Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force											Date: March 2024	
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 1206616SF *I Space Advanced Technology Development/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	-	157.654	110.033	138.270	0.000	138.270	112.407	115.397	117.008	118.461	Continuing	Continuing
633834: *Integrated Space Technology Demonstrations*	-	68.556	65.731	95.888	0.000	95.888	70.028	74.376	75.668	76.534	Continuing	Continuing
634868: *Maui Space Surveillance System*	-	14.759	10.667	20.925	0.000	20.925	20.285	18.329	17.583	17.528	Continuing	Continuing
634922: *Space & Missile Rocket Propulsion*	-	56.508	22.629	16.456	0.000	16.456	16.971	17.464	18.341	18.869	Continuing	Continuing
63682J: *Spacecraft Vehicles*	-	17.831	11.006	5.001	0.000	5.001	5.123	5.228	5.416	5.530	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program focuses on four major areas. First, integrated space technology demonstrations, is a series of advanced technology demonstrations designed to address mission needs by applying emerging technologies from the Air Force Research Laboratory, other United States government laboratories, and industry. These areas can include multi-domain technologies such as advanced materials and process in areas such as survivability, readiness, and affordability as well as manufacturing and processes to reduce transition risk, enable cost reduction, improve component and system quality, increase readiness and affordable mission availability, enhance industrial capability, and promote transformation through the industrial base. Second, the program focuses on ground-based optical space situational awareness technology development and demonstration at the Maui Space Surveillance System in Hawaii, as well as the operation and upgrade of the facility. Third, the program develops and demonstrates advanced and innovative low-cost high performance space access and satellite propulsion technologies and components. The last major area, spacecraft vehicles, focuses on developing technologies for next-generation space communications terminals and equipment. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

In order to manage, execute, and deliver science and technology capabilities, this program element may include: necessary civilian pay expenses; expenses to support the operation and maintenance of facilities; as well as expenses related to travel, supplies, IT hardware, software and support, administrative contractor services, etc.

The Department of the Air Force technologies in this program are both enabling and enduring as we invest in maturing emerging technologies that address established mission gaps, and transformational technologies that address integrated enterprise capabilities intended to reshape the future force across air, space, and cyber warfighting domains. Development of transformational operational capabilities through advanced technology solutions focuses on five strategic capabilities: Global Persistent Awareness; Resilient Information Sharing; Rapid, Effective Decision-Making; Complexity, Unpredictability, and Mass; and Speed and Reach of Disruption and Lethality.

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 2025 Air Force	Date: March 2024
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 1206616SF *I Space Advanced Technology Development/Demo*

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	167.423	110.033	103.000	0.000	103.000
Current President's Budget	157.654	110.033	138.270	0.000	138.270
Total Adjustments	-9.769	0.000	35.270	0.000	35.270
• 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	0.000	0.000			
• SBIR/STTR Transfer	-5.522	0.000			
• Other Adjustments	-4.247	0.000	35.270	0.000	35.270

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: 633834: *Integrated Space Technology Demonstrations*		
Congressional Add: *Congressional Add: Program increase - accelerate cislunar flight experiment*	19.341	-
Congressional Add: *Congressional Add: Program increase - space research hub*	3.868	-
Congressional Add Subtotals for Project: 633834	23.209	-
Project: 634922: *Space & Missile Rocket Propulsion*		
Congressional Add: *Congressional Add: Program increase - tridyne multi-mode propulsion*	2.901	-
Congressional Add: *Hall multi-mode propulsion Tech*	2.901	-
Congressional Add: *Additive Mfg of solid rocket propellant*	2.901	-
Congressional Add: *Commercial Space Access Improvements*	4.835	-
Congressional Add: *Congressional Add: Program increase - upper stage engine technology*	22.629	-
Congressional Add Subtotals for Project: 634922	36.167	-
Congressional Add Totals for all Projects	59.376	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force	Date: March 2024
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 1206616SF *I Space Advanced Technology Development/Demo*

Change Summary Explanation

FY 2025 increased compared to FY 2024 by $28.2M due to the additional funding for continuing the Oracle cislunar flight experiment, Maui base operations support, and USAF to USSF transfers for advanced materials and manufacturing for space applications. This was coupled with a decrease in funding for completion of several W/V Band launch activities and reductions for re-prioritization to meet the nation's future security needs.

The increase in FY2025 from PB 2024 to PB 2025 of $35.3M reflects additional funding for continuing the Oracle cislunar flight experiment ($36.0M), Maui base operations support ($10.0M), USAF to USSF transfers for advanced materials and manufacturing for space applications ($5.3M) and reductions for re-prioritization to meet the nation's future security needs ($-16.0M).

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / *Space Advanced Technology Development/Demo*	Project (Number/Name) 633834 / *Integrated Space Technology Demonstrations*	

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
633834: *Integrated Space Technology Demonstrations*	-	68.556	65.731	95.888	0.000	95.888	70.028	74.376	75.668	76.534	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project is a series of advanced technology demonstrations designed to address mission needs by applying emerging technologies from the Air Force Research Laboratory, other United States government laboratories, and industry. These technologies are integrated into system-level demonstrations that are used to test, evaluate, and validate the technologies in a relevant environment. This project includes the initiation and development of programs addressing Department of the Air Force (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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Integrated Satellite Demonstrations	20.410	21.887	18.956
Description: Develop satellite technologies for integrated, robust, and flexible satellite demonstrations building on previous work and leveraging investments by other organizations. ***FY 2024 Plans:*** Continue development of integrated satellite demonstrations of key space technologies across multi-domain mission areas. Continue design, build, and test of small satellite missions with a focus on capabilities in autonomy, cyber resiliency, and integration of commercial, allied, and government space networks for command and control (C2) of a hybrid space architecture. Continue evolution of the space center of excellence to accelerate transition of space capabilities to the joint warfighter. ***FY 2025 Plans:*** Continue development of integrated satellite demonstrations of key space technologies across multi-domain mission areas. Complete on orbit demonstration of command and control (C2) networks. Initiate effort to demonstrate traditional large architecture through small satellite employment. Continue design, build, and test of small satellite missions with a focus on capabilities in autonomy, cyber resiliency, and integration of commercial, allied, and government space networks C2 of a hybrid space architecture. Initiate development of space flight experiments focused to increase the resiliency of space missions to emerging threats. Resiliency includes system-level hardening of satellites, rapid manufacturing of payloads, autonomous systems, and hybrid architecture tests that maintain continuity of DOD missions using satellites in various orbits. Using advanced rapid manufacturing methods, individual technologies will be integrated together to experiment with individual satellite resiliency. New technologies include advanced autonomous algorithms to reduce satellite operator burden, novel space cyber flight software (FSW) hardening methods, advanced materials, advanced image processing			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 633834 / *Integrated Space Technology Demonstrations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
techniques and advanced satellite communication technologies to enable hybrid orbit architectures that have minimal impacts to user equipment. Evaluate studies to further development and maturation of space technologies to incorporate into future flight demonstrations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 decreased compared to FY 2024 by $2.931M due to finalizing evaluation of prior studies and selecting one new demonstration.			
Title: Transformational Technology Development ***Description:*** This funding allocation will initiate new and continue existing transformational technology development. The Department of the Air Force (DAF) needs to provide game-changing leap-ahead capabilities to meet future force designs. This effort identifies transformational science and technology investment opportunities through the WARfighter- TECHnologist (WARTECH) process. The WARTECH process enables the DAF enterprise to collaboratively translate future force design priorities and requirements into targeted USSF science and technology investments. WARTECH accelerates capability development and responds to emerging technology opportunities by supporting integrated concept exploration. These investments support activities such as mission thread analyses to demonstrate military utility and software and hardware feasibility assessments. Select efforts will evolve into either a Vanguard Pathfinder to allow for further assessment and maturation or be designated a Vanguard Prospect or Vanguard indicating enterprise-level priority. ***FY 2024 Plans:*** Continue experiment demonstrating advanced space situational awareness and multi-agent satellite inspection with integration and test of payloads for rendezvous, proximity operations, and docking. Continue development of payloads cislunar space situational awareness experiment. Initiate development of concept flight experiment for multi-domain space operations supporting the joint warfighter base on USSF technology needs. ***FY 2025 Plans:*** Complete integrated spacecraft testing, perform launch vehicle integration, launch, and early operations for advanced space domain awareness and multi-agent satellite inspection demonstrating advanced rendezvous, proximity operations, and docking capabilities. Continue development of concept flight experiment for multi-domain space operations supporting the joint warfighter base on USSF technology needs. Initiate efforts to de-risk the maturation of resilient space architectures, components, and systems. Initiate the design and development of space-systems focused modeling and simulation, live virtual constructs, and test and evaluation capabilities. Initiate efforts to increase space-systems autonomy and improve processing and exploitation of space-based data sources. ***FY 2024 to FY 2025 Increase/Decrease Statement:***	24.937	26.475	23.001

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 633834 / *Integrated Space Technology Demonstrations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2025 decreased compared to FY 2024 by $3.474M due to realized reduction in component cost and to fund higher priority requirements within the DoD.			
Title: Modeling and Simulation Tools for Space Applications ***Description:*** Provide modeling, simulation, and analysis for technology evolution in space-based terrestrial surveillance systems, precision navigation and timing, space domain awareness, satellite communications, space environment monitoring, and space control payloads. ***FY 2024 Plans:*** Continue mission-level military utility analyses of technology and associated architectures and employment concepts across multi-domain mission areas. Continue refining guidelines and checkpoints for concept maturation evaluations in context of emerging space technologies. Continue to evolve processes for applying model-based systems engineering into technology decision-making and flight experiment design. ***FY 2025 Plans:*** Continue mission-level military utility analyses of technology and associated architectures and employment concepts across multidomain mission areas. Continue refining guidelines and checkpoints for concept maturation evaluations in context of emerging space technologies. Continue to evolve processes for applying model-based systems engineering into technology decision making and flight experiment design. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $0.198M due to increased military utility analyses.	0.000	8.852	9.050
Title: Agile Space Operations Technology ***Description:*** Develop, provide, and leverage agile software development platforms and pipelines that support pain point identification and rapid software application prototyping, operational evaluation, operator/Guardian effectiveness, and certification in support of USSF operators in collaboration with commercial partners. ***FY 2024 Plans:*** Continue to focus on tactical level exploratory development and transition of emerging technologies, refine an environment to perform agile software development and delivery through user focused collaboration and commercial partnerships, and to work with USSF Field Commands and SAF to develop and field a variety of software applications to the USSF Space Delta Units and improve Guardian performance. ***FY 2025 Plans:***	0.000	3.517	3.585

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 633834 / *Integrated Space Technology Demonstrations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue to focus on tactical level exploratory development and transition of emerging technologies to operators, refine an agile software development environment in collaboration with CTIO to perform agile software development and delivery through user focused collaboration and commercial partnerships, and to work with USSF Field Commands and SAF to develop and field a variety of software applications to the USSF Space Delta Units and improve Guardian performance. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $0.068M due to additional software testing.			
Title: Orbital Prime ***Description:*** SpaceWERX Orbital Prime will transition agile, affordable, and accelerated space capabilities, reducing risk to the global commons to rapidly field In-space Servicing, Assembly, Manufacturing (ISAM) capabilities. ***FY 2024 Plans:*** Pair funding with capabilities being matured through the SpaceWERX Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) pipeline set aside for Orbital Prime, which includes Strategic Funding Increase (STRATFI) matching consideration, and to seed a Prize Challenge such as through the private sector X-Prize program. ***FY 2025 Plans:*** N/A ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 decreased compared to FY 2024 by $5.000M due to to completion of the effort.	0.000	5.000	0.000
Title: Cislunar Space Situational Awareness ***Description:*** Develop technologies that detect space objects in cislunar space that are challenging to observe using traditional Space Surveillance Network (SSN) assets, and track objects in transit between the Earth/Moon corridor. ***FY 2025 Plans:*** Commence assembly integration and testing (AI&T) of the Oracle cislunar spacecraft, delivering increased space situational awareness (SSA) capabilities beyond 10X Geosynchronous Orbit, capable of detecting, tracking and maintaining custody of objects transiting in the Earth-Moon corridor. Continue procurement of remaining payload and spacecraft materials required to complete AI&T. Continue development of cislunar data analysis software and cloud based ground system improving on existing system architectures and leveraging commercial networks for command and control of space vehicle. This was previously funded in the Transformational Technology Development thrust and is not a FY 2025 new start. ***FY 2024 to FY 2025 Increase/Decrease Statement:***	-	-	36.000

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 633834 / *Integrated Space Technology Demonstrations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2025 increased compared to FY 2024 by $36.000M due to additional funds allocated towards continuing the Oracle Cislunar Flight Experiment. This was previously funded in the Transformational Technology Development thrust as well as with Congressional Adds in FY 2022 and FY 2023 to accelerate cislunar flight. It has been broken out to provide visibility consistent with Congressional interest in cislunar space as articulated in the Department Of Defense Appropriations Bill, 2023.			
Title: Manufacturing for Space Systems ***Description:*** Develop and transition technologies to reduce cost and improve acquisition timelines through manufacturing innovations of advanced technologies for Department of the Air Force space and multi-domain applications. ***FY 2024 Plans:*** In FY 2024 this work was accomplished in 3600: Research, Development, Test & Evaluation, USAF; Program 0603680F/ Manufacturing Technology Program, Project 635280/Manufacturing Technology; Effort: Affordable Mission Availability. ***FY 2025 Plans:*** Develop technologies to improve efficiency gains to radiation shielding and thermal control through adapting manufacturing processes for new materials technology. Investigate yield improvements and cost reduction on space-based sensors. Improve yield and cost reduction on efforts for in-space maneuverability. Initiate identification of Department of the Air Force needs for in-space assembly and manufacturing. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $2.194M due to funds transferred from the USAF program as shown in the FY 2024 plans.	-	0.000	2.194
Title: Advanced Materials for Spacecraft Resilience ***Description:*** Develop advanced materials and technologies for spacecraft structures, mission-systems, and payloads to ensure survivability and mission effectiveness from electro-magnetic spectrum threats and hazards. These technologies are applicable to spacecraft at all orbital regimes and supports numerous programs of record (PoRs) spanning multiple government agencies. They are synchronized with related air-domain efforts executed in 3600: Research, Development, Test & Evaluation, Air Force; Program 0603112F/Advanced Materials for Weapon Systems, Project 632100/Laser Hardened Materials. ***FY 2024 Plans:*** In FY 2024 this work was accomplished in 3600: Research, Development, Test & Evaluation, USAF; Program 0603112F / Advanced Materials for Weapon Systems; Project 632100, Laser Hardened Materials; Effort: Aerospace Systems Protection. ***FY 2025 Plans:***	-	0.000	3.102

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 633834 / *Integrated Space Technology Demonstrations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue development of resilient materials for spacecraft structures. Investigate environmental compatibility of materials at low earth orbit and other orbital regimes. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increased compared to FY 2024 by $3.102M due to funds transferred from the USAF program as shown in the FY 2024 plans.			
Accomplishments/Planned Programs Subtotals	45.347	65.731	95.888

	FY 2023	FY 2024
Congressional Add: Congressional Add: Program increase - accelerate cislunar flight experiment ***FY 2023 Accomplishments:*** Conduct Congressionally directed effort.	19.341	-
Congressional Add: Congressional Add: Program increase - space research hub ***FY 2023 Accomplishments:*** Conduct Congressionally directed effort.	3.868	-
Congressional Adds Subtotals	23.209	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / *Space Advanced Technology Development/Demo*	Project (Number/Name) 634868 / *Maui Space Surveillance System*	

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
634868: *Maui Space Surveillance System*	-	14.759	10.667	20.925	0.000	20.925	20.285	18.329	17.583	17.528	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program funds ground-based optical space situational awareness technology development and demonstration at the Maui Space Surveillance System (MSSS) in Hawaii, as well as the operation and upgrade of the experimental equipment and required facilities. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Operate and Upgrade Maui Space Surveillance System	14.759	10.667	20.925
Description: Operate, sustain, and upgrade the Maui Space Surveillance System (MSSS) to support development, demonstration, and integration of ground-based optical space domain awareness technologies for use in R&D, as well as for missions conducted by the Space Operations Command DELTA 2/15 Space Surveillance Squadron (SPoC/DEL2/15SPSS).			
FY 2024 Plans: Continue to maintain the Maui Space Surveillance System (MSSS) research and development (R&D) facilities and experimental equipment in a mission-ready state including needed upgrades and modernization to keep the R&D facilities and equipment in good working order to perform efficiently and reliably. Continue to operate MSSS R&D facilities for development and demonstration of ground-based space domain awareness capabilities in conjunction with customer programs and to contribute to the Space Operations Command (SPoC)/DEL2/15SPSS's operational Space Domain Awareness (SDA) mission as needed. Continue to collect observations of satellites as requested by mission partners. Continue to operate the prototype regional wide-area-search of the geosynchronous belt in the Pacific Area of Responsibility (AOR) until the Ground-Based Electro-Optical Deep Space Surveillance (GEODSS)-Maui installation reaches initial operating capability (IOC) for its search-based surveillance capability. Initiate expert assistance to 15 SPSS in R&D design requirements during the construction of the new Air Force Maui Optical and Supercomputing (AMOS) facility funded under military construction (MILCON) authority. Initiate expert assistance to 15 SPSS in R&D design requirements and environmental assessment as a lead up to reconstruction of the Small Telescope Advanced Research site. Continue to host missions in the Pacific AOR for Department of Defense (DoD) components and other government agencies.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 634868 / *Maui Space Surveillance System*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue to maintain the Maui Space Surveillance System (MSSS) research and development (R&D) facilities and experimental equipment in a mission-ready state, including needed upgrades and modernization to keep the R&D facilities and equipment in good working order to perform efficiently and reliably. MSSS R&D facilities for development and demonstration of ground-based space domain awareness capabilities in conjunction with customer programs and to contribute to the Space Operations Command (SPoC)/DEL2/15SPSS's operational Space Domain Awareness mission as needed. Continue to collect observations of satellites as requested by mission partners. Continue to operate the prototype regional wide-area-search of the geosynchronous belt in the Pacific Area of Responsibility (AOR) until the (Ground-Based Electro-Optical Deep Space Surveillance) GEODSS-Maui installation reaches initial operating capability (IOC) for its search-based surveillance capability. Continue expert assistance to 15 SPSS in R&D design requirements during the construction of the new Air Force Maui Optical and Supercomputing (AMOS) facility funded under military communication (MILCON) authority. Complete expert assistance to 15 SPSS in R&D design requirements and environmental assessment as a lead up to re-construction of the Small Telescope Advanced Research site. Continue to host missions in the Pacific AOR for DoD components and other government agencies. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Increase from FY 2024 to FY 2025 of $10.258M to fund necessary base operations support.			
Accomplishments/Planned Programs Subtotals	14.759	10.667	20.925

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / *Space Advanced Technology Development/Demo*	Project (Number/Name) 634922 / *Space & Missile Rocket Propulsion*	

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
634922: *Space & Missile Rocket Propulsion*	-	56.508	22.629	16.456	0.000	16.456	16.971	17.464	18.341	18.869	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced liquid rocket engine technologies, components, engines, and integrated systems for launch vehicles. Characteristics such as environmental acceptability, affordability, reliability, responsiveness, reduced weight, and reduced operation and launch costs are emphasized. The objective is to reduce costs, simplify manufacturability, increase performance and life/reusability as well as payload lift capability. Additionally, this project investigates and demonstrates technologies that will improve responsiveness and resiliency of space access systems and launch infrastructure. This project also develops and demonstrates solar electric, electric, chemical, and advanced propulsion technologies, for station-keeping, repositioning, and orbit transfer for satellites and satellite constellations. This effort develops technologies for flexible, responsive in-space maneuver in all orbit regimes. These technologies are critical to expanding Space Force's capability to deliver capabilities resiliently and responsively in, to, and through space. This project further develops and demonstrates the next generation of physics-based modeling, simulation, and analysis (MS&A) tools for rapid and agile space access and in-space propulsion design, analysis, and production, as well as the digital engineering concepts to manage the entire process of design, test, and validation of space access and in-space systems. All efforts in this project contribute to the sustainment and growth of the space and rocket propulsion industry, providing space access and in-space propulsion technology for the entire Department of Defense (DoD). Technologies under this project enable capabilities of interest to DoD, National Aeronautics and Space Administration (NASA), and growing Space community. The efforts in this project are reviewed by a DoD level steering committee annually for relevance to DoD missions, and the associated support costs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Space Access Propulsion Technologies	8.835	9.828	2.703
Description: Develop and demonstrate liquid rocket propulsion technology for current and future space launch vehicles. Demonstrate technologies and concepts of operation supporting rapid launch capability. ***FY 2024 Plans:*** Continue modular engine feasibility to address scalability, applicability, testability, and life cycle cost for National Security Space applications. Continue development of disruptive engine concepts/cycles for liquid propellant engines, engine system components, and control for space launch system. Continue evaluation of austere location launch capability with commercial partners and demonstration opportunities, driving towards a sustainable rapid launch capability. Continue coordination of technology transition opportunities for space access to manage technology insertion and evaluate capabilities for rocket engine hardware and related systems. Initiate a digital framework for space access planning, integration, modeling and logistical areas to facilitate rapid launch capabilities. ***FY 2025 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 634922 / *Space & Missile Rocket Propulsion*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue evaluation of launch capability with commercial partners and demonstration opportunities. Continue coordination of technology transition opportunities for space access to manage technology insertion and evaluate capabilities for rocket engine hardware and related systems. Reduce efforts for digital framework development for space access planning, integration, and modeling; modular engine feasibility evaluation for National Security Space applications; and development of disruptive engine concepts, engine components, and control for space launch system. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY2025 decrease compared to FY2024 by $7.125M due to re-prioritization to meet the nation's future security needs.			
Title: Advanced On-Orbit Propulsion Technologies ***Description:*** Develop and demonstrate solar electric, electric, and monopropellant propulsion technologies for existing and future satellites, upper stages, orbit transfer vehicles, and satellite maneuvering. ***FY 2024 Plans:*** Continue to develop and transition experimental, modeling and simulation, and theoretical efforts geared towards advanced thruster development with emphasis on understanding thrust scale-up. Continue analysis and development of multi-mode propulsion opportunities to combine high efficiency and high thrust capabilities on a common propellant. Continue thrust scale-up effort for advanced non-toxic propellant for use in monopropellant thrusters and electric propulsion thrusters for a multi-mode propulsion capability. Continue flight-weight design and development of multimode propulsion flight system combining capabilities of chemical thrusters and electric propulsion thrusters and utilizing a single common propellant for greater operational potentiality. Initiate design and development of high power electric propulsion thrusters for enhanced maneuver capability. ***FY 2025 Plans:*** Continue to develop, demonstrate and transition experimental, modeling and simulation, and theoretical efforts geared towards advanced thruster development with emphasis on understanding thrust scale-up. Continue analysis and development of multi-mode propulsion opportunities to combine high efficiency and high thrust capabilities on a common propellant. Continue thrust scale- up effort for advanced non-toxic propellant for use in monopropellant thrusters and electric propulsion thrusters for a multi-mode propulsion capability. Continue flight-weight design and development of multimode propulsion flight system combining capabilities of chemical thrusters and electric propulsion thrusters and utilizing a single common propellant for greater operational capability. Continue design and development of high power electric propulsion thrusters for enhanced maneuver capability. Initiate development of modular propulsion architectures that allow for rapid integration & transition of new propulsion technology. ***FY 2024 to FY 2025 Increase/Decrease Statement:***	11.506	12.801	12.547

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 634922 / *Space & Missile Rocket Propulsion*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY2025 decreased compared to FY2024 by $0.254M. Funding decreased due to consolidation of testing activities driven by budget limitation.			
Title: Space Warfighter Technologist Capabilities ***Description:*** This funding allocation will initiate new transformational technology development. The Department of the Air Force (DAF) needs to provide game-changing leap-ahead capabilities to meet future force designs. This effort identifies transformational science and technology investment opportunities through the WARfighter- TECHnologist (WARTECH) process. The WARTECH process enables the DAF enterprise to collaboratively translate future force design priorities and requirements into targeted USSF science and technology investments. WARTECH accelerates capability development and responds to emerging technology opportunities by supporting integrated concept exploration. These investments support activities such as mission thread analyses to demonstrate military utility and software and hardware feasibility assessments. Select efforts will evolve into either a Vanguard Pathfinder to allow for further assessment and maturation or be designated a Vanguard Prospect or Vanguard indicating enterprise-level priority. ***FY 2024 Plans:*** N/A ***FY 2025 Plans:*** In FY25 the efforts to de-risk the maturation of resilient space architectures, components and systems are not new starts. Funds will be realigned to PE 1206616SF/Space Advanced Technology Development/Demo, Project 633834/Integrated Space Technology Demonstrations. A correction is going to be requested during year of execution to properly align funding. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 funding increased compared to FY 2024 by 1.206M to fund efforts for risk reduction of space architectures, components, and systems.	0.000	0.000	1.206
Accomplishments/Planned Programs Subtotals	20.341	22.629	16.456

	FY 2023	FY 2024
Congressional Add: Congressional Add: Program increase - tridyne multi-mode propulsion ***FY 2023 Accomplishments:*** Conduct Congressionally directed effort.	2.901	-
Congressional Add: Hall multi-mode propulsion Tech	2.901	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 634922 / *Space & Missile Rocket Propulsion*

	FY 2023	FY 2024
FY 2023 Accomplishments: Conduct Congressionally directed effort.		
Congressional Add: Additive Mfg of solid rocket propellant ***FY 2023 Accomplishments:*** Conduct Congressionally directed effort.	2.901	-
Congressional Add: Commercial Space Access Improvements ***FY 2023 Accomplishments:*** Commercial Space Access Improvements	4.835	-
Congressional Add: Congressional Add: Program increase - upper stage engine technology ***FY 2023 Accomplishments:*** Conduct Congressionally directed effort.	22.629	-
Congressional Adds Subtotals	36.167	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / *Space Advanced Technology Development/Demo*	Project (Number/Name) 63682J / *Spacecraft Vehicles*	

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
63682J: *Spacecraft Vehicles*	-	17.831	11.006	5.001	0.000	5.001	5.123	5.228	5.416	5.530	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates technologies critical to addressing documented military satellite communications capability gaps and top-ranked United States Space Force (USSF) and/or Space Systems Command (SSC) technology needs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Space Communication Technologies	17.831	11.006	5.001
Description: Develop technologies for next-generation space communications terminals and equipment, along with methods/techniques to enable future space system operational command and control concepts. ***FY 2024 Plans:*** Initiate W/V-band transponder integration and testing activities. Prepare integrated payload for launch. Finish development of ground terminal capabilities to support transponder testing and experimentation. Continue on-orbit beacon experiment, including mission support, transmission of test signals, operation of ground receiver terminals, collection and archiving of data, monitoring of environmental conditions, and analysis of environmental impacts on W/V propagation. ***FY 2025 Plans:*** Continue on-orbit W/V-band beacon experiment, including mission support, transmission of test signals, operation of ground receiver terminals, collection and archiving of data, monitoring of environmental conditions, and analysis of environmental impacts on W/V propagation. Complete W/V-band transponder launch and early on-orbit operations. Initiate transponder experiments and technology demonstrations. Operate and maintain ground transceiver. Collect, analyze, and archive data. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 decreased compared to FY 2024 by $6.005M due to W/V-band transponder launch and early on-orbit operations.			
Accomplishments/Planned Programs Subtotals	17.831	11.006	5.001

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3620F / 3	**R-1 Program Element (Number/Name)** PE 1206616SF / *Space Advanced Technology Development/Demo*	**Project (Number/Name)** 63682J / *Spacecraft Vehicles*

D. Acquisition Strategy

N/A