Integ & Demo.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: High Speed/Hypersonic Vehicle Technologies	11.599	13.611	11.606
Description: Develop, simulate, and demonstrate integrated vehicle technologies to enable and improve the performance of future high-speed and hypersonic systems.			
FY 2024 Plans: Continue Multi-Mission Cruiser technology maturation activities to expand performance capabilities of high speed systems. Continue robust digital engineering framework, model-based systems engineering, and multi-level modeling, simulation & analysis (MS&A) for accelerated, focused technology development and demonstration. Initiating design work for expendable hypersonic multi-mission ISR and Strike demo.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
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 2023	FY 2024	FY 2025
- Continue Multi-Mission Cruiser technology maturation activities to expand performance capabilities of high speed systems . - Continue robust digital engineering framework, model-based systems engineering, and multi-level modeling, simulation & analysis (MS&A) for accelerated, focused technology development and demonstration. - Continue design work for expendable hypersonic multi-mission Intelligence, Surveillance and Reconnaissance (ISR) and Strike demo. - Initiate technology maturation activities to investigate performance capabilities of reusable hypersonic vehicles. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 decreased compared to FY 2024 by $2.005 million due to re-prioritization to meet the nation's future security needs.			
Title: Scramjet Technologies	0.000	0.000	12.109
Description: This project develops and demonstrates, via ground and flight tests, the scramjet propulsion cycle to a technology readiness level appropriate for full integration with other engine cycles (including turbine and rocket-based) to provide the Air Force with transformational military capabilities.. Multi-cycle engines will provide the propulsion systems for possible application to support aircraft and weapon platforms. Efforts include: scramjet flow-path optimization to enable operation over the widest possible range of Mach numbers; active combustion control to assure continuous positive thrust (even during mode transition); robust flame-holding to maintain stability through flow distortions; and maximized volume-to-surface area to minimize the thermal load imposed by the high-speed engine. Thermal management plays a vital role in scramjet and combined cycle engines, including considerations for protecting low speed propulsion systems (e.g., turbine engines) during hypersonic flight. ***FY 2024 Plans:*** For FY 2024 and prior years, this work is performed under PE 0603216F, Aerospace Propulsion and Power Technology, Project 635098 Advanced Aerospace Propulsion, Scramjet Technologies effort. ***FY 2025 Plans:*** - Continue development and integration of larger scale scramjet component technologies to enhance operability including robust operation during maneuvers and extended operating time. - Continue development and demonstration of tactically-relevant, scramjet engine designs, technologies, and components including ground and flight demonstrations needed for potential follow-on acquisition program. - Continue propulsion technology maturation activities for multi-mission cruiser concept to expand performance capabilities of high speed systems. - Continue integration of scramjet components into expendable hypersonic multi-mission Intelligence, Surveillance and Reconnaissance (ISR) and Strike demo design.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
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 2023	FY 2024	FY 2025
- Initiate technology maturation activities to investigate, develop, and demonstrate propulsion capabilities for reusable hypersonic vehicles ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $12.109 million due to transfer of Scramjet Technologies effort from PE0603216F, Aerospace Propulsion & Power Technology, 634920 Advanced Aerospace Propulsion, to PE 0603211F, Aerospace Technology Dev/Demo, 634926 High Speed Systems Integ & Demo, Scramjet Technologies effort.			
Accomplishments/Planned Programs Subtotals	11.599	13.611	23.715

	FY 2023	FY 2024
Congressional Add: Hypersonic aircraft rapid prototyping	28.902	-
FY 2023 Accomplishments: Conduct Congressionally directed efforts. This effort will be executed in Program 0603211F, Aerospace Technology Dev/Demo, Project 634926, High Speed Systems Integ & Demo.		
Congressional Adds Subtotals	28.902	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
634927: *Flight Systems Control*	-	16.093	18.686	10.918	0.000	10.918	17.010	17.328	17.894	18.280	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 2025, the entirety of PE 0603216F, Aerospace Propulsion and Power Technology, Project 633035 Aerospace Power Technology, is transferred to PE 0603211F, Aerospace Technology Dev/Demo, Project 634927 Flight Systems Control.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Autonomous Systems Control	16.093	18.686	0.797
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 2024 Plans: Continue research to 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. Initiate development and autonomy spiral demonstrations of advanced autonomy to manage a heterogeneous team of attritable and expendable aircraft without human interaction in complex missions and challenging threat environments.			
FY 2025 Plans: - Complete research to 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. - Continue development and autonomy spiral demonstrations of advanced autonomy to manage a heterogeneous team of affordable and expendable aircraft without human interaction in complex missions and challenging threat environments to include definition and scoping of flight experiment to accelerate transition of fully autonomous team capabilities.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
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 2023	FY 2024	FY 2025
FY 2025 decreased compared to FY 2024 by $17.889 million. Funding decreased due to completion of one flight experiment activity and build-up toward the next.			
Title: High Power Aircraft Subsystem Technologies ***Description:*** Develop and demonstrate integrated architecture, controls and components for power generation, conditioning, and distribution; energy storage components; and thermal management and subsystem technologies for integration into high power aircraft. ***FY 2024 Plans:*** For FY 2024 and prior years, this work is performed under PE 0603216F, Aerospace Propulsion and Power Technology, Project 633035 Aerospace Power Technology, High Power Aircraft Subsystem Technologies effort. ***FY 2025 Plans:*** - Continue development and demonstration of integrated power, thermal, and propulsion technologies for medium-scale systems including an initial hybrid architecture design to enable future electrified autonomous collaborative platform concepts. - Complete architecture and technology assessment and digital integration. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $10.121 million. $0.054 million of the increase is due to transition to medium-scale system development activities. $10.067 million increase is due to transfer of High Power Aircraft Subsystem Technologies effort from PE 0603216F, Aerospace Propulsion and Power Technology, Project 633035 Aerospace Power Technology, High Power Aircraft Subsystem Technologies effort.	0.000	0.000	10.121
Accomplishments/Planned Programs Subtotals	16.093	18.686	10.918

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.