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Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-386



Ground/Air Task Oriented Radar (G/ATOR)

As of FY 2019 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

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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

Ground/Air Task Oriented Radar (G/ATOR)

DoD Component

Navy

Responsible Office

Mr. John Karlovich
2200 Lester Ave
Quantico, VA 22134

john.karlovich@usmc.mil

Phone: 703-432-4982
Fax: 703-784-0307
DSN Phone: 378-4982
DSN Fax: 278-0307
Date Assigned: August 1, 2014

References

SAR Baseline (Production Estimate)

Assistant Secretary of the Navy (Research, Development & Acquisition) (ASN(RDA)) Approved Acquisition Program Baseline (APB) dated April 14, 2014

Approved APB

Assistant Secretary of the Navy (Research, Development & Acquisition) (ASN(RDA)) Approved Acquisition Program Baseline (APB) dated April 14, 2014

Mission and Description

The Ground/Air Task Oriented Radar (G/ATOR) is a single material solution for the mobile Multi-Role Radar System and Ground Weapons Locating Radar (GWLR) requirements. It is a three-dimensional, short/medium range multi-role radar designed to detect unmanned aerial systems, cruise missiles, air breathing targets, rockets, artillery, and mortars. G/ATOR satisfies the warfighter's expeditionary needs across the Marine Air Ground Task Force spectrum replacing five legacy radar systems with a single solution. The Air Defense/ Surveillance Radar G/ATOR Block 1 provides capabilities in the Short Range Air Defense and Air Surveillance mission areas; GWLR G/ATOR Block 2 will address Counter-fire Targeting Missions; and Expeditionary Airport Surveillance Radar G/ATOR Block 4 will address Air Traffic Control missions. G/ATOR Block 4 is not included in the Acquisition Program Baseline. Resourcing may be included in future budget builds. G/ATOR provides real-time radar measurement data to the Common Aviation Command and Control System, Composite Tracking Network, and Advanced Field Artillery Tactical Data System.

Executive Summary

Program Highlights Since Last Report

Five Gallium Arsenide (GaAs) LRIP systems delivered in CY 2017 and the 6th delivered on January 31, 2018 to support G/ATOR Block (GB)1 and GB2 IOC in FY 2018.

Milestone C ADM authorizes Early Deployment Decision (EDD) for GaAs based G/ATOR GB1 and GB2 assets. Delegation of Authority for EDD of two systems to PEO LS on June 13, 2017.

Developmental Testing (DT)1C was successfully completed on September 20, 2017.

DT1D began on September 25, 2017.

Entry into GB1 DT commenced in February 2017 with New Equipment Training. Installation and checkout completed in April 2017. Integrated Test (combined DT/Operational Test) with the operational test agencies was utilized to support the GB1 Operational Assessment (OA).

GB1 OA completed in October 2017.

Director, Marine Corps Operational Test and Evaluation Activity provided an assessment of progress towards Operational Effectiveness/Operational Suitability to support an EDD of the G/ATOR GB1 in December 2017.

Nine Gallium Nitride systems are under contract. The first three systems support Initial Operational Test & Evaluation in FY 2019.

History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	Significant Development Description
July 2005	July 26, 2005: G/ATOR Program Milestone B ADM. This memorandum designated G/ATOR as an ACAT II program and approved entry into the System Development and Demonstration (SDD) phase. The MDA at program initiation was Assistant Secretary of the Navy (Research, Development and Acquisition) (ASN (RDA)).
September 2005	Initial development contract awarded to Northrop Grumman and became a subject of protest.
February 2007	The FY 2008 Senate Armed Services Committee Report directed the Secretary of the Navy to conduct an independent assessment, and submit a report to the Congressional Defense Committees, with the FY 2009 budget request on the Marine Corps acquisition of the G/ATOR. The report was provided to the Congressional Defense Committees on February 4, 2008. The report concluded the G/ATOR system design provides optimal capability across a wide variety of operational mission profiles. The system is properly phased to provide the necessary air defense capabilities to Joint forces with performance that exceeds that of the legacy systems it replaces.
March 2007	Deputy Commandant, Combat Development and Integration letter, and the subsequent Director, Force Protection Integration Division letter, dated August 3, 2007, clarified G/ATOR's compliance with Joint Requirements Oversight Council Memorandum 120-05, "Policy for Updating Capabilities Documents to Incorporate Force Protection and Survivability KPPs" dated June 13, 2005, by requiring G/ATOR to procure M1152A1 up-armored High Mobility Multipurpose Wheeled Vehicles. This KPP forced significant system redesign.
March 2007	Awarded SDD Contract to Northrop Grumman.
April 2007	ASN (RDA) directed transition of the G/ATOR Program from Marine Corps Systems Command to the newly established Program Executive Office Land Systems (PEO LS).
February 2009	The G/ATOR Program was designated a Department of Defense Special Interest program by a USD (AT&L) Memorandum.
October 2011	USD (AT&L) ADM, designated G/ATOR an ACAT IC program with the Navy as the lead component. G/ATOR was no longer a special interest program.
March 2014	ASN (RDA) G/ATOR Milestone C ADM authorized the procurement of LRIP Lot 1 units contingent upon approval of all statutory acquisition documentation. The memorandum also required ASN (RDA) authorization for an Early Deployment Decision (EDD) based on Marine Corps Operational Test and Evaluation Activity (MCOTEA) certification of Operational Effectiveness/Operational Suitability (OE/OS).
March 2015	On March 30, 2015, G/ATOR Program received Director, Capabilities Development Directorate letter that clarified G/ATOR reliability requirements and the development of an operationally meaningful Key System Attribute with the timeline for achieving the threshold and objective values.
June 2015	ASN (RDA) memorandum, dated June 11, 2015 amended the Milestone C ADM to require Director, MCOTEA to provide an assessment of progress towards OE/OS to support an EDD for GaAs – based GB1 and GB2 assets, and defer final certification of OE/OS to Initial Operational Test & Evaluation.
August 2015	Contract awarded to develop and verify the GB2 capability. GB2 will address Counterfire Targeting missions.
August 2016	Awarded LRIP GaN Contract to Northrop Grumman.
June 2017	MS C ADM clarification. Delegation of Authority for EDD of GB1 and GB2 systems to PEO LS on June 13, 2017.

December 2017	Director, MCOTEA provided an assessment of progress towards OE/OS to support an EDD of the G/ATOR GB1 in December 2017.
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Threshold Breaches

APB Breaches

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

Nunn-McCurdy Breaches

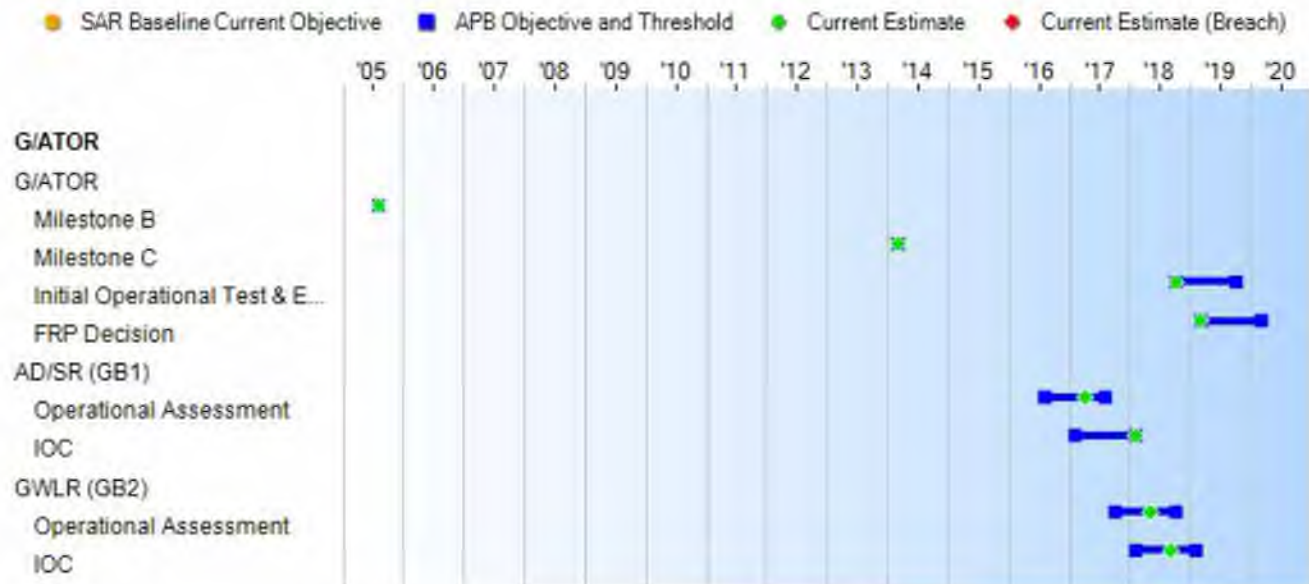
Current UCR Baseline

PAUC	None
APUC	None

Original UCR Baseline

PAUC	None
APUC	None

Schedule



Schedule Events				
Events	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate
G/ATOR				
Milestone B	Aug 2005	Aug 2005	Aug 2005	Aug 2005
Milestone C	Mar 2014	Mar 2014	Mar 2014	Mar 2014
Initial Operational Test & Evaluation	Oct 2018	Oct 2018	Oct 2019	Oct 2018
FRP Decision	Mar 2019	Mar 2019	Mar 2020	Mar 2019
AD/SR (GB1)				
Operational Assessment	Aug 2016	Aug 2016	Aug 2017	Apr 2017
IOC	Feb 2017	Feb 2017	Feb 2018	Feb 2018
GWLR (GB2)				
Operational Assessment	Oct 2017	Oct 2017	Oct 2018	May 2018
IOC	Feb 2018	Feb 2018	Feb 2019	Sep 2018

Change Explanations

None

Acronyms and Abbreviations

AD/SR - Air Defense/Surveillance Radar

GB1/2 - Ground/Air Task Oriented Radar Block 1/2

GWLR - Ground Weapons Locating Radar

Performance

Performance Characteristics				
SAR Baseline Production Estimate	Current APB Production Objective/Threshold	Demonstrated Performance	Current Estimate	
AD/SR (GB1)				
Tier 1: Net-Centric Tier 2: Information Transport, Information Assurance				
Enter and be managed in the network				
Network: Direct Fiber to TAOM, CAC2S or CTN Measure: Time to connect to an operational network from power up Conditions: Network connectivity Network: EPLRS to TAOM or CAC2S				
30 min Reconfigure from transport to full operation 30 min	30 min Reconfigure from transport to full operation 30 min	60 min Reconfigure from transport to full operation 60 min	TBD	30 min Reconfigure from transport to full operation 30 min
Exchange information				
Information Element: Air Track Data Measure: Dissemination of target biographic and physical data Measure: Receipt of HVT data Measure: Latency of data Measure: Strenght of encryption Conditions: Tactical/Geopolitical				
Non Permissive	Non Permissive	Data: Date and time, Azimuth, range, elevation, time, size, speed and IFF NRT Data Rate: -524 Kbps TFOCA-11 Not Encrypted EPLRS: Communication / Transmission Integrated Circuit (CTIC), CTIC DS-101 Hybrid (CDH) Permissive	TBD	Non Permissive
Tier 1: Battlespace Awareness Tier 2: Intelligence, Surveillance & Reconnaissance, Environment				
Combat Identification (Block 1) (Applicable to Block 4)				
(Threshold=Objective) AD/SR's IFF system shall be compatible with MK XII IFF systems (Modes 1, 2, 3/A, C, 4).	(Threshold= Objective) AD/SR's IFF system shall be compatible with MK XII IFF systems (Modes 1, 2, 3/A, C, 4).	AD/SR's IFF system shall be compatible with MK XII IFF systems (Modes 1, 2, 3/A, C, 4).	TBD	(Threshold= Objective) AD/SR's IFF system shall be compatible with MK XII IFF systems (Modes 1, 2, 3/A, C, 4).
Combat Identification (Block 1) (Applicable to Block 4)				

Integrate IFF Mode 5 (Level 3) and Mode S (Level 3)	Integrate IFF Mode 5 (Level 3) and Mode S (Level 3)	Growth - Block 4. AD/SR shall integrate MK XIIA IFF Mode 5 (Level 2) capabilities and Mode S (level 2)	TBD	Integrate IFF Mode 5 (Level 3) and Mode S (Level 3)
Tier 1: Logistics Tier 2: Operational Contract Support				
Sustainment				
Material Availability				
Materiel Availability The AD/SR shall have a Materiel Availability of 0.90 (Objective)	Materiel Availability The AD/SR shall have a Materiel Availability of 0.90 (Objective)	Materiel Availability The AD/SR shall have a Materiel Availability of 0.85 (Threshold)	TBD	Materiel Availability The AD/SR shall have a Materiel Availability of 0.90 (Objective)
Operational availability				
Operational availability The AD/SR shall have an Ao of 0.95 (Objective)	Operational availability The AD/SR shall have an Ao of 0.95 (Objective)	Operational availability The AD/SR shall have an Ao of 0.90 (Threshold)	TBD	Operational availability The AD/SR shall have an Ao of 0.95 (Objective)
GWLR (GB2)				
Detection, Tracking and Classification (all ranges in (km))				
(Mortar (Light .5-30) (Medium .5-40) (Heavy .5-40)) (Artillery (Light 3-60) (Medium 3-60) (Heavy 3-60)) (Rockets (Light 6-60) (Medium 6-60) (Heavy 15-90))	(Mortar (Light .5-30) (Medium .5-40) (Heavy .5-40)) (Artillery (Light 3-60) (Medium 3-60) (Heavy 3-60)) (Rockets (Light 6-60) (Medium 6-60) (Heavy 15-90))	(Mortar (Light .75-20) (Medium .75-30) (Heavy .75-30)) (Artillery (Light 3-30) (Medium 3-40) (Heavy 3-40)) (Rockets (Light 10-40) (Medium 10-50) (Heavy 10-60))	TBD	(Mortar (Light .75-20) (Medium .75-30) (Heavy .75-30)) (Artillery (Light 3-30) (Medium 3-40) (Heavy 3-40)) (Rockets (Light 10-40) (Medium 10-50) (Heavy 10-60))
Probability of location (acquisition)				
Assuming no targets in track, 0.97 for at least 90% of the cases in the shot array with +/-800 mils coverage (1600 mils total) with the radar in either normal or extended range operating mode in the defined nominal environment.	Assuming no targets in track, 0.97 for at least 90% of the cases in the shot array with +/-800 mils coverage (1600 mils total) with the radar in either normal or extended range operating mode in the defined nominal environment.	Assuming no targets in track, 0.90 for at least 90% of the cases in the shot array with +/-800 mils coverage (1600 mils total) with the radar in either normal or extended range operating mode in the defined nominal environment.	TBD	Assuming no targets in track, 0.90 for at least 90% of the cases in the shot array with +/-800 mils coverage (1600 mils total) with the radar in either normal or extended range operating mode in the defined nominal environment.
Hostile Weapon Location (range in (m))				
The CEP50 of weapon	The CEP50 of weapon	The CEP50 of	TBD	The CEP50 of

location shall be less than the greater of 30m or 0.252% of range for at least 90% (threshold) of the cases in the shot array in the defined nominal environment.	location shall be less than the greater of 30m or 0.252% of range for at least 90% (threshold) of the cases in the shot array in the defined nominal environment.	weapon location shall be less than the greater of 30m or 0.252% of range for at least 80% (objective) of the cases in the shot array in the defined nominal environment.		weapon location shall be less than the greater of 30m or 0.252% of range for at least 80% (objective) of the cases in the shot array in the defined nominal environment.
Projectile Impact (CEP50)				
The CEP50 of weapon location shall be less than the greater of 30m or 0.252% of range (in meters) for at least 90% (threshold) of the cases in the shot array in the defined nominal environment.	The CEP50 of weapon location shall be less than the greater of 30m or 0.252% of range (in meters) for at least 90% (threshold) of the cases in the shot array in the defined nominal environment.	The CEP50 of weapon location shall be less than the greater of 30m or 0.252% of range (in meters) for at least 80% (objective) of the cases in the shot array in the defined nominal environment.	TBD	The CEP50 of weapon location shall be less than the greater of 30m or 0.252% of range (in meters) for at least 80% (objective) of the cases in the shot array in the defined nominal environment.
Transportability				
(Objective=Threshold) C-130 drive-on, drive-off	(Objective=Threshold) C-130 drive-on, drive-off	C-130 drive-on, drive-off	TBD	C-130 drive-on, drive-off
Net Ready				
100% of interfaces certified; services; policy-enforcement controls; and data correctness, availability and processing requirements in the Joint integrated architecture.	100% of interfaces certified; services; policy-enforcement controls; and data correctness, availability and processing requirements in the Joint integrated architecture.	100% of interfaces certified; services; policy-enforcement controls; and data correctness, availability and processing requirements designated as enterprise-level or critical in the Joint integrated architecture.	TBD	100 percent of interfaces certified; services; policy enforcement controls; and data correctness, availability and processing requirements designated as enterprise level or critical in the Joint integrated architecture.

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

Requirements Reference

CPD (GB1) dated December 3, 2012 and ORD (GB2) dated July 20, 2004

Change Explanations

None

Acronyms and Abbreviations

AD/SR - Air Defense/Surveillance Radar
CAC2S - Common Aviation Command and Control System
CEP50 - Circular Error Probable 50
CTN - Composite Tracking Network
EPLRS - Enhanced Position Location Reporting System
GB1/2/4 - Ground/Air Task Oriented Radar Block 1/2/4
GWLR - Ground Weapons Locating Radar
HVT - High Value Target
IFF - Identification Friend or Foe
kbps - kilobits per second
km - Kilometers
m - meters
mils - milliradians
min - minutes
NRT - Near Real Time
TAOM - Tactical Air Operations Modules
TFOCA - Tactical Fiber Optic Cable Assembly

Track to Budget

RDT&E

Appn	BA	PE
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Navy 1319 07 0204460M

Project	Name
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9C89 Marine Ground-Air Radar

Navy 1319 04 0206313M

Project	Name
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3099D Radar Systems (Shared) (Sunk)

Notes:

Navy 1319 07 0206313M

Project	Name
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9C89 G/ATOR (Shared) (Sunk)

Procurement

Appn	BA	PE
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Navy 1109 04 0204460M

Line Item	Name
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4650 Radar Systems (Shared) (Sunk)

Navy 1109 04 0206313M

Line Item	Name
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4650 Radar Systems (Shared) (Sunk)

Navy 1109 04 0506313M

Line Item	Name
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4655 Ground/Air Task Oriented Radar

Notes: G/ATOR Reserves

Navy 1109 04 0204460M

Line Item	Name
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4655 Ground/Air Task Oriented Radar

Navy 1109 07 0204460M

Line Item	Name
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7000 Spares and Repairs Parts (Shared)

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2012 \$M			BY 2012 \$M	TY \$M		
	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	SAR Baseline Production Estimate	Current APB Production Objective	Current Estimate
RDT&E	986.5	986.5	1085.2	1054.9	1019.2	1019.2	1094.3
Procurement	1625.3	1625.3	1787.8	1753.3	1894.8	1894.8	2030.4
Flyaway	--	--	--	1566.0	--	--	1816.9
Recurring	--	--	--	1452.3	--	--	1684.7
Non Recurring	--	--	--	113.7	--	--	132.2
Support	--	--	--	187.3	--	--	213.5
Other Support	--	--	--	94.3	--	--	106.3
Initial Spares	--	--	--	93.0	--	--	107.2
MILCON	3.5	3.5	3.9	0.0	3.9	3.9	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2615.3	2615.3	N/A	2808.2	2917.9	2917.9	3124.7

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	0	0	0
Procurement	45	45	45
Total	45	45	45

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	890.8	54.6	45.0	23.9	10.6	12.2	12.3	44.9	1094.3
Procurement	536.1	156.0	238.0	286.2	298.1	311.9	33.4	170.7	2030.4
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	1426.9	210.6	283.0	310.1	308.7	324.1	45.7	215.6	3124.7
PB 2018 Total	1429.3	210.6	250.3	299.0	269.1	239.3	140.7	128.3	2966.6
Delta	-2.4	0.0	32.7	11.1	39.6	84.8	-95.0	87.3	158.1

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	12	3	6	8	8	8	0	0	45
PB 2019 Total	0	12	3	6	8	8	8	0	0	45
PB 2018 Total	0	12	3	6	8	7	6	3	0	45
Delta	0	0	0	0	0	1	2	-3	0	0

Cost and Funding

Annual Funding By Appropriation

Annual Funding								
1319 RDT&E Research, Development, Test, and Evaluation, Navy								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2004	--	--	--	--	--	--	--	6.7
2005	--	--	--	--	--	--	--	8.9
2006	--	--	--	--	--	--	--	13.5
2007	--	--	--	--	--	--	--	37.2
2008	--	--	--	--	--	--	--	88.9
2009	--	--	--	--	--	--	--	127.3
2010	--	--	--	--	--	--	--	67.2
2011	--	--	--	--	--	--	--	63.2
2012	--	--	--	--	--	--	--	102.5
2013	--	--	--	--	--	--	--	70.2
2014	--	--	--	--	--	--	--	74.4
2015	--	--	--	--	--	--	--	90.6
2016	--	--	--	--	--	--	--	61.3
2017	--	--	--	--	--	--	--	78.9
2018	--	--	--	--	--	--	--	54.6
2019	--	--	--	--	--	--	--	45.0
2020	--	--	--	--	--	--	--	23.9
2021	--	--	--	--	--	--	--	10.6
2022	--	--	--	--	--	--	--	12.2
2023	--	--	--	--	--	--	--	12.3
2024	--	--	--	--	--	--	--	6.2
2025	--	--	--	--	--	--	--	--
2026	--	--	--	--	--	--	--	5.5
2027	--	--	--	--	--	--	--	--
2028	--	--	--	--	--	--	--	5.7
2029	--	--	--	--	--	--	--	--
2030	--	--	--	--	--	--	--	5.9
2031	--	--	--	--	--	--	--	--
2032	--	--	--	--	--	--	--	2.7
2033	--	--	--	--	--	--	--	--
2034	--	--	--	--	--	--	--	2.8
2035	--	--	--	--	--	--	--	--
2036	--	--	--	--	--	--	--	3.0
2037	--	--	--	--	--	--	--	--
2038	--	--	--	--	--	--	--	3.1

2039	--	--	--	--	--	--	--
2040	--	--	--	--	--	--	3.2
2041	--	--	--	--	--	--	--
2042	--	--	--	--	--	--	3.2
2043	--	--	--	--	--	--	--
2044	--	--	--	--	--	--	3.6
Subtotal	--	--	--	--	--	--	1094.3

Annual Funding							
1319 RDT&E Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 2012 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2004	--	--	--	--	--	--	7.8
2005	--	--	--	--	--	--	10.1
2006	--	--	--	--	--	--	14.8
2007	--	--	--	--	--	--	39.8
2008	--	--	--	--	--	--	93.5
2009	--	--	--	--	--	--	132.1
2010	--	--	--	--	--	--	68.7
2011	--	--	--	--	--	--	63.1
2012	--	--	--	--	--	--	100.7
2013	--	--	--	--	--	--	68.3
2014	--	--	--	--	--	--	71.3
2015	--	--	--	--	--	--	85.8
2016	--	--	--	--	--	--	57.1
2017	--	--	--	--	--	--	72.3
2018	--	--	--	--	--	--	49.2
2019	--	--	--	--	--	--	39.8
2020	--	--	--	--	--	--	20.7
2021	--	--	--	--	--	--	9.0
2022	--	--	--	--	--	--	10.2
2023	--	--	--	--	--	--	10.0
2024	--	--	--	--	--	--	5.0
2025	--	--	--	--	--	--	--
2026	--	--	--	--	--	--	4.2
2027	--	--	--	--	--	--	--
2028	--	--	--	--	--	--	4.2
2029	--	--	--	--	--	--	--
2030	--	--	--	--	--	--	4.2
2031	--	--	--	--	--	--	--
2032	--	--	--	--	--	--	1.8
2033	--	--	--	--	--	--	--
2034	--	--	--	--	--	--	1.8
2035	--	--	--	--	--	--	--
2036	--	--	--	--	--	--	1.9
2037	--	--	--	--	--	--	--
2038	--	--	--	--	--	--	1.9
2039	--	--	--	--	--	--	--
2040	--	--	--	--	--	--	1.9
2041	--	--	--	--	--	--	--
2042	--	--	--	--	--	--	1.8
2043	--	--	--	--	--	--	--

2044	--	--	--	--	--	--	1.9
Subtotal	--	--	--	--	--	--	1054.9

Annual Funding							
1109 Procurement Procurement, Marine Corps							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	4.2	4.2	--	4.2
2013	2	74.0	--	10.6	84.6	1.8	86.4
2014	2	74.0	--	10.6	84.6	9.2	93.8
2015	2	72.6	--	6.4	79.0	11.9	90.9
2016	3	108.9	--	1.0	109.9	17.2	127.1
2017	3	108.4	--	10.8	119.2	14.5	133.7
2018	3	110.3	--	3.3	113.6	42.4	156.0
2019	6	196.7	--	11.5	208.2	29.8	238.0
2020	8	250.8	--	4.5	255.3	30.9	286.2
2021	8	267.5	1.8	5.3	274.6	23.5	298.1
2022	8	266.3	11.4	18.2	295.9	16.0	311.9
2023	--	7.0	--	11.9	18.9	14.5	33.4
2024	--	37.7	30.0	9.4	77.1	1.1	78.2
2025	--	--	--	14.7	14.7	0.7	15.4
2026	--	--	--	9.8	9.8	--	9.8
2027	--	9.9	--	--	9.9	--	9.9
2028	--	--	--	--	--	--	--
2029	--	--	--	--	--	--	--
2030	--	10.1	--	--	10.1	--	10.1
2031	--	--	--	--	--	--	--
2032	--	--	--	--	--	--	--
2033	--	10.9	--	--	10.9	--	10.9
2034	--	--	--	--	--	--	--
2035	--	--	--	--	--	--	--
2036	--	11.5	--	--	11.5	--	11.5
2037	--	--	--	--	--	--	--
2038	--	--	--	--	--	--	--
2039	--	12.1	--	--	12.1	--	12.1
2040	--	--	--	--	--	--	--
2041	--	--	--	--	--	--	--
2042	--	12.8	--	--	12.8	--	12.8
Subtotal	45	1641.5	43.2	132.2	1816.9	213.5	2030.4

Annual Funding							
1109 Procurement Procurement, Marine Corps							
Fiscal Year	Quantity	BY 2012 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	4.1	4.1	--	4.1
2013	2	71.3	--	10.3	81.6	1.7	83.3
2014	2	70.4	--	10.1	80.5	8.7	89.2
2015	2	68.1	--	6.0	74.1	11.2	85.3
2016	3	100.5	--	0.9	101.4	16.0	117.4
2017	3	98.4	--	9.8	108.2	13.2	121.4
2018	3	98.4	--	2.9	101.3	37.8	139.1
2019	6	172.1	--	10.1	182.2	26.1	208.3
2020	8	215.2	--	3.9	219.1	26.5	245.6
2021	8	225.0	1.5	4.5	231.0	19.8	250.8
2022	8	219.6	9.4	15.0	244.0	13.2	257.2
2023	--	5.7	--	9.6	15.3	11.7	27.0
2024	--	29.9	23.7	7.5	61.1	0.9	62.0
2025	--	--	--	11.5	11.5	0.5	12.0
2026	--	--	--	7.5	7.5	--	7.5
2027	--	7.4	--	--	7.4	--	7.4
2028	--	--	--	--	--	--	--
2029	--	--	--	--	--	--	--
2030	--	7.1	--	--	7.1	--	7.1
2031	--	--	--	--	--	--	--
2032	--	--	--	--	--	--	--
2033	--	7.2	--	--	7.2	--	7.2
2034	--	--	--	--	--	--	--
2035	--	--	--	--	--	--	--
2036	--	7.2	--	--	7.2	--	7.2
2037	--	--	--	--	--	--	--
2038	--	--	--	--	--	--	--
2039	--	7.1	--	--	7.1	--	7.1
2040	--	--	--	--	--	--	--
2041	--	--	--	--	--	--	--
2042	--	7.1	--	--	7.1	--	7.1
Subtotal	45	1417.7	34.6	113.7	1566.0	187.3	1753.3

Cost Quantity Information		
1109 Procurement Procurement, Marine Corps		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2012 \$M
2012	--	--
2013	2	75.2
2014	2	74.2
2015	2	72.0
2016	3	106.1
2017	3	103.7
2018	3	103.4
2019	6	182.3
2020	8	228.9
2021	8	238.6
2022	8	233.3
2023	--	--
2024	--	--
2025	--	--
2026	--	--
2027	--	--
2028	--	--
2029	--	--
2030	--	--
2031	--	--
2032	--	--
2033	--	--
2034	--	--
2035	--	--
2036	--	--
2037	--	--
2038	--	--
2039	--	--
2040	--	--
2041	--	--
2042	--	--
Subtotal	45	1417.7

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	3/10/2014	8/8/2016
Approved Quantity	14	15
Reference	MS C ADM	Justification and Authorization (J&A) No. 15,077 Amendment (1)
Start Year	2014	2014
End Year	2018	2018

The Current Total LRIP Quantity is more than 10% of the total production quantity. The MDA authorized additional LRIP units to mitigate risk associated with conversion to Gallium Arsenide (GaN) technology and associated testing (no change to total Approved Acquisition Objective (AAO) quantity).

Foreign Military Sales

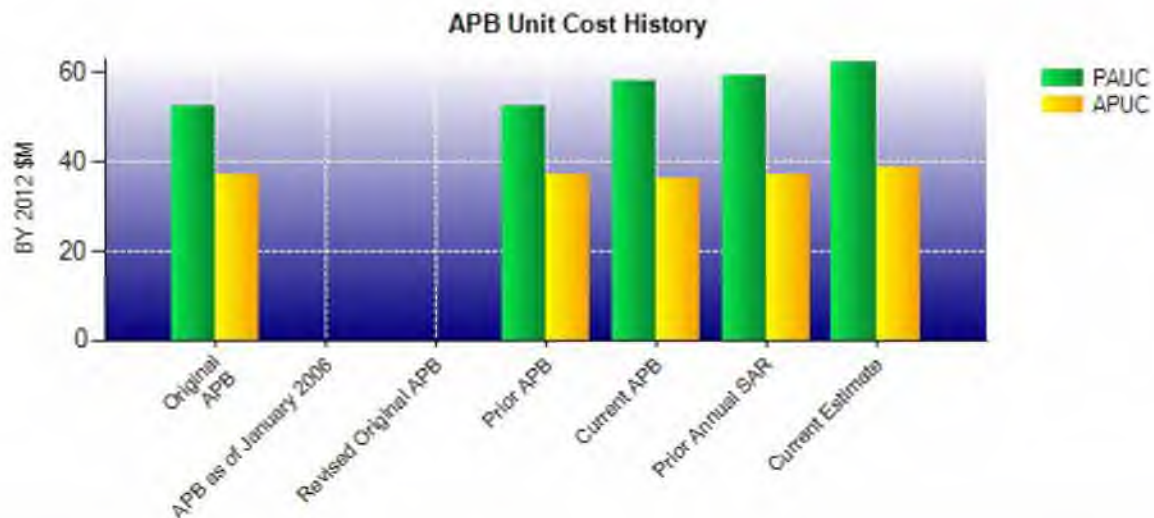
None

Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2012 \$M	BY 2012 \$M	% Change
	Current UCR Baseline (Apr 2014 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	2615.3	2808.2	
Quantity	45	45	
Unit Cost	58.118	62.404	+7.37
Average Procurement Unit Cost			
Cost	1625.3	1753.3	
Quantity	45	45	
Unit Cost	36.118	38.962	+7.87
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2012 \$M	BY 2012 \$M	% Change
	Original UCR Baseline (May 2012 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	2987.3	2808.2	
Quantity	57	45	
Unit Cost	52.409	62.404	+19.07
Average Procurement Unit Cost			
Cost	2103.1	1753.3	
Quantity	57	45	
Unit Cost	36.896	38.962	+5.60



APB Unit Cost History					
Item	Date	BY 2012 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	May 2012	52.409	36.896	58.349	42.665
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	May 2012	52.409	36.896	58.349	42.665
Current APB	Apr 2014	58.118	36.118	64.842	42.107
Prior Annual SAR	Dec 2016	59.213	36.982	65.924	43.020
Current Estimate	Dec 2017	62.404	38.962	69.438	45.120

SAR Unit Cost History

Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial PAUC Development Estimate	Changes								PAUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
58.349	0.367	5.249	0.813	0.000	1.451	0.000	-1.387	6.493	64.842

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Production Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
64.842	-1.053	0.000	-0.076	2.576	0.849	0.000	2.300	4.596	69.438

Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
42.665	0.276	1.067	0.813	0.000	-1.327	0.000	-1.387	-0.558	42.107

Current SAR Baseline to Current Estimate (TY \$M)									
APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
42.107	-0.869	0.000	-0.076	1.429	0.349	0.000	2.180	3.013	45.120

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	Aug 2005	Aug 2005	Aug 2005
Milestone C	N/A	Jul 2013	Mar 2014	Mar 2014
IOC	N/A	Aug 2016	Feb 2017	Feb 2018
Total Cost (TY \$M)	N/A	3325.9	2917.9	3124.7
Total Quantity	N/A	57	45	45
PAUC	N/A	58.349	64.842	69.438

Cost Variance

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	1019.2	1894.8	3.9	2917.9
Previous Changes				
Economic	-7.3	-25.7	-0.1	-33.1
Quantity	--	--	--	--
Schedule	--	-0.7	--	-0.7
Engineering	--	+33.6	--	+33.6
Estimating	+13.4	-87.7	-3.8	-78.1
Other	--	--	--	--
Support	+5.4	+121.6	--	+127.0
Subtotal	+11.5	+41.1	-3.9	+48.7
Current Changes				
Economic	-0.9	-13.4	--	-14.3
Quantity	--	--	--	--
Schedule	--	-2.7	--	-2.7
Engineering	+51.6	+30.7	--	+82.3
Estimating	+12.9	+103.4	--	+116.3
Other	--	--	--	--
Support	--	-23.5	--	-23.5
Subtotal	+63.6	+94.5	--	+158.1
Total Changes	+75.1	+135.6	-3.9	+206.8
CE - Cost Variance	1094.3	2030.4	--	3124.7
CE - Cost & Funding	1094.3	2030.4	--	3124.7

Summary BY 2012 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	986.5	1625.3	3.5	2615.3
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	-0.1	-0.1
Engineering	--	+28.8	--	+28.8
Estimating	+13.9	-94.3	-3.4	-83.8
Other	--	--	--	--
Support	--	+104.4	--	+104.4
Subtotal	+13.9	+38.9	-3.5	+49.3
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	+44.7	+25.0	--	+69.7
Estimating	+9.8	+82.5	--	+92.3
Other	--	--	--	--
Support	--	-18.4	--	-18.4
Subtotal	+54.5	+89.1	--	+143.6
Total Changes	+68.4	+128.0	-3.5	+192.9
CE - Cost Variance	1054.9	1753.3	--	2808.2
CE - Cost & Funding	1054.9	1753.3	--	2808.2

Previous Estimate: December 2016

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-0.9
Processor Engineering Change Proposal (ECP) to improve reliability and resolve Diminishing Manufacturing Sources (DMS) issues (Engineering)	+13.0	+15.0
Additional funding for Radar Survivability Upgrade (Engineering)	+4.4	+5.0
Additional funding for Electronic Protection Improvements. (Engineering)	+14.3	+16.8
Additional funding for Military-Code Global Positioning System improvements. (Engineering)	+5.7	+6.5
Additional funding for Counter-Unmanned Aircraft System Improvements. (Engineering)	+7.3	+8.3
Revised estimate to reflect actuals. (Estimating)	-2.0	-2.2
Updated estimating methodology based on trends through delivery of the final production lot. (Estimating)	+1.5	+1.8
Revised estimate for outyear methodology and approach to post FRP engineering change rates. (Estimating)	+9.7	+12.7
Adjustment for current and prior escalation. (Estimating)	+0.6	+0.6
RDT&E Subtotal	+54.5	+63.6

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-13.4
Acceleration of procurement buy profile by moving three G/ATOR radar system from FY 2023 into FY 2021 and FY 2022 to achieve production rate efficiencies. (Schedule) (QR)	0.0	-2.7
Processor ECP implementation to improve reliability and resolve DMS issues. (Engineering)	+17.6	+21.7
Additional funding for Radar Survivability/Decoy Upgrade implementation. (Engineering)	+7.4	+9.0
Revised estimate to reflect actuals. (Estimating)	+3.6	+4.0
Revised estimate due to Congressional reduction in FY 2019 (Estimating)	-8.1	-9.1
Revised estimate to align with FY 2019 PB based on modified assumptions to the impact of inflation. (Estimating)	+0.3	+0.5
Revised estimate to reflect Department affordability and efficiency initiatives. (Estimating)	-3.6	-4.4
Engineering Change Order/ECP costs increase as a function of Hardware procurement costs and rephasing of funding. (Estimating)	+6.7	+8.4
Updated estimating methodology factor to incorporate HW reliability metric trends through delivery of the final production lot and associated phasing. (Estimating)	+54.5	+67.7
Adjustment for current and prior escalation. (Estimating)	+2.1	+2.3
Increase due to USMC Combat Development & Integration Post FOC. (Estimating)	+27.0	+34.0
Adjustment for current and prior escalation. (Support)	+0.3	+0.3
Decrease in Other Support due to refined estimate in hardware costs and the associated factor used in the estimating methodology through delivery of the final production lot. (Support)	-20.5	-26.1
Increase in Initial Spares due to Department-wide adjustments (Support)	+1.8	+2.3
Procurement Subtotal	+89.1	+94.5

(QR) Quantity Related

Contracts

Contract Identification	
Appropriation:	Procurement
Contract Name:	LRIP GaN
Contractor:	Northrop Grumman Corporation
Contractor Location:	1580 West Nursery Road Linthicum Heights, MD 21090
Contract Number:	M67854-16-C-0211/9
Contract Type:	Fixed Price Incentive(Firm Target) (FPIF), Cost Plus Fixed Fee (CPFF), Firm Fixed Price (FFP)
Award Date:	August 31, 2016
Definitization Date:	August 31, 2016

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
126.2	132.1	3	247.8	259.1	6	247.8	240.2

Target Price Change Explanation
The difference between the Initial Contract Price Target and the Current Contract Price Target is due to exercised additional lot of 3 units, bringing total LRIP unit quantity to 6 and the incorporation of Interim Contractor Logistics Support efforts.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2017)	+3.2	-2.1
Previous Cumulative Variances	+2.0	-2.6
Net Change	+1.2	+0.5

Cost and Schedule Variance Explanations
The favorable net change in the cost variance is due to reduced effort for System Engineering/Program Management and integration, assembly, test and checkout.

The favorable net change in the schedule variance is due to reduced effort for integration, assembly, test and checkout and early material receipts.

Notes
Option for Lot 4 (quantity of 3 units) exercised in April 2017 for a total of 6 units to-date.

Contract Identification

Appropriation: RDT&E
Contract Name: Ground Weapons Locating Radar (GWLR) GB2
Contractor: Northrop Grumman Corporation
Contractor Location: 1580 West Nursery Road
 Linthicum Heights, MD 21090
Contract Number: M67854-15-C-0230/7
Contract Type: Cost Plus Incentive Fee (CPIF)
Award Date: August 28, 2015
Definitization Date: August 28, 2015

Contract Price

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
58.7	N/A	0	66.8	N/A	0	66.1	66.8

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to increase modification to incorporate Diminishing Manufacturing Sources (DMS) processor new scope and associated travel to support testing.

Contract Variance

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2017)	+0.8	-0.4
Previous Cumulative Variances	-0.3	-1.6
Net Change	+1.1	+1.2

Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to material receipts lower than planned.

The favorable net change in the schedule variance is due to completion of integration activities and SPR resolution.

Notes

This contract is more than 90% complete; therefore, this is the final report for this contract.

Contract Identification

Appropriation: RDT&E
Contract Name: LRIP GaAs
Contractor: Northrop Grumman Corporation
Contractor Location: 1580 West Nursery Road
 Linthicum Heights, MD 21090
Contract Number: M67854-07-C-2072/4
Contract Type: Fixed Price Incentive(Firm Target) (FPIF), Firm Fixed Price (FFP), Cost Plus Incentive Fee (CPIF)
Award Date: October 23, 2014
Definitization Date: October 23, 2014

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
0.0	207.3	4	344.6	357.8	6	344.7	345.8

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to an omission of target cost during data entry at initial contract award.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2017)	-3.7	-3.4
Previous Cumulative Variances	-0.2	-9.3
Net Change	-3.5	+5.9

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to material and labor associated with integration, assembly, test, and checkout.

The favorable net change in the schedule variance is due to resolution of Line Replaceable Unit integration for the first four LRIP units.

Notes

This contract is more than 90% complete; therefore, this is the final report for this contract.

Contract Identification

Appropriation: RDT&E
Contract Name: GaN Transition Phase 2
Contractor: Northrop Grumman Corporation
Contractor Location: 1580 West Nursery Road
 Linthicum Heights, MD 21090
Contract Number: M67854-07-C-2072/8
Contract Type: Cost Plus Fixed Fee (CPFF)
Award Date: August 28, 2015
Definitization Date: August 28, 2015

Contract Price

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
9.2	N/A	0	8.8	N/A	0	8.8	8.8

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to Reduction in scope associated with effort.

Contract Variance

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2017)	-0.1	0.0
Previous Cumulative Variances	+0.2	-0.8
Net Change	-0.3	+0.8

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to unplanned effort required to investigate and mediate system performance analysis.

The favorable net change in the schedule variance is due to system availability delays, as systems are dedicated to other contract efforts of greater priority.

Notes

This contract is more than 90% complete; therefore, this is the final report for this contract.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	45	6	45	13.33%
Total Program Quantity Delivered	45	6	45	13.33%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	3124.7	Years Appropriated	15
Expended to Date	1149.2	Percent Years Appropriated	36.59%
Percent Expended	36.78%	Appropriated to Date	1637.5
Total Funding Years	41	Percent Appropriated	52.41%

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

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	December 29, 2017
Source of Estimate:	POE
Quantity to Sustain:	45
Unit of Measure:	System
Service Life per Unit:	20.00 Years
Fiscal Years in Service:	FY 2018 - FY 2044

A system consists of the Radar Equipment Group, the Communications Equipment Group, and the Power Equipment Group.

Sustainment Strategy

The sustainment strategy includes organic support with contract support for the depot level. Current Product Support Strategy employs Contractor Logistics Support (CLS) during the EMD phase to provide support for the two Engineering Development Models and up to 18 LRIP systems through Interim CLS on the Gallium Nitride (GaN) and FRP contracts. During production some components may remain under CLS, others may transition to Performance Based Logistics and others may transition to traditional organic support. Final determination of these elements will be made by Full Rate Production Decision (FRPD).

Antecedent Information

The AN/TPS-63B Radar is the antecedent system. There is no data in the Naval Visibility and Management of Operating and Support Costs database for the antecedent system.

Annual O&S Costs BY2012 \$M		
Cost Element	G/ATOR Average Annual Cost Per System	AN/TPS-63B Radar (Antecedent) Average Annual Cost Per System
Unit-Level Manpower	0.261	0.000
Unit Operations	0.007	0.000
Maintenance	1.145	0.000
Sustaining Support	0.599	0.000
Continuing System Improvements	0.732	0.000
Indirect Support	0.009	0.000
Other	--	--
Total	2.753	--

Item	Total O&S Cost \$M			
	G/ATOR			AN/TPS-63B Radar (Antecedent)
	Current Production APB Objective/Threshold		Current Estimate	
Base Year	2522.6	2774.9	2477.9	N/A
Then Year	3326.3	N/A	3565.5	N/A

Disposal Cost is included in the Operating and Support Cost of the current APB objective and threshold for this program.

Equation to Translate Annual Cost to Total Cost

Total O&S cost = Average Annual Cost Per System * # of systems * Service Life = \$2.753M * 45 * 20 = \$2477.9M

O&S Cost Variance		
Category	BY 2012 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2016 SAR	2468.7	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	9.2	Revised methodology for maintainability, sustaining engineering and software maintenance. Revised methodology is a more applicable cost estimating relationship.
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
Total Changes	9.2	
Current Estimate	2477.9	

Disposal Estimate Details

Date of Estimate: December 29, 2017
Source of Estimate: POE
Disposal/Demilitarization Total Cost (BY 2012 \$M): Total costs for disposal of all System are 2.8

TY Total disposal cost are \$5.2M.