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## Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-447



### **Military Global Positioning System (GPS) User Equipment Increment 1 (MGUE Inc 1)**

As of FY 2019 President's Budget

Defense Acquisition Management  
Information Retrieval  
(DAMIR)

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## Table of Contents

Sensitivity Originator	3
Common Acronyms and Abbreviations for MDAP Programs	4
Program Information	6
Responsible Office	6
References	7
Mission and Description	8
Executive Summary	9
Threshold Breaches	13
Schedule	14
Performance	16
Track to Budget	18
Cost and Funding	19
Low Rate Initial Production	24
Foreign Military Sales	25
Nuclear Costs	25
Unit Cost	26
Cost Variance	29
Contracts	32
Deliveries and Expenditures	35
Operating and Support Cost	36

## **Sensitivity Originator**

No originator info Available at this time.

## Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance  
ACAT - Acquisition Category  
ADM - Acquisition Decision Memorandum  
APB - Acquisition Program Baseline  
APPN - Appropriation  
APUC - Average Procurement Unit Cost  
\$B - Billions of Dollars  
BA - Budget Authority/Budget Activity  
Blk - Block  
BY - Base Year  
CAPE - Cost Assessment and Program Evaluation  
CARD - Cost Analysis Requirements Description  
CDD - Capability Development Document  
CLIN - Contract Line Item Number  
CPD - Capability Production Document  
CY - Calendar Year  
DAB - Defense Acquisition Board  
DAE - Defense Acquisition Executive  
DAMIR - Defense Acquisition Management Information Retrieval  
DoD - Department of Defense  
DSN - Defense Switched Network  
EMD - Engineering and Manufacturing Development  
EVM - Earned Value Management  
FOC - Full Operational Capability  
FMS - Foreign Military Sales  
FRP - Full Rate Production  
FY - Fiscal Year  
FYDP - Future Years Defense Program  
ICE - Independent Cost Estimate  
IOC - Initial Operational Capability  
Inc - Increment  
JROC - Joint Requirements Oversight Council  
\$K - Thousands of Dollars  
KPP - Key Performance Parameter  
LRIP - Low Rate Initial Production  
\$M - Millions of Dollars  
MDA - Milestone Decision Authority  
MDAP - Major Defense Acquisition Program  
MILCON - Military Construction  
N/A - Not Applicable  
O&M - Operations and Maintenance  
ORD - Operational Requirements Document  
OSD - Office of the Secretary of Defense  
O&S - Operating and Support  
PAUC - Program Acquisition Unit Cost

PB - President's Budget  
PE - Program Element  
PEO - Program Executive Officer  
PM - Program Manager  
POE - Program Office Estimate  
RDT&E - Research, Development, Test, and Evaluation  
SAR - Selected Acquisition Report  
SCP - Service Cost Position  
TBD - To Be Determined  
TY - Then Year  
UCR - Unit Cost Reporting  
U.S. - United States  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

## Program Information

**Program Name**

Military Global Positioning System (GPS) User Equipment Increment 1 (MGUE Inc 1)

**DoD Component**

Air Force

## Responsible Office

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**Date Assigned:** July 8, 2015

## References

**SAR Baseline (Development Estimate)**

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated January 18, 2017

**Approved APB**

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated January 18, 2017



## Mission and Description

The Global Positioning System (GPS) is a space based Positioning, Navigation, and Timing (PNT) distribution system, which operates through weather and electromagnetic environments (jamming, spoofing, etc.). GPS supports both civil and military users in air, space, sea, and land operations. GPS users process satellite signals to determine accurate position, velocity, and time. GPS must comply with section 2281 of title 10, United States Code (USC), which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes and section 50112 of title 51, USC, which requires that GPS complies with certain standards and facilitates international cooperation.

The objective of the Military GPS User Equipment Increment 1 (MGUE Inc 1) program is to deliver affordable advanced GPS capabilities to military users as rapidly as possible to meet the PNT needs of a broad user base. The MGUE program is developing standard, modernized receiver form factors and will integrate them into the Service nominated lead platforms. This new family of modernized GPS receivers will deliver improved capabilities to counter current and emerging PNT threats and enable military operations in a Navigation Warfare environment.



## Executive Summary

### Program Highlights Since Last Report

MGUE Increment (Inc) 1 delivers two circuit card receivers, ground & aviation/maritime, for 4 Service nominated lead platforms: Air Force B-2 bomber, Navy Arleigh Burke Destroyer (DDG), United States Marine Corps Joint Light Tactical Vehicle, and the Army Stryker.

Three contractors are producing MGUE Increment 1 M-Code receivers: L3, Raytheon (RTN) and Rockwell Collins (RCI). All three contractors are producing a ground card, and RTN and RCI are producing an aviation/maritime card. After lead platform Operational Test, the Services will procure and sustain MGUE Inc 1 receivers for their lead platforms and any other platforms they choose to equip.

The first issue is a delay with RTN GPS Receiver Application Module Standard Electronic Module (GRAM-S/M) receiver card software deliveries impacting the DDG and Air Force B-2 Operational Test and Evaluation (OT&E) dates. The program office is working closely with RTN to provide additional engineering support and tools to Raytheon's subcontractor and prioritize content of work in each build. The Program Office executed a mitigation activity to confirm B-2 MGUE compatibility while awaiting a final MGUE card in a fully upgraded M-Code Miniaturized Airborne GPS Receiver (MAGR) for subsequent fielding. Both B-2 and DDG have Selective Availability Anti-Spoofing Module (SAASM) fielding strategies in parallel to MGUE development. Despite the delays, the program maintains enough schedule margin that the current estimate still remains within the APB parameters.

Both the Air Force B-2 and Navy DDG will utilize the RTN GRAM-S/M receiver. The Program Office is concerned with progress of RTN's subcontractor Trimble in finishing the software development work for their GRAM-S/M. The Program Office implemented mitigation steps to support B-2 Operational Flight Program development while completing a fully upgraded M-Code MAGR. The fourth and final B-2 Development Test flight incorporating the MGUE-based prototype MAGR-2K-M completed July 14, 2017, serving as a risk reduction to final GRAM-S/M software delivery and B-2 OT&E. The Program Office is also working with the Navy to modify the DDG integration contract to facilitate incremental software drops by RTN. RTN also submitted an Over Target Schedule/Over Target Baseline (OTS/OTB) request letter on October 13, 2017 due to issues with current scope. The program has agreed to proceed with the OTS/OTB.

The second issue is Trusted Foundry availability. In CY 2015, IBM sold their foundries to GlobalFoundries (owned by an Abu Dhabi sovereign wealth fund). GlobalFoundries is the sole Trusted Foundry providing all of the digital Application Specific Integrated Circuits (ASICs) for MGUE and applicable SAASM-based GPS receivers. A Committee on Foreign Investment in the United States case completed on June 29, 2015. GlobalFoundries provided a projected production life of MGUE Inc 1 ASICs through CY 2020. Any new ASICs require a 3-5 year developmental timeline plus time to integrate into the respective platforms. The Government's expected procurement volume may not be significant enough to meet GlobalFoundries' business case to get Trusted or International Traffic in Arms Regulation accreditation on their new 14 nanometer (nm) manufacturing process. As a result, the MGUE program is working with OSD to shape a Trusted equivalent accreditation. MGUE program contractors received all ASICs requested to execute the current Inc 1 development program, however this issue applies to fielding MGUE across the Services as a diminishing manufacturing source issue.

The third issue is evolving requirements since establishing the MGUE APB in January 2017. On March 28, 2017, the requirements community sent a legacy weapons initialization (also known as Hot Start) requirements clarification memorandum. The Program Office is working with the requirements community to define a two-step fielding approach with a roving channel, receiver-based Hot Start solution called legacy weapons initialization followed by an Enterprise Hot Start solution. The Program Office awarded Engineering Change Proposals to each contractor for roving channel, receiver-based legacy weapons initialization. The Program Office also released Request For Proposals in July 2017 to all vendors for an Enterprise Hot Start solution. The Program Office received all three proposals. RCI and L3 are currently resubmitting cost numbers while RTN's proposal is currently being evaluated. All three contractors expected to be on contract in the third quarter of FY 2018.

There are no significant software-related issues with this program at this time.



### History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	Significant Development Description
May 2003	The Global Positioning System (GPS) Directorate first issued Program Research and Development Announcement (PRDA) contracts in 2003 to achieve technology demonstration of early MGUE concepts.
May 2006	The GPS Program Office continued the work of the PRDA contracts via three competitively awarded Modernized User Equipment development contracts in 2006.
June 2006	The Secretary of the Air Force submitted an Analysis of Alternatives (AoA) to provide Congress with a summary of the studies conducted to modernize GPS. The AoA found that developing new Military-Code signals as the most cost effective solution to mitigate growing denial of service and integrity threats to the warfighter.
April 2012	USD(AT&L) approved the Milestone A ADM and 2366a certifications were made for the MGUE Inc 1 program, which initiated awarding technology development contracts. Materiel Development Decision was approved for Inc 2 and MGUE Inc 2 was designated as a pre-MDAP with the Air Force as lead.
September 2012	Three technology development contracts were competitively awarded to Raytheon, L-3 Interstate Electronics Corporation, and Rockwell Collins Inc.
February 2014	USD(AT&L) signed an ADM to accelerate the MGUE Inc 1 effort via a combined Milestone B/C. This ADM added software risk reduction efforts and accelerated delivery of security certification and test material into the Technology Development phase of the MGUE Inc 1 program previously planned for the EMD phase.
June 2014	In response to the February 2014 ADM, the GPS Directorate awarded Engineering Change Proposals (ECPs) on all three MGUE Inc 1 development contracts to add software development risk reductions scope.
July 2014	Operational requirements were approved by the JROC. Four KPPs identified in the CDD: (1) Positioning, Navigation, and Timing (PNT) Determination, (2) PNT Accuracy, (3) Integrity and (4) Cryptography, Security Architecture, and Key Distribution.
September 2014	MGUE Inc 1 Preliminary Design Reviews were completed by all three MGUE vendors.
November 2014	A MGUE Technology Readiness Assessment was completed indicating that all critical technologies were at a Technology Readiness Level of 6 or higher.
January 2015	In response to the February 2014 ADM, the GPS Directorate awarded ECPs on all three MGUE Inc 1 development contracts for additional test hardware deliveries.
April 2015	USD(AT&L) signed an updated Acquisition Strategy capturing accelerated approach.
June 2015	Existing contracts were again modified to add resiliency and increased software assurance.
October 2016	L-3 became the first MGUE contractor to receive security and compatibility certification.
January 2017	USD(AT&L) approved the MGUE Inc 1 2366B certifications and determinations, the Milestone B APB and ADM, and established MGUE Inc 1 as an ACAT ID MDAP. The ADM also relieved the program of Milestone C as production decisions will be made by the hosting systems.
March 2017	PEO AMMO conducted a Live Fire event at Yuma Proving Ground to assess the maturity of MGUE Inc 1 technology for Precision Guided Munitions (PGMs). A combination of 5 ballistic trajectory shots and 3 First-Ever M-Code Guide-to-Hit test shots were conducted for each of the two vendors using a US government-designed 81mm Mortar PGM.
July 2017	All four B-2 Developmental flight tests to confirm B-2 Operational Flight Program compatibility using an MGUE-based prototype MAGR-2K-M completed on July 14, 2017.

November 2017	USD(AT&L) delegated the MDA for the program to the Secretary of the Air Force as an ACAT IC.
December 2017	All three MGUE contracts updated with Engineering Change Proposal 4 for Roving Channel Hot-Start modification.

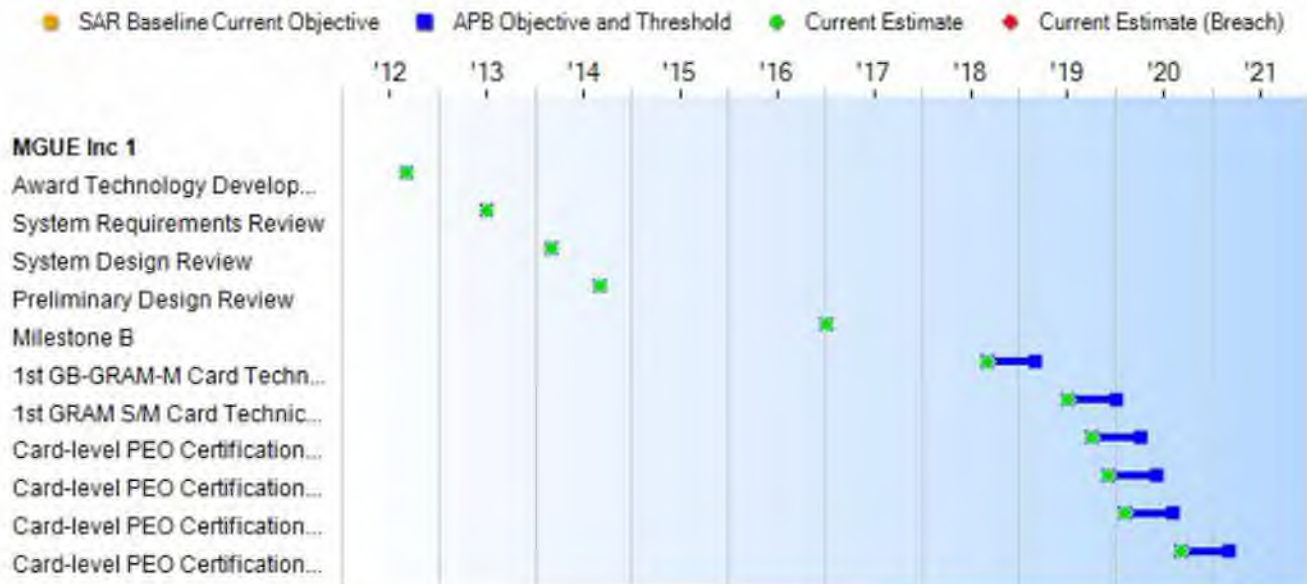
# Threshold Breaches

<b>APB Breaches</b>		
<b>Schedule</b>		<input type="checkbox"/>
<b>Performance</b>		<input type="checkbox"/>
<b>Cost</b>	RDT&E	<input type="checkbox"/>
	Procurement	<input type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input type="checkbox"/>
<b>O&amp;S Cost</b>		<input type="checkbox"/>
<b>Unit Cost</b>	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

<b>Nunn-McCurdy Breaches</b>		
<b>Current UCR Baseline</b>		
	PAUC	None
	APUC	None
<b>Original UCR Baseline</b>		
	PAUC	None
	APUC	None



## Schedule



Schedule Events				
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate
Award Technology Development Contract	Sep 2012	Sep 2012	Sep 2012	Sep 2012
System Requirements Review	Jul 2013	Jul 2013	Jul 2013	Jul 2013
System Design Review	Mar 2014	Mar 2014	Mar 2014	Mar 2014
Preliminary Design Review	Sep 2014	Sep 2014	Sep 2014	Sep 2014
Milestone B	Jan 2017	Jan 2017	Jan 2017	Jan 2017
1st GB-GRAM-M Card Technical Requirements Verification	Sep 2018	Sep 2018	Mar 2019	Sep 2018
1st GRAM S/M Card Technical Requirements Verification	Jul 2019	Jul 2019	Jan 2020	Jul 2019
Card-level PEO Certification for DDG	Oct 2019	Oct 2019	Apr 2020	Oct 2019
Card-level PEO Certification for JLTV	Dec 2019	Dec 2019	Jun 2020	Dec 2019
Card-level PEO Certification for B-2	Feb 2020	Feb 2020	Aug 2020	Feb 2020
Card-level PEO Certification for Stryker	Sep 2020	Sep 2020	Mar 2021	Sep 2020

### Change Explanations

None

**Acronyms and Abbreviations**

B-2 - US Air Force B-2 Bomber  
DDG - Arleigh Burke Class Guided Missile Destroyer  
GB-GRAM-M - Ground Based GRAM Modernized  
GRAM - GPS Receiver Applications Module  
GRAM S/M - GRAM Standard Electronic Module  
JLTV - US Marine Corps Joint Light Tactical Vehicle



## Performance

Performance Characteristics				
SAR Baseline Development Estimate	Current APB Development Objective/Threshold	Demonstrated Performance	Current Estimate	
<b>PNT Determination</b>				
MGUE shall use M-Code, P(Y)-Code, and C/A Code; MGUE shall be capable of acquiring M-Code in the presence of J/S ≤ 41 dB; MGUE shall use GPS signals needed to determine PNT in BFEA environments.	MGUE shall use M-Code, P(Y)-Code, and C/A Code; MGUE shall be capable of acquiring M-Code in the presence of J/S ≤ 41 dB; MGUE shall use GPS signals needed to determine PNT in BFEA environments.	(T=O) MGUE shall use M-Code, P(Y)-Code, and C/A Code; MGUE shall be capable of acquiring M-Code in the presence of J/S ≤ 41 dB; MGUE shall use GPS signals needed to determine PNT in BFEA environments.	TBD	MGUE shall use M-Code, P(Y)-Code, and C/A Code; MGUE shall be capable of acquiring M-Code in the presence of J/S ≤ 41 dB; MGUE shall use GPS signals needed to determine PNT in BFEA environments.
<b>PNT Accuracy</b>				
Ground: 10.0 m H, 20.0 m V, 0.1 m/s (velocity, per axis) and 100 nsec; Aviation: 3.0 m H, 5.25 m V and 30 nsec; Maritime: 7.0 m H, 12.5 m V and 50 nsec.	Ground: 10.0 m H, 20.0 m V, 0.1 m/s (velocity, per axis) and 100 nsec; Aviation: 3.0 m H, 5.25 m V and 30 nsec; Maritime: 7.0 m H, 12.5 m V and 50 nsec.	(T=O) Ground: 10.0 m H, 20.0 m V, 0.1 m/s (velocity, per axis) and 100 nsec; Aviation: 3.0 m H, 5.25 m V and 30 nsec; Maritime: 7.0 m H, 12.5 m V and 50 nsec.	TBD	Ground: 10.0 m H, 20.0 m V, 0.1 m/s (velocity, per axis) and 100 nsec; Aviation: 3.0 m H, 5.25 m V and 30 nsec; Maritime: 7.0 m H, 12.5 m V and 50 nsec.
<b>Integrity</b>				
Ground: MGUE shall reject invalid GPS signals 99% of the time so they are not used in the PNT solution; MGUE shall detect and reject MSI provided from GPS satellites and reject that data from the PNT solution. Aviation: MGUE shall report when GPS should not be used for PNT. Maritime: MGUE shall report when GPS should not be used for PNT.	Ground: MGUE shall reject invalid GPS signals 99% of the time so they are not used in the PNT solution; MGUE shall detect and reject MSI provided from GPS satellites and reject that data from the PNT solution. Aviation: MGUE shall report when GPS should not be used for PNT. Maritime: MGUE shall report when GPS should not be used for PNT.	(T=O) Ground: MGUE shall reject invalid GPS signals 99% of the time so they are not used in the PNT solution; MGUE shall detect and reject MSI provided from GPS satellites and reject that data from the PNT solution. Aviation: MGUE shall report when GPS should not be used for PNT. Maritime: MGUE shall report when GPS should not be used for PNT.	TBD	Ground: MGUE shall reject invalid GPS signals 99% of the time so they are not used in the PNT solution; MGUE shall detect and reject MSI provided from GPS satellites and reject that data from the PNT solution. Aviation: MGUE shall report when GPS should not be used for PNT. Maritime: MGUE shall report when GPS should not be used for PNT.

Classified Performance information is provided in the classified annex to this submission.

**Requirements Reference**

CDD dated May 9, 2014 as approved and validated by JROC memorandum 077-14 dated July 24, 2014

**Change Explanations**

None

**Acronyms and Abbreviations**

BFEA - Blue Force Electronic Attack  
C/A - Coarse Acquisition  
dB - Decibel  
GPS - Global Positioning System  
H - Horizontal  
J/S - Jamming-to-Signal Ratio  
m - Meter  
m/s - Meter(s) Per Second  
M-Code - Military Code  
MSI - Misleading Signal in Space Information  
NSA - National Security Agency  
nsec - Nanosecond  
O - Objective  
P(Y) - Encrypted Precision  
PNT - Position, Navigation, and Timing  
T - Threshold  
V - Vertical



## Track to Budget

RDT&E			
Appn	BA	PE	
Air Force	3600	07	0301004F
	<b>Project</b>	<b>Name</b>	
	677517	Resiliency and Software Assurance Modification	(Sunk)
Air Force	3600	04	0305164F
	<b>Project</b>	<b>Name</b>	
	643833	Military Global Positioning System User Equip	(Sunk)
Air Force	3600	07	0305164F
	<b>Project</b>	<b>Name</b>	
	673028	NAVSTAR Global Positioning System (User Equipment) (SPACE)	(Sunk)
Air Force	3600	07	1203164F
	<b>Project</b>	<b>Name</b>	
	643833	Military Global Positioning System User Equip	(Shared)
	<b>Notes:</b> MGUE Inc 1 and Inc 2		

## Cost and Funding

### Cost Summary

Total Acquisition Cost							
Appropriation	BY 2017 \$M			BY 2017 \$M	TY \$M		
	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Development Objective	Current Estimate
RDT&E	1505.7	1505.7	1656.3	1413.6	1531.2	1531.2	1431.5
Procurement	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flyaway	--	--	--	0.0	--	--	0.0
Recurring	--	--	--	0.0	--	--	0.0
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	0.0	--	--	0.0
Other Support	--	--	--	0.0	--	--	0.0
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1505.7	1505.7	N/A	1413.6	1531.2	1531.2	1431.5

#### Current APB Cost Estimate Reference

MGUE Increment 1 ICE dated January 12, 2017

#### Cost Notes

In accordance with Section 842 of the National Defense Authorization Act for FY 2017, which amended title 10 U.S.C. § 2334, the Director of Cost Assessment and Program Evaluation, and the Secretary of the military department concerned or the head of the Defense Agency concerned, must issue guidance requiring a discussion of risk, the potential impacts of risk on program costs, and approaches to mitigate risk in cost estimates for MDAPs and major subprograms. The information required by the guidance is to be reported in each SAR. This guidance is not yet available; therefore, the information on cost risk is not contained in this SAR.

The MGUE Inc 1 program includes \$112.6M of external funding to support the MGUE Inc 1 Resiliency and Software Assurance Modification effort. Additionally, program includes \$3.1M of external funding for a next generation Application Specific Integrated Circuit study. The \$115.7M of RDT&E funds are included in the APB and thus are added to the PB 2019 numbers which are captured in the table above.

The MGUE Inc 1 program baseline does not include procurement or sustainment, however, maintenance of the MGUE technical baseline remains an enduring responsibility for the GPS program office throughout the acquisition and O&S phases.

This program does not have an antecedent system.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	0	0	0
Procurement	0	0	0
Total	0	0	0



## Cost and Funding

### Funding Summary

Appropriation Summary									
FY 2019 President's Budget / December 2017 SAR (TY\$ M)									
Appropriation	Prior	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	To Complete	Total
RDT&E	823.7	252.4	180.5	103.6	71.3	0.0	0.0	0.0	1431.5
Procurement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2019 Total	823.7	252.4	180.5	103.6	71.3	0.0	0.0	0.0	1431.5
PB 2018 Total	768.8	153.7	115.5	71.6	56.8	0.0	0.0	0.0	1166.4
Delta	54.9	98.7	65.0	32.0	14.5	0.0	0.0	0.0	265.1

#### Funding Notes

The MGUE Inc 1 program includes \$112.6M of external funding to support the MGUE Inc 1 Resiliency and Software Assurance Modification effort. Additionally, program includes \$3.1M for external funding for a next generation Application Specific Integrated Circuit study. The \$115.7M of RDT&E funds are included in the APB and thus are added to the PB 2019 numbers which are captured in the table above.

Quantity Summary										
FY 2019 President's Budget / December 2017 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	0	0	0	0	0	0	0	0	0
PB 2019 Total	0	0	0	0	0	0	0	0	0	0
PB 2018 Total	0	0	0	0	0	0	0	0	0	0
Delta	0	0	0	0	0	0	0	0	0	0

## Cost and Funding

### Annual Funding By Appropriation

Annual Funding							
3600   RDT&E   Research, Development, Test, and Evaluation, Air Force							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	--	--	--	15.2
2013	--	--	--	--	--	--	63.7
2014	--	--	--	--	--	--	165.0
2015	--	--	--	--	--	--	152.1
2016	--	--	--	--	--	--	208.1
2017	--	--	--	--	--	--	219.6
2018	--	--	--	--	--	--	252.4
2019	--	--	--	--	--	--	180.5
2020	--	--	--	--	--	--	103.6
2021	--	--	--	--	--	--	71.3
Subtotal	--	--	--	--	--	--	1431.5



Annual Funding							
3600   RDT&E   Research, Development, Test, and Evaluation, Air Force							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	--	--	--	16.1
2013	--	--	--	--	--	--	66.5
2014	--	--	--	--	--	--	170.0
2015	--	--	--	--	--	--	155.1
2016	--	--	--	--	--	--	209.2
2017	--	--	--	--	--	--	216.9
2018	--	--	--	--	--	--	245.2
2019	--	--	--	--	--	--	172.2
2020	--	--	--	--	--	--	97.0
2021	--	--	--	--	--	--	65.4
Subtotal	--	--	--	--	--	--	1413.6

## **Low Rate Initial Production**

There is no LRIP for this program.

## **Foreign Military Sales**

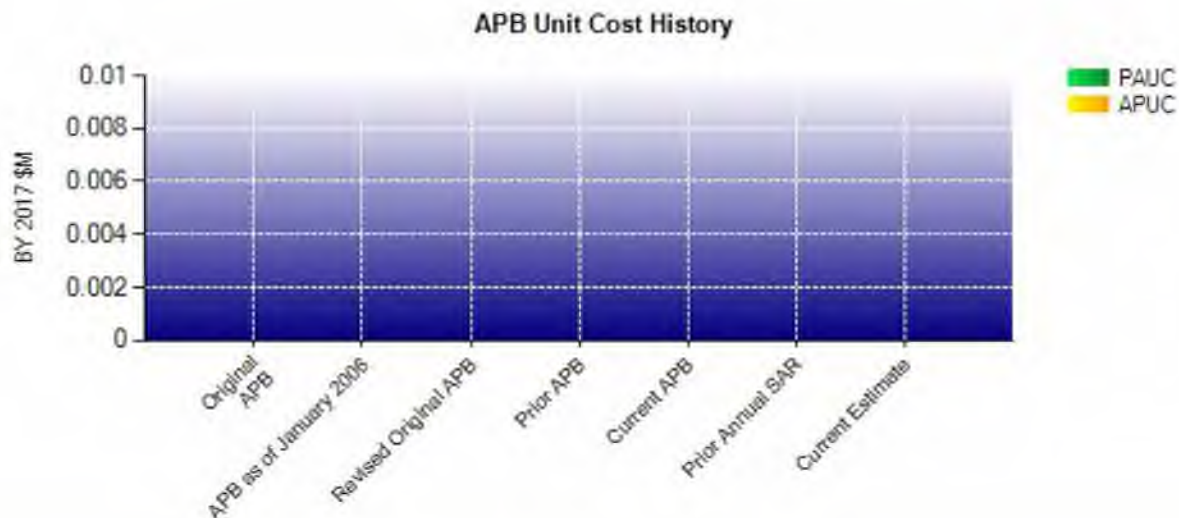
None

## **Nuclear Costs**

None

## Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Current UCR Baseline (Jan 2017 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	1505.7	1413.6	
Quantity	0	0	
Unit Cost	--	--	--
Average Procurement Unit Cost			
Cost	0.0	0.0	
Quantity	0	0	
Unit Cost	--	--	--
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Original UCR Baseline (Jan 2017 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	1505.7	1413.6	
Quantity	0	0	
Unit Cost	--	--	--
Average Procurement Unit Cost			
Cost	0.0	0.0	
Quantity	0	0	
Unit Cost	--	--	--



APB Unit Cost History					
Item	Date	BY 2017 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Jan 2017	N/A	N/A	N/A	N/A
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	N/A	N/A	N/A	N/A	N/A
Current APB	Jan 2017	N/A	N/A	N/A	N/A
Prior Annual SAR	Dec 2016	N/A	N/A	N/A	N/A
Current Estimate	Dec 2017	N/A	N/A	N/A	N/A

### SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
0.000	--	--	--	--	--	--	--	--	0.000

A PAUC Unit Cost History is not available, since no Initial PAUC Estimate had been calculated due to a lack of defined quantities.



Current SAR Baseline to Current Estimate (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
0.000	--	--	--	--	--	--	--	--	0.000

An APUC Unit Cost History is not available, since no Initial APUC Estimate had been calculated due to a lack of defined quantities.

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	N/A	N/A	N/A
Milestone B	N/A	Jan 2017	N/A	Jan 2017
Milestone C	N/A	N/A	N/A	N/A
IOC	N/A	N/A	N/A	N/A
Total Cost (TY \$M)	N/A	1531.2	N/A	1431.5
Total Quantity	N/A	0	N/A	0
PAUC	N/A	N/A	N/A	N/A

**Cost Variance**

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	1531.2	--	--	1531.2
Previous Changes				
Economic	+2.7	--	--	+2.7
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-367.5	--	--	-367.5
Other	--	--	--	--
Support	--	--	--	--
Subtotal	-364.8	--	--	-364.8
Current Changes				
Economic	-2.5	--	--	-2.5
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	+267.6	--	--	+267.6
Other	--	--	--	--
Support	--	--	--	--
Subtotal	+265.1	--	--	+265.1
Total Changes	-99.7	--	--	-99.7
CE - Cost Variance	1431.5	--	--	1431.5
CE - Cost & Funding	1431.5	--	--	1431.5



Summary BY 2017 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	1505.7	--	--	1505.7
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-350.0	--	--	-350.0
Other	--	--	--	--
Support	--	--	--	--
Subtotal	-350.0	--	--	-350.0
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	+257.9	--	--	+257.9
Other	--	--	--	--
Support	--	--	--	--
Subtotal	+257.9	--	--	+257.9
Total Changes	-92.1	--	--	-92.1
CE - Cost Variance	1413.6	--	--	1413.6
CE - Cost & Funding	1413.6	--	--	1413.6

Previous Estimate: December 2016

RDT&E		\$M	
Current Change Explanations		Base Year	Then Year
Revised escalation indices. (Economic)		N/A	-2.5
Additional funding received in FY 2017 - FY 2019 to align with CAPE ICE dated January 12, 2017. (Estimating)		+230.1	+237.4
Revised estimate to reflect Department-wide funding adjustments. (Estimating)		+27.0	+29.4
Adjustment for current and prior escalation. (Estimating)		+0.8	+0.8
RDT&E Subtotal		+257.9	+265.1

## Contracts

### Contract Identification

**Appropriation:** RDT&E  
**Contract Name:** Modernized GPS User Equipment (MGUE)  
**Contractor:** L-3 Interstate Electronics Corporation  
**Contractor Location:** 602 E. Vermont Ave  
 Anaheim, CA 92803  
**Contract Number:** FA8807-12-C-0011  
**Contract Type:** Cost Plus Incentive Fee (CPIF)  
**Award Date:** September 28, 2012  
**Definitization Date:** September 28, 2012

### Contract Price

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
27.5	N/A	N/A	69.6	N/A	N/A	75.3	80.8

### Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to additional scope associated with software and security certification, hardware, Resiliency, Software Assurance Modification (RSAM), and Roving Channel Hot Start.

### Contract Variance

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2017)	-10.3	-1.0
Previous Cumulative Variances	-8.6	-0.1
Net Change	-1.7	-0.9

### Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to Anti-Spoof (AS) integration issues, Hot Start integration issues, and a higher number of System Trouble Reports than planned.

The unfavorable net change in the schedule variance is due to additional efforts to complete RSAM build as well as delay of AS and Hot Start integration.

### Notes

The Contractor's Estimated Price at Complete is lower than that of the PM because the contractor's estimate does not include the assumed fee at completion of work.



**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** Military GPS User Equipment  
**Contractor:** Raytheon Space and Airborne Systems  
**Contractor Location:** 2000 E. El Segundo Blvd  
 El Segundo, CA 90245  
**Contract Number:** FA8807-12-C-0012  
**Contract Type:** Cost Plus Incentive Fee (CPIF)  
**Award Date:** September 28, 2012  
**Definitization Date:** September 28, 2012

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
25.2	N/A	N/A	94.4	N/A	N/A	139.4	141.1

**Target Price Change Explanation**

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to additional scope associated with software and security certification, hardware, and for RSAM.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (10/31/2017)	-42.3	-5.2
Previous Cumulative Variances	-32.4	-8.1
Net Change	-9.9	+2.9

**Cost and Schedule Variance Explanations**

The unfavorable net change in the cost variance is due to software development delays, software security rework, and Raytheon's subcontractor, Trimble, struggling with AS integration.

The favorable net change in the schedule variance is due to software development delays, software security rework, and Raytheon's subcontractor, Trimble, struggling with AS integration.

**General Contract Variance Explanation**

Raytheon values are from month-end October 2017 Contract Performance Report, which was the last full Earned Value reporting period. In November 2017, Raytheon began implementing an Over Target Baseline/Over Target Schedule (OTB/OTS) with limited EV reporting.

**Notes**

OTB/OTS situation is driven by crypto rework issues, Anti-Tamper rework, and significant hardware changes.

While the Government is finalizing the OTB/OTS process/details, Raytheon has been granted permission to report only actual costs, impacts to Estimate at Complete, schedule performance, and funding status.



**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** MGUE TD  
**Contractor:** Rockwell Collins Inc, Government Systems  
**Contractor Location:** 400 Collins Road NE  
 Cedar Rapids, IA 52498  
**Contract Number:** FA8807-12-C-0013  
**Contract Type:** Cost Plus Incentive Fee (CPIF)  
**Award Date:** September 28, 2012  
**Definitization Date:** September 28, 2012

**Contract Price**

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
27.7	N/A	N/A	149.3	N/A	N/A	138.2	187.7

**Target Price Change Explanation**

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to additional scope associated with software and security certification, hardware, for RSAM, approval of OTB/OTS (August 1, 2017), and Roving Channel Hot Start.

**Contract Variance**

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2017)	+0.7	-0.2
Previous Cumulative Variances	--	--
Net Change	+0.7	-0.2

**Cost and Schedule Variance Explanations**

The favorable cumulative cost variance is due to Rockwell Collins has delivered MGUE software ahead of schedule using less headcount.

The unfavorable cumulative schedule variance is due to Rockwell Collins in the month of December experienced minor delays with cryptography updates and has since recovered.

**Notes**

Rockwell Collins has resumed EVM reporting since the authorization of their OTB/OTS (August 1, 2017). The current progress since implementing has been favorable with no issues.

The difference between the contractor's Current Target Price and their Estimated Price at Complete is the result of the contractor entering into a cost-share type contract after OTB/OTS. The difference reflects the impact of the cost-share to the contractor.

## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	0	0	0	--
Total Program Quantity Delivered	0	0	0	--

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	1431.5	Years Appropriated	7
Expended to Date	631.8	Percent Years Appropriated	70.00%
Percent Expended	44.14%	Appropriated to Date	1076.1
Total Funding Years	10	Percent Appropriated	75.17%

The above data is current as of February 12, 2018.



## Operating and Support Cost

### Cost Estimate Details

Date of Estimate:

Source of Estimate:

Quantity to Sustain:

Unit of Measure:

Service Life per Unit:

Fiscal Years in Service:

### Sustainment Strategy

O&S requirements will be addressed by the DoD Services following completion of the MGUE development program.

### Antecedent Information

No Antecedent

Annual O&S Costs BY2017 \$M		
Cost Element	MGUE Inc 1	Antecedent Item (Antecedent) YYYY
Unit-Level Manpower	--	--
Unit Operations	--	--
Maintenance	--	--
Sustaining Support	--	--
Continuing System Improvements	--	--
Indirect Support	--	--
Other	--	--
Total	--	--

Item	Total O&S Cost \$M			
	MGUE Inc 1			Antecedent Item (Antecedent)
	Current Development APB Objective/Threshold	Current Estimate		
Base Year	0.0	0.0	N/A	N/A
Then Year	0.0	N/A	N/A	0.0

O&S Cost Variance		
Category	BY 2017 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2016 SAR	0.0	
Programmatic/Planning Factors	0.0	



Cost Estimating Methodology	0.0
Cost Data Update	0.0
Labor Rate	0.0
Energy Rate	0.0
Technical Input	0.0
Other	0.0
Total Changes	0.0
Current Estimate	0.0

**Disposal Estimate Details**

Date of Estimate:

Source of Estimate:

Disposal/Demilitarization Total Cost (BY 2017 \$M):