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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2024 Air Force **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	367.652	419.889	381.394	353.807	0.000	353.807	299.499	133.838	0.000	0.000	Continuing	Continuing
643833: MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP	367.652	419.889	381.394	353.807	0.000	353.807	299.499	133.838	0.000	0.000	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 pacing and 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

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acquisition 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 \$1,566.89 million. MGUE Inc 2 MSI 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Previous President's Budget	434.194	382.594	301.005	0.000	301.005
Current President's Budget	419.889	381.394	353.807	0.000	353.807
Total Adjustments	-14.305	-1.200	52.802	0.000	52.802
• Congressional General Reductions	0.000	-1.200			
• 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	-14.305	0.000			
• Other Adjustments	0.000	0.000	52.802	0.000	52.802

**Change Summary Explanation**

FY 2024: +\$53.200M Fund MGUE Inc 2 to Single Best Estimate

FY 2024: -\$1.982M to realign funding to APPN 3410, PE 1207804SF (SAG 13C), for fiscal policy compliance as Space Systems Command (SSC) establishes Headquarters functions and a Chief Information Office (CIO) for integrated cybersecurity.

FY 2024: +\$1.584M Inflation adjustment

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<b>Title:</b> Military Global Positioning System (GPS) User Equipment (MGUE) Increment (Inc) 1 Product Development	75.289	66.000	24.581

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p><b>Description:</b> The MGUE Inc 1 program develops standard modernized receiver form factors for the Service-nominated lead platforms in accordance with the MGUE Inc 1 Capability Development Document (CDD).</p> <p><b>FY 2023 Plans:</b> Complete the following receiver modernization Activities: Verification Testing, Qualification Testing, Technical Requirements Verification, and Manufacturing Readiness Assessment (MRA) for the remaining MGUE card. Conduct GPS Enterprise Engineering updates to Ground Based - GPS Receiver Application Module (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 Program Executive Officer (PEO) Certification of Readiness for B-2 and Arleigh Burke Destroyer (DDG) Platform Operational Test &amp; Evaluation (OT&amp;E). Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2024 Plans:</b> Complete GPS Enterprise Engineering updates to GPS Receiver Application Module - Standard Electronic Module (GRAM-S/M). Conduct deficiency resolution for test problems resulting from lead platform testing. Complete PEO Certification of Readiness for B-2 and DDG Platform OT&amp;E. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> FY 2024 funding decreased reflects the completion of the majority of the Raytheon Firm Fixed Price contract performance based payments, and completion of the BAE development contract. Raytheon Formal Qualification test and technical requirements verification completes on GRAM-S/M.</p>				
<p><b>Title:</b> Advanced Technology</p> <p><b>Description:</b> Advanced Technology/Pre-Tech includes efforts to mature technology for future GPS receivers identified 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><b>FY 2023 Plans:</b> 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 Modernized Protection Device (MoPD). Continue integration into a multi-Global Navigation Satellite System (GNSS) software defined radio platform and begin to demonstrate functional performance, programmability, and flexibility. Mature the Military Underwater Navigation System/M-Code (MUNS-M) software and displays based on feedback from a US Special Forces test activity. Complete fabrication of Integrated M-Code/Antenna System prototype (IMAS) and conduct design validation testing to evaluate Technical Requirement Document</p>		12.760	16.367	7.816

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p>(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 applicable National Defense Authorization Act objectives.</p> <p><b>FY 2024 Plans:</b> Mature and test technologies and prototype demonstration systems that increase the robustness and resilience of Modernized GPS receivers and PNT system solutions. Implement required Request for Change modifications, including Regional Military Protection (RMP) and from an engineering perspective, extended Pseudorandom Noise (PRN) codes into the MoPD. Support the integration and security certification activities associated with implementing MoPD into a multi-GNSS software defined radio platform and continue to demonstrate the functional performance and flexibility of this security architecture. Continue multi-GNSS prototyping exploring the trustworthiness of "covered signals" to increase the resilience and capability of military PNT equipment and to meet applicable National Defense Authorization Act objectives. Continue working with US Special Forces and Foreign Military System (FMS) customers on supporting test, evaluation, and transition opportunities for the MUNS-M. Complete the qualification testing and prototype fabrication of the IMAS.</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> FY 2024 funding decrease due to maturation of technologies and prototype demonstration leading to completion of testing and prototype fabrication of IMAS.</p>				
<p><b>Title:</b> MGUE Inc 1 System/Platform Integration and Performance Certification</p> <p><b>Description:</b> 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><b>FY 2023 Plans:</b> 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&amp;V), field testing in a threat environment and system level integration testing. Conduct B-2 combined developmental/operational test. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2024 Plans:</b> 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 B-2 and DDG integration and qualification efforts in</p>		33.571	53.255	49.934

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
support of developmental and operational or field test events. Complete B-2 combined developmental and operational test. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms. 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.				
<b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> FY 2024 funding decreased due to completion of lead platform GRAM-S/M card level development efforts phasing into Production Representative Unit level integration and testing efforts.				
<b>Title:</b> Information Assurance, Security/Compatibility Certification, and Test/Evaluation		18.421	9.966	10.059
<b>Description:</b> 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.				
<b>FY 2023 Plans:</b> Continue to conduct initial and delta 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. 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.				
<b>FY 2024 Plans:</b> 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 certified 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 KLIF effort. The KLIF facilitates the programming of black key (cryptographic) algorithms into the SAASM to provide accurate positioning solutions for GPS users using secure equipment. Conduct GPS Enterprise IST activities for MGUE Lead Platforms.				
<b>FY 2023 to FY 2024 Increase/Decrease Statement:</b>				

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
FY 2024 increased due to increased DoD demand for M-Code capable GPS User equipment requiring security certification. Widespread availability of military GPS equipment is expected to ramp up in FY 2023, when the final MGUE Inc 1 card has completed successful technical requirements verification.				
<p><b>Title:</b> MGUE Inc 2 Risk Reduction</p> <p><b>Description:</b> 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 Design Review (PDR) for the next generation Application Specific Integrated Circuit (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.</p> <p><b>FY 2023 Plans:</b> N/A</p> <p><b>FY 2024 Plans:</b> N/A</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> N/A</p>		7.736	0.000	0.000
<p><b>Title:</b> MGUE Inc 2 Miniature Serial Interface (MSI) Receiver Card Rapid Prototyping</p> <p><b>Description:</b> 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 ASIC post-PDR progress and will develop, integrate, produce, and test M-Code capable, low size and 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 effort for additional visibility.</p> <p><b>FY 2023 Plans:</b> Continue three development contracts 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</p>		272.112	221.885	245.634

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p>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. Continue program office and other related support activities that may include, but are not limited to: studies, technical analysis, prototyping, etc.</p> <p><b>FY 2024 Plans:</b> Continue three development contracts 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 First Test Article (FTA) and Proof of Design (POD) for all three vendors. Contractors will continue to verify performance requirements are met through demonstrations and testing. Continue security certification and design validation activities. Continue investments in core ASIC technology, early ASIC fabrication, manufacturing and Intellectual Property procurement. Continue MSI rapid prototyping through intellectual property maturation. 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><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> FY 2024 funding increased to support Critical Design Review closeout activities, and FTA and POD deliveries for all three vendors.</p>				
<p><b>Title:</b> MGUE Inc 2 Handheld</p> <p><b>Description:</b> The MGUE 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. Transition HH risk reduction activities to a MTA Rapid Prototyping effort in line with the Service Acquisition Executive (SAE)-approved MGUE Inc 2 Acquisition Strategy.</p> <p><b>FY 2023 Plans:</b> 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. The MTA start is late FY 2023 after contract award when funds first obligate. Rapidly respond to implement system resiliency and situational awareness</p>		0.000	13.921	15.783

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
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.			
<b>FY 2024 Plans:</b> Continue the HH MTA Rapid Prototyping effort in line with the 2018 SAE-approved MGUE Inc 2 Acquisition Strategy. Continue to develop the Ground Application TRD-compliant prototype that will be M-Code capable and ready for security approval. Continue to conduct Joint service demonstration events to inform HH development, burning down user acceptance risk. Continue to integrate MSI technology into the HH advanced prototype; continue to perform limited operational testing, security testing and power model analysis. Analyze prototype manufacturing, hardware, software, and critical component completeness in support of the initial product baseline. Rapidly respond 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.			
<b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> FY 2024 funding increase due to MTA start in late FY 2023, MSI FTA integration, and testing.			
<b>Accomplishments/Planned Programs Subtotals</b>	419.889	381.394	353.807

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> <u>Base</u>	<u>FY 2024</u> <u>OCO</u>	<u>FY 2024</u> <u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 0305164F: NAVSTAR Global Positioning System (User Equipment) (SPACE)	2.274	0.950	0.893	-	0.893	0.833	0.881	0.833	0.851	0.000	7.515

**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.

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<p>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.</p> <p>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 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.</p>		

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force** **Date:** March 2023

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<b>Product Development (\$ in Millions)</b>				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc 1 Technology Development (1)	C/CPIF	Collins Aerospace : Cedar Rapids, IA	0.012	12.210	Nov 2021	6.000	Nov 2022	-		-		-	0.000	18.222	-
MGUE Inc 1 Technology Development (2)	C/CPIF	Raytheon : El Segundo, CA	41.136	46.329	Nov 2021	45.787	Nov 2022	10.788	Nov 2023	-		10.788	2.752	146.792	-
MGUE Inc 1 Technology Development (3)	C/CPIF	L3 Harris : Anaheim, CA	1.000	0.637	Nov 2021	-		-		-		-	0.000	1.637	-
MGUE Inc 1 Platform Integration	Various	Various : Various	26.550	33.571	Nov 2021	53.255	Nov 2022	49.960	Nov 2023	-		49.960	15.510	178.846	-
MGUE Inc 1 Information Assurance	Various	Various : Various	2.710	-		-		-		-		-	0.000	2.710	-
MGUE Inc 1 Technical Mission Analysis	Various	Aerospace/MITRE : Various	7.384	1.908	Nov 2021	1.210	Nov 2022	0.861	Nov 2023	-		0.861	0.739	12.102	-
MGUE Inc 1 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	1.596	1.597	Dec 2021	3.971	Dec 2022	3.180	Dec 2023	-		3.180	2.273	12.617	-
MGUE Advanced Technology/Pre-Tech	Various	Various : Various	5.000	12.760	Jan 2022	16.367	Jan 2023	7.816	Jan 2024	-		7.816	Continuing	Continuing	-
MGUE Inc 2 MSI Receiver Card Rapid Prototyping	Various	Various : Various	69.783	50.013	Dec 2021	17.300	Dec 2022	17.698	Dec 2023	-		17.698	Continuing	Continuing	-
MGUE Security Certification	Various	Various : Various	5.307	5.299	Nov 2021	5.460	Nov 2022	5.622	Nov 2023	-		5.622	Continuing	Continuing	-
MGUE Inc 2 Technology Development (1)	C/CPIF	BAE Systems : Cedar Rapids, IA	37.309	68.933	Nov 2021	69.474	Nov 2022	84.456	Nov 2023	-		84.456	Continuing	Continuing	-
MGUE Inc 2 Technology Development (2)	C/CPIF	L3 Harris : Anaheim, CA	28.850	44.707	Nov 2021	39.158	Nov 2022	39.100	Nov 2023	-		39.100	Continuing	Continuing	-
MGUE Inc 2 Technology Development (3)	C/CPIF	Raytheon : El Segundo, CA	35.185	63.673	Nov 2021	48.024	Nov 2022	51.090	Nov 2023	-		51.090	Continuing	Continuing	-
MGUE Inc 2 Risk Reduction	Various	Various : Various	71.173	7.737	Nov 2021	-		-		-		-	0.000	78.910	-
MGUE Inc 2 Information Assurance	Various	Various : Various	0.000	3.870	Nov 2021	3.960	Nov 2022	4.060	Nov 2023	-		4.060	Continuing	Continuing	-
MGUE Inc 2 Handheld	Various	Various : Various	0.000	-		13.921	Nov 2022	15.783	Nov 2023	-		15.783	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3620F / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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<b>Product Development (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
MGUE Inc 2 Technical Mission Analysis	Various	Aerospace/MITRE : El Segundo, CA	6.820	12.379	Nov 2021	11.309	Nov 2022	11.143	Nov 2023	-		11.143	Continuing	Continuing	-
MGUE Inc 2 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	5.069	2.340	Jan 2022	5.753	Jan 2023	5.337	Jan 2024	-		5.337	Continuing	Continuing	-
MGUE Inc 1 and Inc 2 SBIR/STTR	Allot	TBD : Washington, DC	0.000	-		-		12.328		-		12.328	Continuing	Continuing	-
<b>Subtotal</b>			344.884	367.963		340.949		319.222		-		319.222	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
MGUE Inc 1 Test and Evaluation	Various	Various : Various	0.944	2.593	Jan 2022	-		0.356	Jan 2024	-		0.356	0.000	3.893	-
MGUE Inc 2 Test and Evaluation	Various	Various : Various	2.459	6.290	Jan 2022	0.548	Jan 2023	0.377	Jan 2024	-		0.377	Continuing	Continuing	-
<b>Subtotal</b>			3.403	8.883		0.548		0.733		-		0.733	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
MGUE Inc 1 FFRDC	RO	Aerospace/MITRE : El Segundo, CA	7.876	3.249	Dec 2021	2.059	Dec 2022	1.593	Dec 2023	-		1.593	1.367	16.144	-
MGUE Inc 2 FFRDC	RO	Aerospace/MITRE : El Segundo, CA	4.882	7.745	Dec 2021	8.449	Dec 2022	7.813	Dec 2023	-		7.813	Continuing	Continuing	-
MGUE Inc 1 A&AS	Various	Various : Various	0.831	6.466	Dec 2021	6.673	Dec 2022	4.896	Dec 2023	-		4.896	3.434	22.300	-
MGUE Inc 2 A&AS	Various	Various : Various	5.598	25.007	Dec 2021	22.192	Dec 2022	19.019	Dec 2023	-		19.019	Continuing	Continuing	-
MGUE Inc 1 and Inc 2 Other Support	Various	Various : El Segundo, CA	0.178	0.576	Oct 2021	0.524	Oct 2022	0.531	Oct 2023	-		0.531	0.150	1.959	-
<b>Subtotal</b>			19.365	43.043		39.897		33.852		-		33.852	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2024 Air Force							<b>Date:</b> March 2023				
<b>Appropriation/Budget Activity</b> 3620F / 4			<b>R-1 Program Element (Number/Name)</b> PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)				<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP				
	<b>Prior Years</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	367.652	419.889	381.394	353.807	-	353.807	Continuing	Continuing	N/A		

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3620F / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	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
<b>MGUE Increment 1</b>																												
MGUE Inc 1 M-Code & Legacy Receiver Security Certification	██████████																											
MGUE Inc 1 Developmental & Modernization	████████████████████																											
MGUE Inc 1 Development Test	██████████████████████████████																											
MGUE Inc 1 Card level PEO Certification	████████████████████████████████████████																											
MGUE Inc 1 Lead Platform Integration and Test	████████████████████████████████████████████████████████████																											
<b>Advanced Technology/Pre-Tech</b>																												
ADV/Pre-Tech MoPD Security Certification Testing, Implement RFCs, and Integration into M-GNSS SDR Platforms													████████████████████████████████████████															
ADV/Pre-Tech IMAS TRD System fabrication and conduct design validation testing													████████████████████████████████████████															
ADV/Pre-Tech MUNS-M software and displays maturation													████████████████████████████████████████															
ADV/Pre-Tech IMAS Transition opportunities / Evaluation													████████████████████████████████████████															
ADV/Pre-Tech IMAS Platform Transition / Evaluation													████████████████████████████████████████															
<b>MGUE Increment 2</b>																												
MGUE Inc 2 Risk Reduction Transfer to Handheld Activities	████████████████████																											
MGUE Inc 2 MSI Receiver Card w/Next Gen ASIC Rapid Prototyping	████████████████████████████████████████████████████████████																											
MGUE Inc 2 M-Code & Legacy Receiver Security Certification	████████████████████████████████████████████████████████████																											

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**Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3620F / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	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 Inc 2 Critical Design Review																												
MGUE Inc 2 Modernized Handheld Receiver																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3620F / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>MGUE Increment 1</b>				
MGUE Inc 1 M-Code & Legacy Receiver Security Certification	1	2022	3	2022
MGUE Inc 1 Developmental & Modernization	1	2022	3	2023
MGUE Inc 1 Development Test	1	2022	4	2023
MGUE Inc 1 Card level PEO Certification	1	2022	2	2024
MGUE Inc 1 Lead Platform Integration and Test	1	2022	2	2025
<b>Advanced Technology/Pre-Tech</b>				
ADV/Pre-Tech MoPD Security Certification Testing, Implement RFCs, and Integration into M-GNSS SDR Platforms	4	2022	3	2025
ADV/Pre-Tech IMAS TRD System fabrication and conduct design validation testing	2	2023	2	2025
ADV/Pre-Tech MUNS-M software and displays maturation	2	2023	3	2025
ADV/Pre-Tech IMAS Transition opportunities / Evaluation	4	2023	2	2026
ADV/Pre-Tech IMAS Platform Transition / Evaluation	3	2024	1	2027
<b>MGUE Increment 2</b>				
MGUE Inc 2 Risk Reduction Transfer to Handheld Activities	1	2022	4	2023
MGUE Inc 2 MSI Receiver Card w/Next Gen ASIC Rapid Prototyping	1	2022	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