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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	0.000	367.652	434.194	382.594	0.000	382.594	301.005	88.742	55.913	57.012	Continuing	Continuing
643833: MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP	0.000	367.652	434.194	382.594	0.000	382.594	301.005	88.742	55.913	57.012	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code: 447

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space-based radio Positioning, Navigation, and Timing (PNT) distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, and other related equipment, grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by the Department of Defense (DoD). Research, Development, Test and Evaluation (RDT&E) funds UE development, integration, test, and analysis for new PNT receiver capabilities in Navigation Warfare (NAVWAR) across all military platforms using GPS services.

The Military Global Positioning System User Equipment (MGUE) Increment (Inc) 1 program is responsible for the development of standard modernized receiver form factors for the Service-nominated lead platforms. The MGUE Inc 1 Capability Development Document (CDD) was approved by the Joint Requirements Oversight Council (JROC) on 24 July 2014. MGUE Inc 1 is initiating a new family of modernized GPS receivers that will deliver significantly improved capability to counter current and emerging PNT threats and enable military operations in a NAVWAR environment where current legacy receiver performance would be compromised. MGUE Inc 1 received a Milestone A decision in April 2012. The program received direction in February 2014, from the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) to execute a new acquisition strategy, accelerating the program to provide test units faster to facilitate military end users. The MGUE program received a Milestone B decision in January 2017.

The MGUE Inc 2 effort will continue to expand Military-Code (M-Code) receiver technology into additional applications (space receivers and precision guided munitions), and develop a modernized Handheld (HH) device to meet Service requirements. This effort leverages the MGUE Inc 1 technology to the maximum extent while addressing the production of M-Code integrated circuits far into the future. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) Miniature Serial Interface (MSI) Receiver Card Middle Tier Acquisition (MTA) rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The JROC approved the MGUE Inc 2 CDD on 6 April 2018. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) MSI Receiver Cards to include Next-Generation (Next Gen) Application Specific Integrated Circuit (ASIC) and 2) Joint, Modernized Handheld Receiver.

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition

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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

The total cost of the MGUE Inc 2 MSI Middle Tier of Acquisition effort is \$1,429.446 million. The MGUE Inc 2 MSI program is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways.

This Program Element (PE) may include necessary civilian pay expenses required to manage, execute, and deliver MGUE weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392SF and 1206398SF.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	380.704	434.194	0.000	0.000	0.000
Current President's Budget	367.652	434.194	382.594	0.000	382.594
Total Adjustments	-13.052	0.000	382.594	0.000	382.594
• 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	-13.052	0.000			
• Other Adjustments	0.000	0.000	382.594	0.000	382.594

Change Summary Explanation

FY 2023: +358.137M; The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: MGUE Inc 1 Product Development	73.793	75.346	66.000
Description: The MGUE Inc 1 program develops standard modernized receiver form factors for the Service-nominated lead platforms in accordance with the MGUE Inc 1 CDD.			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans: Continue towards completion of the following: Assist the Air Force B-2 bomber (B-2) and the Navy Arleigh Burke Guided Missile Destroyer (DDG) lead platform offices in integrating and testing M-Code receivers in their respective platforms. Card level PEO Certification for Operational Test and Evaluation (OT&E) or Field Test. Continue Verification Testing, Qualification Testing, Technical Requirements Verification for remaining MGUE cards. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Complete the following receiver modernization Activities: Verification Testing, Qualification Testing, Technical Requirements Verification, and Manufacturing Readiness Assessment (MRA) for remaining MGUE card. Conduct GPS Enterprise Engineering updates to Ground Based - GRAM - Modernized - Module (GB-GRAM-M) and GPS Receiver Application Module - Standard Electronic Module (GRAM-S/M). Conduct deficiency resolution for test problems resulting from lead platform testing. Continue preparation for PEO Certification of Readiness for B-2 and DDG Platform OT&E (or field test). Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to completion of Raytheon Firm Fixed Price contract performance based payments and completion of enterprise engineering modernization efforts on the ground card.</p>				
<p>Title: Advanced Technology</p> <p>Description: Advanced Technology/Pre-Tech includes efforts to mature technology for future GPS receivers called out in the MGUE CDDs. These efforts aim to find innovative solutions to increase resiliency in GPS performance and improve on size, weight, power, and cost (SWAP/C) of military receivers.</p> <p>FY 2022 Plans: Continue developing technologies and prototypes to increase the robustness and resilience of GPS receiver / PNT system solutions. Continue the integration of the next-generation, Government developed intellectual property identified as Modernized Protection Device (MoPD), GPS security architecture, into a multi-Global Navigation Satellite System (GNSS) software defined radio platform and demonstrate functional performance, programmability / flexibility, and certifiability. Continue the M-Code Military Underwater Navigation System (MUNS-M) Government test activities and work with US Special Forces and Foreign Military Sales (FMS) customers on transition opportunities. Complete fabrication of initial integrated antenna, antenna electronics and M-Code prototype and conduct design validation testing to evaluate Technical Requirement Document (TRD) compliance and access</p>		0.000	12.760	16.367

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>effort for production representative units. Select advanced anti-spoof / trust / integrity algorithms to implement and test that might permit military use of other GNSS signals for delivering assured PNT.</p> <p>FY 2023 Plans: Continue developing technologies and prototypes to increase the robustness and resilience of Modernized GPS receivers and PNT system solutions. Complete the development and security certifiability testing of MoPD. Continue integration into a multi-GNSS software defined radio platform and begin to demonstrate functional performance, programmability, and flexibility. Mature the MUNS-M software and displays based on feedback from US Special Forces test activity. Continue working with FMS customers on transition opportunities. Complete fabrication of IMAS (Integrated M-Code/Antenna System prototype) and conduct design validation testing to evaluate TRD compliance and access effort for production representative units. Continue Multi-GNSS prototyping including M-code and "covered signals" to increase the resilience and capability of military PNT to meet National Defense Authorization Act objectives.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased due to added support integrating the next-generation, government developed MoPD intellectual property into a multi-GNSS software defined radio platform and demonstrating functional performance, programmability / flexibility, and certifiability. Additionally, both the IMAS and the MUNS-M prototypes will be undergoing testing and maturation.</p>				
<p>Title: MGUE Inc 1 System/Platform Integration and Performance Certification</p> <p>Description: Integration of MGUE Inc 1 receiver form factors into the Service-nominated lead platforms in support of developmental and operational (or field) test events. Conduct technical and operational modernization impact analysis for MGUE Service lead platform integration.</p> <p>FY 2022 Plans: Continue verification testing of remaining GRAM-S/M cards. Continue requirements verification and reliability test activities as required to include approved engineering changes. Complete lead platform development efforts to on-board minimum viable product GRAM-S/ M capabilities, and begin final B-2 and DDG integration and qualification efforts in support of developmental and operational or field test events. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms.</p> <p>FY 2023 Plans: Continue platform-level verification testing of the GRAM-S/M. Continue platform-level requirements verification and reliability test activities as required to include approved engineering changes. Complete lead platform development efforts to integrate GRAM-S/M capabilities, and begin final B-2 and DDG integration and qualification efforts in support of developmental and operational or field test events. Conduct DDG independent verification and validation testing (IV&V), field testing in a threat environment and system level integration testing. Complete B-2 combined developmental/operational test. Assist DoD integration of M-Code GPS</p>		26.550	33.571	53.255

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
receivers for joint Service non-lead platforms. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to the shift of lead platform development efforts into FY 2023, after addressing technical issues on one of the MGUE cards. Increase reflects continued lead platform technical staff in addition to previously planned test execution costs to validate the GRAM -S/M integration in the B-2 and DDG lead platforms.				
Title: Information Assurance, Security/Compatibility Certification, and Test/Evaluation Description: Develop, implement, and maintain GPS security certification programs. Develop policy, strategy and resource requirements for MGUE security certification and compatibility certification. Security certification, compatibility certification, and security approval ensures future military GPS receivers protect critical program information and continue working in all environments and concepts of operations called for by U.S. Strategic Command. FY 2022 Plans: Continue to conduct security certification activities for all M-Code receivers, as required. Continue modernized security evaluations/tests for Selective Availability Anti-Spoofing Module (SAASM) and other legacy GPS receiver equipment. Continue to review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue the GPS Receiver Application Module-Standard Electronic Module/M-Code (GRAM-S/M) verification testing for all remaining MGUE cards. Continue to conduct delta certifications, as required. Continue requirements verification and reliability test activities as required to include approved engineering changes. Continue Lead Platform Integration Test and Operational Test (OT) activities for MGUE and Lead Platform vendors. FY 2023 Plans: Continue to conduct initial and delta security certification activities for all M-Code receivers, as required. Continue modernized security evaluations/tests for SAASM and other legacy GPS receiver equipment. Review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue technical support to develop, validate and process engineering changes. Continue SAASM and modernize Key Loading Installation Facility (KLIF) effort. Conduct GPS Enterprise Integrated System Test (IST) activities for MGUE Lead Platforms. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to a reduction in test and evaluation related requirements.		2.459	18.421	9.966
Title: MGUE Inc 2 Risk Reduction Description: The MGUE Inc 2 program will develop M-Code receiver technology to meet Service requirements. MGUE Inc 2 Risk Reduction activities include, but are not limited to, acquisition strategy development, early design efforts through Preliminary		71.173	7.736	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Design Review (PDR) for the next generation ASIC using 14nm (nanometer) ASIC technology node, handheld design activities and early user demonstrations, advanced concept studies, receiver component prototyping to include MGUE Inc 2 requirements.				
FY 2022 Plans: Continue M-Code Handheld risk reduction activities, to include prototype demonstrations. Continue additional Handheld risk reduction activities to address challenging Increment 2 performance requirements, improve user functionality, and reduce unit cost. Implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.				
FY 2023 Plans: N/A				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to contract completion in 2QFY2022 and transfer of Handheld activities into the MGUE Inc 2 HH Major Thrust.				
Title: MGUE Inc 2 Miniature Serial Interface (MSI) Receiver Card Rapid Prototyping		193.677	286.360	223.085
Description: The MGUE Inc 2 program will develop M-Code receiver technology for additional applications (space receivers, precision guided munitions, and handheld receivers) to meet Service requirements. MGUE Inc 2 MSI Receiver Card Rapid prototyping builds on the Application Specific Integrated Circuit (ASIC) post-PDR progress and will develop, integrate, produce, and test M-Code capable, low size & power GPS MSI form factor to include a Next Gen ASIC. The MSI receiver card is to meet the needs of low size, weight and power (SWaP) ground-embedded users. However, The Next Gen ASIC must meet the needs of the MSI form factor and be backwards compatible with Inc 1 performance requirements as a potential functional replacement due to Inc 1 ASIC obsolescence. MGUE Inc 2 MSI Receiver Card Rapid Prototyping has been broken out into a separate major thrust for additional visibility.				
FY 2022 Plans: Continue three development contract(s) for new low size/power MSI receiver card to include Next Gen ASIC, hardware, and software. Begin all efforts related to the prototypes, including, but not limited to, ordering of components for early integrated testing, long-lead parts planning and purchase, procurement of test equipment and articles, facilities planning, manufacturing prototypes, and manpower. Begin preparations for Critical Design Review (CDR) planned for 4th quarter FY 2023. In addition to preparing for CDR, the contractors will be verifying through demonstrations and testing that performance requirements will be met. Continue security certification and design activities. Continue investments in core ASIC technology, early ASIC fabrication,				

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>manufacturing, and Intellectual Property procurement. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Continue three development contract(s) for new low size/power MSI receiver card to include Next Gen ASIC, hardware, and software. Continue efforts related to the prototypes including, but not limited to, ordering of components for early integrated testing, long-lead parts planning and purchase, procurement of test equipment and articles, manufacturing prototypes, and manpower. Complete Release to Manufacture (RTM) of the Next Gen ASIC and facilities planning. Complete CDR for all three vendors. Contractors will continue to verify performance requirements are met through demonstrations and testing. Continue security certification and design activities. Continue investments in core ASIC technology, early ASIC fabrication, manufacturing and Intellectual Property procurement. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to the completion of the CDR campaign for all three development contractor efforts. The CDR campaign is a critical event to ensure stable design, performance, and delivery of a first test article in FY 2024.</p>				
<p>Title: MGUE Inc 2 Handheld</p> <p>Description: The Military GPS User Equipment (MGUE) Increment (Inc) 2 Handheld (HH) effort will develop a joint common modernized HH receiver that will provide M-code, anti-spoof, and anti-jam capabilities, with significant improvements in size, weight, and power. The goal of the MGUE Inc 2 HH risk reduction activities is to reduce development risk for the MGUE Inc 2 HH receiver through feedback from the rapid prototyping process and multiple joint service demonstration events. The MGUE Inc 2 Handheld activities transferred from the MGUE Inc 2 Risk Reduction Major Thrust to provide increased Middle Tier Acquisition (MTA) transparency.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Transition HH risk reduction activities to a MTA Rapid Prototyping effort in line with the 2018 SAE-approved MGUE Inc 2 Acquisition Strategy. Ground Application Technical Requirements Document compliant prototype that is M-Code capable and ready for security approval. Joint service demonstration events will continue to inform HH development, burning down user acceptance risk. Integrate the MSI into HH advanced prototype and perform limited operational testing, security testing and power model analysis. Multiple competitive contracts will be awarded in FY 2023 for the MTA Rapid Prototyping effort. Rapidly respond</p>		0.000	0.000	13.921

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to MGUE Inc 2 Handheld activities transfer from the MGUE Inc 2 Risk Reduction Major Thrust to provide increased MTA transparency.			
Accomplishments/Planned Programs Subtotals	367.652	434.194	382.594

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• SPAF 01 0305164F: NAVSTAR Global Positioning System (User Equipment) (SPACE)	2.256	2.274	0.950	-	0.950	0.901	0.838	0.888	0.840	0.000	8.947

Remarks
Procurement, Space Force (PSF) funding in this PE supports legacy SAASM efforts. Similar work for the MGUE is in the planning phase.

E. Acquisition Strategy
The MGUE program has developed a comprehensive acquisition strategy to provide modernized GPS capabilities to U.S. and Allied Forces by developing a competitive market driven approach. This strategy establishes the signal compatibility and security criteria along with a process for evaluating components to enable rapid movement from development to fielding. The pillars of this effort are: (a) establishing time certain and low risk development; (b) bounding requirements to leverage mature technology to the maximum extent possible; (c) focusing on the development of form factors based on well-defined standards to support lead platform integration; and (d) implementing a proactive, collaborative MGUE platform integration activity to mitigate risk and reduce cost for DoD force structure modernization.

The MGUE program awarded three sole source contracts for the Inc 1 Technology Development Phase effort in September 2012, as follow-on efforts to the competitively awarded Modernized User Equipment (MUE) contracts awarded in June 2006. The effort spans the Technology Maturation and Risk Reduction Phase through design and includes integration and test of M-Code receivers into Service-nominated lead platforms. In 1QFY2021, the program office converted the remaining Raytheon GRAM-S/M development effort to a Firm Fixed Price contract type at the direction of the Air Force Service Acquisition Executive. The contracts of the other two vendors remain primarily a Cost Plus Incentive Fee type contract. This effort also includes the security and compatibility certification of GPS receiver cards as a part of the integration effort. The Service lead platforms will select from the available vendors to integrate and perform operational testing with funding from the MGUE program. This supports compliance with PL 111-383, section 913.

The MGUE Inc 2 program developed an Acquisition Strategy to continue MGUE development by: addressing long term producibility of MGUE ASICs, identifying a U.S. owned trusted foundry for ASIC development, delivering GPS receiver cards to meet stringent Inc 2 requirements, and developing a modernized GPS handheld receiver

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Appropriation/Budget Activity	R-1 Program Element (Number/Name)
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to meet the needs of the Services. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) MSI MTA rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver MTA rapid prototyping effort. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two MTA Rapid Prototype efforts: 1) Miniature Serial Interface Receiver Card (includes Next-Gen ASIC) and 2) Joint, Modernized Handheld Receiver. MGUE Inc 2 awarded three full and open competitive contracts in Nov 2020 for MSI. The program office plans to award full and open competitive Handheld contracts beginning in FY 2023.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 1 Technology Development (1)	C/CPIF	Collins Aerospace : Cedar Rapids, IA	0.000	0.012	Nov 2020	12.210	Nov 2021	6.000	Nov 2022	-		6.000	0.150	18.372	130.555
MGUE Inc 1 Technology Development (2)	C/CPIF	Raytheon : El Segundo, CA	0.000	41.136	Nov 2020	46.329	Nov 2021	45.787	Nov 2022	-		45.787	15.028	148.280	142.013
MGUE Inc 1 Technology Development (3)	C/CPIF	L3 Harris : Anaheim, CA	0.000	1.000	Nov 2020	0.637	Nov 2021	0.000	Nov 2022	-		0.000	0.000	1.637	83.670
MGUE Inc 1 Platform Integration	Various	Various : Various	0.000	26.550	Nov 2020	33.571	Nov 2021	53.255	Nov 2022	-		53.255	65.614	178.990	-
MGUE Inc 1 Information Assurance	Various	Various : Various	0.000	2.710	Jan 2021	0.000	Jan 2022	0.000	Jan 2023	-		0.000	0.000	2.710	-
MGUE Inc 1 Technical Mission Analysis	Various	Aerospace/MITRE : Various, CA	0.000	7.384	Oct 2020	1.908	Nov 2021	1.210	Nov 2022	-		1.210	1.120	11.622	-
MGUE Inc 1 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	0.000	1.596	Oct 2020	1.597	Dec 2021	3.971	Dec 2022	-		3.971	5.467	12.631	-
MGUE Advanced Technology/Pre-Tech	Various	Various : Various, CA	0.000	5.000	Jan 2021	12.760	Jan 2022	16.367	Jan 2023	-		16.367	Continuing	Continuing	-
MGUE Inc 2 MSI Receiver Card Rapid Prototyping	Various	Various : Various	0.000	69.783	Dec 2020	64.318	Dec 2021	18.451	Dec 2022	-		18.451	Continuing	Continuing	-
MGUE Security Certification	Various	Various : Various	0.000	5.307	Jan 2021	5.299	Nov 2021	5.459	Nov 2022	-		5.459	Continuing	Continuing	-
MGUE Inc 2 Technology Development (1)	C/CPIF	BAE Systems : Cedar Rapids, IA	0.000	37.309	Dec 2020	68.933	Nov 2021	69.474	Nov 2022	-		69.474	Continuing	Continuing	-
MGUE Inc 2 Technology Development (2)	C/CPAF	L3 Harris : Anaheim, CA	0.000	28.850	Dec 2020	44.707	Nov 2021	39.208	Nov 2022	-		39.208	Continuing	Continuing	-
MGUE Inc 2 Technology Development (3)	C/CPIF	Raytheon : El Segundo, CA	0.000	35.185	Dec 2020	63.673	Nov 2021	48.024	Nov 2022	-		48.024	Continuing	Continuing	-
MGUE Inc 2 Risk Reduction	Various	Various : Various	0.000	71.173	Jan 2021	7.737	Nov 2021	0.000		-		0.000	0.000	78.910	-
MGUE Inc 2 Information Assurance	Various	Various : Various	0.000	0.000		3.870	Nov 2021	3.960	Nov 2022	-		3.960	Continuing	Continuing	-
MGUE Inc 2 Handheld	Various	Various : Various	0.000	0.000		0.000		13.921	Nov 2022	-		13.921	Continuing	Continuing	-

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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 2 Technical Mission Analysis	Various	Aerospace/MITRE : El Segundo, CA	0.000	6.820	Jan 2021	12.379	Nov 2021	11.309	Nov 2022	-		11.309	Continuing	Continuing	-
MGUE Inc 2 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	0.000	5.069	Jan 2021	2.340	Jan 2022	5.753	Jan 2023	-		5.753	Continuing	Continuing	-
Subtotal			0.000	344.884		382.268		342.149		-		342.149	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 1 Test and Evaluation	Various	Various : Various	0.000	0.944	Jan 2021	2.593	Jan 2022	0.000	Jan 2023	-		0.000	0.000	3.537	-
MGUE Inc 2 Test and Evaluation	Various	Various : Various	0.000	2.459	Jan 2021	6.290	Jan 2022	0.548	Jan 2023	-		0.548	Continuing	Continuing	-
Subtotal			0.000	3.403		8.883		0.548		-		0.548	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 1 FFRDC	RO	Aerospace/MITRE : Various	0.000	7.876	Dec 2020	3.249	Dec 2021	2.059	Dec 2022	-		2.059	1.907	15.091	-
MGUE Inc 2 FFRDC	RO	Aerospace/MITRE : Various	0.000	4.882	Dec 2020	7.745	Dec 2021	8.449	Dec 2022	-		8.449	Continuing	Continuing	-
MGUE Inc 1 A&AS	Various	Various : Various	0.000	0.831	Dec 2020	6.466	Dec 2021	6.673	Dec 2022	-		6.673	10.400	24.370	-
MGUE Inc 2 A&AS	Various	Various : Various	0.000	5.598	Dec 2020	25.007	Dec 2021	22.192	Dec 2022	-		22.192	Continuing	Continuing	-
MGUE Inc 1 and Inc 2 Other Support	Various	Various : TBD	0.000	0.178	Dec 2020	0.576	Oct 2021	0.524	Oct 2022	-		0.524	0.450	1.728	-
Subtotal			0.000	19.365		43.043		39.897		-		39.897	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force								Date: April 2022					
Appropriation/Budget Activity 3620F / 4				R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)				Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP					
	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	367.652		434.194		382.594		-		382.594	Continuing	Continuing	N/A

Remarks

Target value of MGUE inc 1 tech development lines includes AF funding.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MGUE Increment 1	
MGUE Inc 1 M-Code & Legacy Receiver Security Certification	[Redacted]
MGUE Inc 1 Developmental & Modernization	[Redacted]
MGUE Inc 1 Development Test	[Redacted]
MGUE Inc 1 Card level PEO Certification	[Redacted]
MGUE Inc 1 Lead Platform Integration and Test	[Redacted]
Advanced Technology/Pre-Tech	
ADV/Pre-Tech IMAS TRD Design, Validation, Testing and Evaluation	[Redacted]
ADV/Pre-Tech IMAS Fabrication	[Redacted]
ADV/Pre-Tech MoPD Development and Security Certification Testing	[Redacted]
MGUE Increment 2	
MGUE Inc 2 Risk Reduction	[Redacted]
MGUE Inc 2 MSI Receiver Card w/Next Gen ASIC Rapid Prototyping	[Redacted]
MGUE Inc 2 M-Code & Legacy Receiver Security Certification	[Redacted]
MGUE Inc 2 Critical Design Review	[Redacted]
MGUE Inc 2 Modernized Handheld Receiver	[Redacted]
MGUE Inc 2 MSI Contingent ASIC Respin & Integration	[Redacted]

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MGUE Increment 1				
MGUE Inc 1 M-Code & Legacy Receiver Security Certification	1	2021	3	2022
MGUE Inc 1 Developmental & Modernization	1	2021	3	2023
MGUE Inc 1 Development Test	1	2021	4	2023
MGUE Inc 1 Card level PEO Certification	1	2021	2	2024
MGUE Inc 1 Lead Platform Integration and Test	1	2021	2	2025
Advanced Technology/Pre-Tech				
ADV/Pre-Tech IMAS TRD Design, Validation, Testing and Evaluation	4	2022	1	2023
ADV/Pre-Tech IMAS Fabrication	1	2023	2	2023
ADV/Pre-Tech MoPD Development and Security Certification Testing	1	2023	4	2023
MGUE Increment 2				
MGUE Inc 2 Risk Reduction	1	2021	2	2022
MGUE Inc 2 MSI Receiver Card w/Next Gen ASIC Rapid Prototyping	1	2021	1	2026
MGUE Inc 2 M-Code & Legacy Receiver Security Certification	1	2022	4	2026
MGUE Inc 2 Critical Design Review	3	2022	4	2023
MGUE Inc 2 Modernized Handheld Receiver	2	2023	4	2026
MGUE Inc 2 MSI Contingent ASIC Respin & Integration	3	2024	3	2027