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Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Air Force **Date:** February 2016

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: Research, Development, Test & Evaluation, Air Force I BA 3: Advanced Technology Development (ATD)					PE 0603211F I Aerospace Technology Dev/Demo							
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	-	86.275	100.622	130.950	0.000	130.950	119.280	123.297	102.871	75.348	Continuing	Continuing
634920: Flight Vehicle Tech Integration	-	5.346	25.772	23.873	0.000	23.873	19.734	19.828	26.258	26.783	Continuing	Continuing
634926: High Speed/Hypersonic Intgr and Demo	-	63.496	50.618	92.801	0.000	92.801	82.762	83.914	50.328	21.755	Continuing	Continuing
634927: Flight Systems Control	-	17.433	24.232	14.276	0.000	14.276	16.784	19.555	26.285	26.810	Continuing	Continuing

A. Mission Description and Budget Item Justification

These projects support Department of Defense (DoD) priorities for demonstrations in hypersonics and unmanned systems, respectively. This program 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. Efforts 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 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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	91.037	100.733	63.866	0.000	63.866
Current President's Budget	86.275	100.622	130.950	0.000	130.950
Total Adjustments	-4.762	-0.111	67.084	0.000	67.084
• Congressional General Reductions	0.000	-0.111			
• 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	-2.484	0.000			
• SBIR/STTR Transfer	-2.278	0.000			
• Other Adjustments	0.000	0.000	67.084	0.000	67.084

Change Summary Explanation

Decrease in FY 2015 reflects reprogramming to support Research and Development Projects, 10 U.S.C. Section 2358.

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Increase in FY 2017 Other Adjustments is due to increased emphasis in hypersonics.

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Appropriation/Budget Activity 3600 / 3					R-1 Program Element (Number/Name) PE 0603211F / <i>Aerospace Technology Dev/ Demo</i>				Project (Number/Name) 634920 / <i>Flight Vehicle Tech Integration</i>			
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
634920: <i>Flight Vehicle Tech Integration</i>	-	5.346	25.772	23.873	0.000	23.873	19.734	19.828	26.258	26.783	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 2015	FY 2016	FY 2017
<p>Title: Aerospace Vehicle Technology Integration</p> <p>Description: Develop, simulate, and demonstrate integrated technologies to improve the performance of aerospace platform capabilities.</p> <p>FY 2015 Accomplishments: Initiated C-17 formation flight Advanced Technology Demonstration (ATD). Initiated feasibility flight test of C-17 aircraft with aft body drag reduction devices. Continued development of advanced engine system design integration to mature adaptive turbine engine technologies for advanced air vehicles along with thrust augmentors and exhaust systems to provide technical options for highly fuel-efficient engines.</p> <p>FY 2016 Plans: Continue development of the C-17 formation flight ATD. Complete feasibility flight test of C-17 aircraft with aft body drag reduction devices. Complete development of advanced engine system design integration to mature adaptive turbine engine technologies for advanced air vehicles along with thrust augmentors and exhaust systems to provide technical options for highly fuel-efficient engines. Initiate quiet small unmanned aerospace systems (UAS) integrated flight test. Initiate near-term flight demonstration of an expendable unmanned system.</p> <p>FY 2017 Plans: Complete development of the C-17 formation flight ATD. Complete quiet small UAS integrated flight test. Initiate mobility aerodynamic swept wing laminar flow flight demonstration. Initiate full flow path demonstration of a medium bypass embedded engine for next generation mobility. Initiate risk reduction exhaust systems demonstrations for future air superiority.</p>	1.517	11.242	12.546
<p>Title: Advanced Aerospace Structure Technologies</p>	3.829	14.530	11.327

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017
<p>Description: This effort changed from Multi-Role Structure Technologies to Advanced Aerospace Structure Technologies to better reflect the content and objectives. Develop and demonstrate affordable, lightweight, adaptive, and multifunctional structural concepts integrated into aerospace systems.</p> <p>FY 2015 Accomplishments: Completed flight test of directional finding communication antenna integration technology demonstration into load-bearing structures for small unmanned aerospace systems (UAS). Completed flight technology demonstrations of key high altitude persistent Intelligence, Surveillance, and Reconnaissance (ISR) for active flutter suppression, gust load alleviation, and adaptive, multi-purpose wing surfaces.</p> <p>FY 2016 Plans: Initiate an electronic warfare and passive radar flight demonstration of an integrated antenna into load-bearing structures for small remotely piloted aircraft. Initiate a low cost airframe design and manufacturing demonstration. Initiate low cost attributable aircraft flight demonstration designs and analysis.</p> <p>FY 2017 Plans: Continue an electronic warfare and passive radar flight demonstration of an integrated antenna into load-bearing structures for small remotely piloted aircraft. Initiate engineered residual stress design methods structural demonstration. Continue low cost airframe design and manufacturing demonstrations. Complete low cost attributable aircraft flight demonstration designs and analysis.</p>			
Accomplishments/Planned Programs Subtotals	5.346	25.772	23.873

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.

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Appropriation/Budget Activity 3600 / 3					R-1 Program Element (Number/Name) PE 0603211F / <i>Aerospace Technology Dev/Demo</i>				Project (Number/Name) 634926 / <i>High Speed/Hypersonic Intgr and Demo</i>			
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
634926: <i>High Speed/Hypersonic Intgr and Demo</i>	-	63.496	50.618	92.801	0.000	92.801	82.762	83.914	50.328	21.755	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 2015	FY 2016	FY 2017
Title: High Speed/Hypersonic Vehicle Technologies	63.496	50.618	92.801
Description: Develop, simulate, and demonstrate integrated vehicle technologies to enable and improve the performance of future high-speed and hypersonic systems.			
FY 2015 Accomplishments: Completed preliminary design review of air-breathing weapon concept vehicle. Continued 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. Continued advancement of high temperature materials and structures for hypersonic vehicles.			
FY 2016 Plans: 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. Complete preliminary design review of boost-glide weapon concept vehicle. Initiate detailed design of air-breathing weapon concept.			
FY 2017 Plans: 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. Complete critical design review of boost-glide weapon concept vehicle. Initiate the fabrication of sufficient number of hypersonic demonstration vehicles and support hardware to execute an extensive multi-year flight test program to validate several different approaches and concepts to achieve hypersonic speed.			
Accomplishments/Planned Programs Subtotals	63.496	50.618	92.801

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

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Appropriation/Budget Activity 3600 / 3					R-1 Program Element (Number/Name) PE 0603211F / <i>Aerospace Technology Dev/ Demo</i>				Project (Number/Name) 634927 / <i>Flight Systems Control</i>			
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
634927: <i>Flight Systems Control</i>	-	17.433	24.232	14.276	0.000	14.276	16.784	19.555	26.285	26.810	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, 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 2015	FY 2016	FY 2017
Title: Autonomous Systems Control	17.433	24.232	14.276
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 2015 Accomplishments: Continued development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Continued demonstration of autonomous and safe airspace interoperability for manned and remotely piloted aircraft systems. Continued development and demonstration of airborne control of teams of unmanned aircraft. Continued development and demonstration of improved accuracy, situational awareness, and safety for air drop operations. Completed development and demonstration of safety of flight of analog flight control system hosting of digital flight control algorithms. Initiated demonstration of integrated ground and air collision avoidance. Initiated development and demonstration of robust, adaptive guidance, and control of hypersonic aircraft.			
FY 2016 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 improved accuracy, situational awareness, and safety for air drop operations. Complete development and demonstration of robust, adaptive guidance, and control of hypersonic aircraft. Complete demonstration of digital ground collision avoidance capability hosted in an analog flight control system.			
FY 2017 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			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017
and remotely piloted aircraft systems. Continue development and demonstration of airborne control of teams of unmanned aircraft. Complete development and demonstration of improved accuracy, situational awareness, and safety for air drop operations. Complete demonstration of integrated ground and air collision avoidance.			
Accomplishments/Planned Programs Subtotals	17.433	24.232	14.276

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

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