Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	0.000	390.704	0.000	390.704	340.178	283.663	212.735	54.066	27.578	1,308.924
643833: *MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP*	0.000	0.000	0.000	390.704	0.000	390.704	340.178	283.663	212.735	54.066	27.578	1,308.924
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 447												

A. Mission Description and Budget Item Justification

Note: "NAVSTAR" will be removed from the program title in this Budget Line Item in the next budget submission.

In FY 2021, PE 1203164F, NAVSTAR Global Positioning System (User Equipment) (SPACE) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203164SF, NAVSTAR Global Positioning System (User Equipment) (SPACE) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

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 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 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

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*

Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface (MSI) Receiver Cards to include next-generation Application Specific Integrated Circuit (ASIC) and 2) Joint, Modernized Handheld Receiver.

The FY 2021 funding request was reduced by $2.381 million to account for the availability of prior year execution balances.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming 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 authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	390.704	0.000	390.704
Total Adjustments	0.000	0.000	390.704	0.000	390.704
• 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	0.000	0.000			
• Other Adjustments	0.000	0.000	390.704	0.000	390.704

Change Summary Explanation

FY 2021: +$390.704M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force; this total includes a $232.946M increase to fully fund MGUE Inc. 2.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: MGUE Inc 1	0.000	0.000	35.933

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
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. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Support completion of the following: Lead Platform Integration, and Card level PEO Certification for Operational Test and Evaluation (OT&E). Continue to assist each lead platform office in integrating and testing M-Code receivers in their respective platforms. Continue Verification Testing, Qualification Testing, Technical Requirements Verification for all 5 MGUE cards. 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. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Title: Advanced Technology ***Description:*** Advanced Technology 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. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Continue developing new technologies to increase the robustness and resilience of GPS receiver / PNT system solutions. Start integration of the next-generation GPS security solution into a software defined radio to verify functionality, programmability/ flexibility, and certifiability. Progress the Military Underwater Navigation System to CDR and begin the planning process M-Code implementation. Advance the integrated antenna, antenna electronics and M-Code capability to PDR. Start working with platforms for integration / test planning and potential transition opportunities. Implement and test advanced trust / integrity algorithms that might permit military use of other GNSS signals for delivering assured PNT. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A	0.000	0.000	5.000
Title: System/Platform Integration and Performance Certification	0.000	0.000	27.109

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Description: Integration of MGUE Inc 1 receiver form factors into the Service-nominated lead platforms in support of developmental and operational test events. Conduct technical and operational modernization impact analysis for MGUE Service lead platform integration. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Complete developmental test of the ground-based and aviation/maritime lead platform efforts. Continue lead platform integration efforts in support of operational test events. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Title: Information Assurance, Security/Compatibility Certification, and Test/Evaluation ***Description:*** Develop, implement, and maintain GPS security certification programs. Development of DoD 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 2020 Plans:*** N/A ***FY 2021 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. Review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue to conduct delta certifications, as required. For the Ground Base-GPS Receiver Application Module - Military Code (GB-GRAM-M) and the GPS Receiver Application Module-Standard Electronic Module/M-Code (GRAM-S/M) complete verification testing for all remaining MGUE Inc 1 cards. 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 2020 to FY 2021 Increase/Decrease Statement:*** N/A	0.000	0.000	5.820
Title: MGUE Inc 2 Risk Reduction	0.000	0.000	100.919

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
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 Risk Reduction activities include, but are not limited to, acquisition strategy development, early design efforts through Preliminary Design Review (PDR) for the next generation ASIC using 14nm ASIC technology node, handheld design activities and early user demonstrations, advanced concept studies, receiver component prototyping to include MGUE Inc 2 requirements. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Complete ASIC PDR on three independent contractor designs. Continue M-Code Handheld risk reduction activities, to include prototype demonstrations. Award additional Handheld risk reduction activities to address challenging Increment 2 performance requirements, improve user functionality, and reduce unit cost. 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. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Title: MGUE Inc 2 Miniature Serial Interface (MSI) Receiver Card Rapid Prototyping	0.000	0.000	215.923
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 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 Generation (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 2020 Plans:*** N/A ***FY 2021 Plans:*** Award up to 3 development contract(s) for new low size/power MSI receiver card to include next generation ASIC post PDR and integration activities. Continue to secure core ASIC technology, and begin early ASIC fabrication and manufacturing activities,			

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
and Intellectual Property. Continue ASIC technology design/ manufacturing/test activities. Continue security certification and design activities; procure test equipment and articles. 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. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	390.704

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• SPSF 01 GPSSPC: *Navstar GPS Space*	-	-	2.256	-	2.256	2.303	2.346	2.405	2.450	0.000	11.760

Remarks

Space Procurement, Space Force (SPSF) 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. 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 to meet the needs of the Services. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) MSI Middle Tier Acquisition rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The Air Force Service Acquisition Executive approved the

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 *I NAVSTAR Global Positioning System (User Equipment) (SPACE)*

MGUE Inc 2 Acquisition Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface Receiver Card (includes next-generation ASIC) and 2) Joint, Modernized Handheld Receiver.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 1 Technology Development (1)	C/CPIF	Collins Aerospace : Cedar Rapids, IA	-	-		-		2.889	Nov 2020	-		2.889	0.000	2.889	167.971
MGUE Inc 1 Technology Development (2)	C/CPIF	Raytheon : El Segundo, CA	-	-		-		2.616	Nov 2020	-		2.616	2.616	5.232	211.320
MGUE Inc 1 Technology Development (3)	C/CPIF	L3 Harris Tech : Anaheim, CA	-	-		-		4.145	Nov 2020	-		4.145	0.000	4.145	120.189
MGUE Inc 1 Pre-Tech Development	C/CPAF	Various : Various	-	-		-		5.000	Jan 2021	-		5.000	0.500	5.500	-
MGUE Inc 1 Platform Integration	C/CPAF	Various : Various	-	-		-		8.219	Nov 2020	-		8.219	0.000	8.219	-
MGUE Inc 1 Information Assurance	C/CPAF	Various : Various	-	-		-		2.770	Jan 2021	-		2.770	2.840	5.610	-
MGUE Inc 1 Security Certification	C/CPAF	Various : Various	-	-		-		1.830	Jan 2021	-		1.830	1.870	3.700	-
MGUE Inc 1 Technical Mission Analysis	MIPR	Various : El Segundo, CA	-	-		-		14.987	Oct 2020	-		14.987	2.470	17.457	-
MGUE Inc 1 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	-	-		-		18.890	Nov 2020	-		18.890	0.000	18.890	132.525
MGUE Inc 2 Risk Reduction	Various	Various : Various	-	-		-		95.292	Jan 2021	-		95.292	204.261	299.553	1,013.400
MGUE Inc 2 MSI Receiver Card Rapid Prototyping	TBD	TBD : TBD	-	-		-		202.923	Dec 2020	-		202.923	584.233	787.156	992.167
MGUE Inc 2 Technical Mission Analysis	MIPR	Various : El Segundo, CA	-	-		-		4.870	Jan 2021	-		4.870	34.646	39.516	-
MGUE Inc 2 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	-	-		-		4.357	Jan 2021	-		4.357	15.388	19.745	97.300
		Subtotal	-	-		-		368.788		-		368.788	848.824	1,217.612	N/A

Remarks

L3 Technologies and Harris Corp completed their merger, new company is now L3 Harris Technologies.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force		Date: February 2020
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*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 1 Test and Evaluation	Various	Various : San Diego, CA	-	-		-		1.220	Jan 2021	-		1.220	0.000	1.220	-
MGUE Inc 2 Test and Evaluation	Various	Various : San Diego, CA	-	-		-		1.540	Jan 2021	-		1.540	16.769	18.309	-
		Subtotal	-	-		-		2.760		-		2.760	16.769	19.529	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc 1 FFRDC	Various	Aerospace/MITRE : Various	-	-		-		5.642	Dec 2020	-		5.642	0.000	5.642	-
MGUE Inc 2 FFRDC	Various	Aerospace/MITRE : Various	-	-		-		2.160	Dec 2020	-		2.160	14.848	17.008	-
MGUE Inc 1 A&AS	Various	Various : Various	-	-		-		5.414	Dec 2020	-		5.414	1.140	6.554	-
MGUE Inc 2 A&AS	Various	Various : Various	-	-		-		5.700	Dec 2020	-		5.700	35.789	41.489	-
MGUE Inc 1 and Inc 2 Other Support	Various	Various : Various	-	-		-		0.240	Dec 2020	-		0.240	0.850	1.090	-
		Subtotal	-	-		-		19.156		-		19.156	52.627	71.783	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		390.704		-		390.704	918.220	1,308.924	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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*

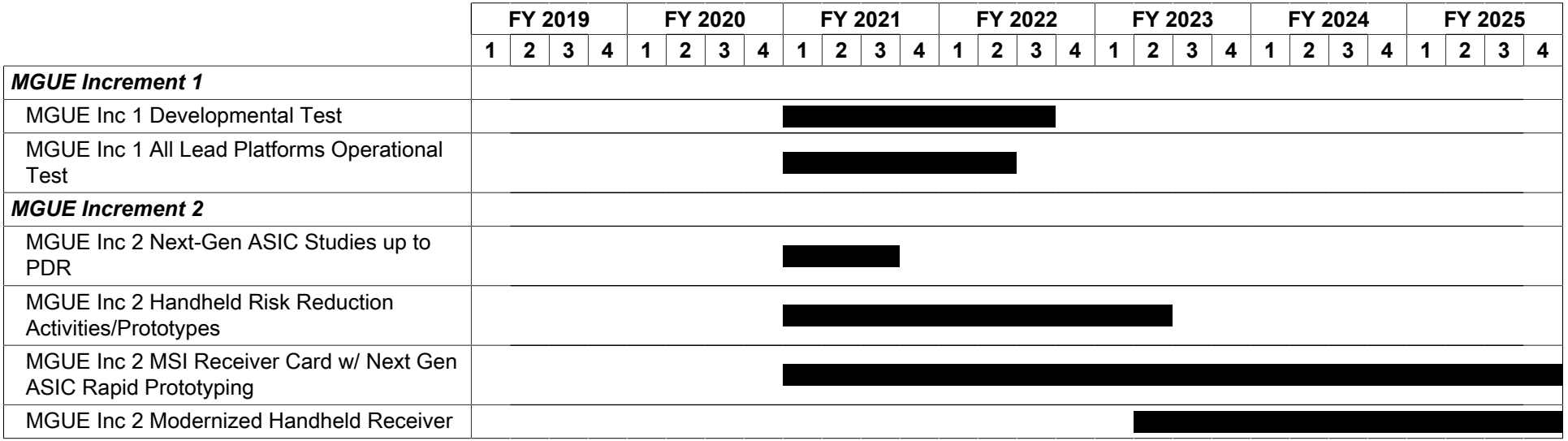

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1203164SF / *NAVSTAR Global Positioning System (User Equipment) (SPACE)*	**Project (Number/Name)** 643833 / *MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MGUE Increment 1				
MGUE Inc 1 Developmental Test	1	2021	3	2022
MGUE Inc 1 All Lead Platforms Operational Test	1	2021	2	2022
MGUE Increment 2				
MGUE Inc 2 Next-Gen ASIC Studies up to PDR	1	2021	3	2021
MGUE Inc 2 Handheld Risk Reduction Activities/Prototypes	1	2021	2	2023
MGUE Inc 2 MSI Receiver Card w/ Next Gen ASIC Rapid Prototyping	1	2021	4	2025
MGUE Inc 2 Modernized Handheld Receiver	2	2023	4	2025

Note

All 5 form factors will go through some form of Developmental Test. Per the MGUE Inc 1 Acq Strategy however, only the first card of each variant (GB-GRAM-M/GRAM-S/M) will go through formal Operational Test. OT could/would complete on the "first card" while other form factors continue to go through DT.