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Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-384



Air and Missile Defense Radar (AMDR)

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

Air and Missile Defense Radar (AMDR)

DoD Component

Navy

Responsible Office

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Date Assigned: April 6, 2015

References

SAR Baseline (Production Estimate)

Under Secretary of Defense (Acquisition, Technology & Logistics) Approved Acquisition Program Baseline (APB) dated June 30, 2017

Approved APB

Under Secretary of Defense (Acquisition, Technology & Logistics) Approved Acquisition Program Baseline (APB) dated June 30, 2017

Mission and Description

The Air and Missile Defense Radar (AMDR) is the Navy's next generation radar system that will address Ballistic Missile Defense and Air Defense capability gaps identified in the Maritime Air and Missile Defense of Joint Forces Initial Capabilities Document. The AMDR suite consists of an S-band radar (AMDR-S), X-band radar, and a Radar Suite Controller (RSC). AMDR-S is a new development Integrated Air and Missile Defense radar providing sensitivity for long range detection and engagement of advanced threats. The X-band radar is a horizon-search radar based on existing technology. The RSC provides S and X band radar resource management, coordination, and interface to the combat system. AMDR will be deployed on the DDG 51 Arleigh Burke Class Guided Missile Destroyer Flight III.

Executive Summary

Program Highlights Since Last Report

After completing Concept Studies and Technology Development phase contracts with Raytheon, Northrop Grumman, and Lockheed Martin, the Air and Missile Defense Radar (AMDR) program achieved Milestone B in September 2013 and received a signed ADM on October 4, 2013. After a full and open competition, a 48-month Engineering and Manufacturing Development (EMD) contract was awarded to Raytheon on October 10, 2013. The EMD phase focuses on the design of the system and development of an affordable and executable manufacturing process leading to a Production Readiness Review.

The AMDR hardware Critical Design Review (CDR) was completed December 3, 2014 and the System CDR was completed April 29, 2015. The CDR assessed the completeness of the detail design and how it supports the performance requirements. Software Build Review number five, of five planned for EMD phase, was successfully completed November 15, 2017. Build 6+ mainly supports alignment with AEGIS Combat System Baseline 10 Software Development.

The EMD phase includes integration and test of a single-faced AMDR-S/Radar Suite Controller (RSC) Engineering Development Model with an AN/SPQ-9B asset at the land-based test site at the Pacific Missile Range Facility (PMRF) in Kauai, HI. The Developmental Testing (DT)-3 Test Readiness Review was completed on July 12, 2016.

DT-3 live testing commenced on September 6, 2016, and has since included live Air, Surface, Electronic Attack/Electronic Protection (EA/EP), Ballistic Missile Defense (BMD), Integrated Air and Missile Defense (IAMD), missile communications test set, satellites and sphere tracking tests through the end of CY 2017. Three successful flight tests were conducted: Vigilant Hunter on March 15, 2017, Vigilant Titan on July 27, 2017, and Vigilant Talon on September 7, 2017. During Vigilant Hunter, the system searched for, detected, tracked and discriminated a short-range ballistic missile target. During Vigilant Titan, the system searched for, detected, tracked and discriminated a medium-range ballistic missile target. During Vigilant Talon the system searched for, detected, tracked and discriminated a short-range ballistic missile while simultaneously tracking two air-to-surface cruise missile targets. The AN/SPY-6(V)1 has also leveraged Missile Defense Agency, PEO IWS 3 and Department of Navy Targets of Opportunity (TOO) at PMRF by demonstrating radar capabilities in live BMD, surface, interceptor, and air target tests in CY 2017. DT-3 testing will complete in February 2018, and AN/SPY-6(V)1 testing will continue at PMRF against live Air, Surface, EA/EP, BMD, satellites and sphere targets and other agency TOOs through September 2018.

The EMD phase contract includes options for up to nine Low Rate Initial Production (LRIP) units. The Long Lead Material option for the first AMDR LRIP unit was exercised on December 13, 2016. The program received Milestone C approval on April 27, 2017 and subsequently exercised contract options for three LRIP systems. An Interim Progress Review will be conducted in March 2018 prior to award of any further LRIP units.

The AMDR program is executing on schedule and within budget and is on track for delivery First Quarter FY 2020.

AMDR is a task based radar with design co-dependencies on the combat system that requires further planned software work in the post-EM&D phase for integration with AEGIS Baseline 10 to fully task capabilities.

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
June 2009	Awarded three 6-month Concept Studies contracts to Raytheon, Lockheed Martin, and Northrop Grumman
September 2010	Milestone A Acquisition Decision Memorandum
September 2010	Awarded three 24-month Technology Development contracts to Raytheon, Lockheed Martin, and Northrop Grumman
May 2012	Pre-Engineering and Manufacturing Development Defense Acquisition Board Review
October 2013	Milestone B Acquisition Decision Memorandum
October 2013	Awarded one 48-month Engineering and Manufacturing Development contract to Raytheon
August 2014	System Preliminary Design Review
April 2015	System Critical Design Review
September 2016	Start of Developmental Test 3 (DT-3)
December 2016	Exercised Long Lead Material contract option for first Low Rate Initial Production unit
March 2017	Vigilant Hunter flight test
April 2017	Milestone C Acquisition Decision Memorandum
May 2017	Exercised contract options for first three Low Rate Initial Production units
July 2017	Vigilant Titan flight test.
September 2017	Vigilant Talon flight test.
December 2017	Combined Systems Engineering Technical Review (Transition Critical Design Review, System Verification Review/Functional Configuration Audit, and Production Readiness Review)

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	
Milestone B	Oct 2013	Oct 2013	Oct 2013	Sep 2013
System CDR	Apr 2015	Apr 2015	Apr 2015	Apr 2015
Milestone C	Apr 2017	Apr 2017	Apr 2017	Apr 2017
DT-3 Complete	Aug 2017	Aug 2017	Feb 2018	Feb 2018
IYND	Sep 2019	Sep 2019	Mar 2020	Jan 2020
IOT&E Complete	Feb 2024	Feb 2024	Aug 2024	Feb 2024
IOC	Feb 2024	Feb 2024	Aug 2024	Feb 2024

Change Explanations

None

Notes

IOT&E Complete dates reflect the planned completion date for IOT&E/Combat System Ship Qualification Test for the DDG 51 Arleigh Burke Class Guided Missile Destroyer Flight III.

IOC date based on the AMDR Capability Development Document. Requirements to reach IOC include: (1) successful completion of IOT&E; (2) all maintenance and training materials, including embedded maintenance training and embedded technical manuals, are available to ship's crew; and (3) logistics support is in place, including onboard spares, supply support and shore-based distance support.

Acronyms and Abbreviations

CDR - Critical Design Review

DT - Developmental Test

IOT&E - Initial Operational Test and Evaluation

IYND - In Yard Need Date

Performance

Performance Characteristics				
SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Demonstrated Performance	Current Estimate
Availability				
Ao ≥0.99	Ao ≥0.99	Ao ≥0.98	TBD	Ao ≥0.98
System Training				
Maintenance technicians correctly perform ≥ 99% of critical tasks and ≥ 99% of non-critical tasks as defined in the TTL.	Maintenance technicians correctly perform ≥ 99% of critical tasks and ≥ 99% of non-critical tasks as defined in the TTL.	Maintenance technicians correctly perform ≥ 99% of critical tasks and ≥ 80% of non-critical tasks as defined in the TTL.	TBD	Maintenance technicians correctly perform ≥ 99% of critical tasks and ≥ 80% of non-critical tasks as defined in the TTL.
Net Ready				
Will satisfy applicable Net Ready KPP elements for all operational activities and information exchanges.	Will satisfy applicable Net Ready KPP elements for all operational activities and information exchanges.	Will satisfy applicable Net Ready KPP elements for joint critical operational activities and information exchanges.	Compliant with Applicable Elements from CDD.	Will satisfy applicable Net Ready KPP elements for joint critical operational activities and information exchanges.
Energy Efficiency				
Two reduced power states for AMDR-S, when commanded by the platform CMS: State 1 consumes no more than 1100 kW total prime power; State 2 consumes no more than 850 kW total prime power	Two reduced power states for AMDR-S, when commanded by the platform CMS: State 1 consumes no more than 1100 kW total prime power; State 2 consumes no more than 850 kW total prime power	Two reduced power states for AMDR-S, when commanded by the platform CMS: State 1 consumes no more than 1230 kW total prime power; State 2 consumes no more than 950 kW total prime power	TBD	Reduced Power Substate 1 consumes 1110kW total power; Reduced Power Substate 2 consumes 860kW total power
Survivability				
(Objective = Threshold) Exemption - AMDR will be integrated into the DDG 51 hull with no decrease in survivability of the hull based on DDG 51 live fire equivalent testing (DDG 81 shock trial)	(Objective = Threshold) Exemption - AMDR will be integrated into the DDG 51 hull with no decrease in survivability of the hull based on DDG 51 live fire equivalent testing (DDG 81 shock trial)	Exemption - AMDR will be integrated into the DDG 51 hull with no decrease in survivability of the hull based on DDG 51 live fire equivalent testing (DDG 81 shock trial)	TBD	Exemption - AMDR will be integrated into the DDG 51 hull with no decrease in survivability of the hull based on DDG 51 live fire equivalent testing (DDG 81 shock trial)
Force Protection				

(Objective = Threshold) Exemption - Will support host platform requirement	(Objective = Threshold) Exemption - Will support host platform requirement	Exemption - Will support host platform requirement	N/A - Exempt	Exemption - Will support host platform requirement
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Classified Performance information is provided in the classified annex to this submission.

Requirements Reference

The AMDR CDD was signed by the Chief of Naval Operations on April 20, 2013 JROC Memorandum signed June 27, 2013. Specific KPP values have been established in the CDD and those requirements have been flowed down to the Top Level Radar Performance and Top Level Requirements documents developed by the program.

The Pre-EMD DAB's ADM, dated May 21, 2012, directed a change to the program structure so that it includes only the AMDR S-band array and the RSC. This APB represents only the S-band and RSC capabilities from the AMDR CDD. The X-band capabilities in the AMDR CDD will be addressed in a separate future Program of Record.

Change Explanations

None

Notes

Net Ready Demonstrated Performance updated because a valid Solution Architecture is established and Information Assurance requirements have been flowed and decomposed in System and Subsystem Specifications.

Acronyms and Abbreviations

Ao - Operational Availability
 CMS - Combat Management System
 DDG - Guided Missile Destroyer
 kW - Kilowatt
 TTL - Training Task List

Track to Budget

RDT&E

Appn	BA	PE
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Navy 1319 04 0603513N

Project	Name
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4019 Shipboard System Component (Shared) (Sunk)
Development - Radar
Upgrades

Notes: Applies to FY 2006 - 2007

Navy 1319 05 0604307N

Project	Name
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3044 AEGIS Combat System (Shared) (Sunk)
Engineering - Solid State SPY
Radar

Notes: Applies to FY 2006 - 2007

Navy 1319 05 0604501N

Project	Name
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3186 Advanced Above Water (Shared) (Sunk)
Sensors - Air and Missile
Defense Radar

Notes: Applies to FY 2008 - 2014

Navy 1319 05 0604522N

Project	Name
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3186 Air and Missile Defense Radar

Notes: Applies to FY 2015 - 2023 (program transitioned
from PE0604501N to PE0604522N in FY 2015).

Procurement

Appn	BA	PE
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Navy 1611 02 0204222N

Line Item	Name
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2122 DDG 51 (Shared)

Notes: Applies to FY 2016 - 2026

MILCON

Appn	BA	PE
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Navy 1205 01 0805376N

Project	Name
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P422 Advanced Radar Detection (Sunk)
Laboratory

Notes: Applies to FY 2009

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2013 \$M			BY 2013 \$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	1986.6	1986.6	2185.3	1751.3	2061.0	2061.0	1794.6
Procurement	3278.3	3278.3	3606.1	3308.8	4075.2	4075.2	4005.6
Flyaway	--	--	--	2807.1	--	--	3403.0
Recurring	--	--	--	2789.1	--	--	3383.0
Non Recurring	--	--	--	18.0	--	--	20.0
Support	--	--	--	501.7	--	--	602.6
Other Support	--	--	--	410.0	--	--	491.7
Initial Spares	--	--	--	91.7	--	--	110.9
MILCON	28.6	28.6	31.5	28.6	27.5	27.5	27.5
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5293.5	5293.5	N/A	5088.7	6163.7	6163.7	5827.7

Current APB Cost Estimate Reference

The cost data in this APB represents the AN/SPY-6 AMDR Navy Estimate dated April 25, 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.

Procurement funding for AMDR is also included in the DDG 51 SAR under Program Element 0204222N. Total Acquisition Cost includes RDT&E, Procurement, and MILCON. FY 2015-2023 RDT&E totals reflect PB 2019 controls and reflect a reduction of \$342M due to removal of the Self-Defense Test Ship effort as well as an additional \$71M in FY21-23 for the Aegis Solid State Backfit effort. MILCON is unchanged from PB 2018.

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	0	0	0
Procurement	22	22	22
Total	22	22	22

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	1540.8	32.1	27.1	26.8	53.8	62.0	52.0	0.0	1794.6
Procurement	613.9	340.1	499.5	331.8	542.3	549.6	558.1	570.3	4005.6
MILCON	27.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.5
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2019 Total	2182.2	372.2	526.6	358.6	596.1	611.6	610.1	570.3	5827.7
PB 2018 Total	2185.5	372.2	500.8	515.8	419.4	407.6	402.5	1359.9	6163.7
Delta	-3.3	0.0	25.8	-157.2	176.7	204.0	207.6	-789.6	-336.0

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	3	2	3	2	3	3	3	3	22
PB 2019 Total	0	3	2	3	2	3	3	3	3	22
PB 2018 Total	0	3	2	2	2	2	2	2	7	22
Delta	0	0	0	1	0	1	1	1	-4	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
2006	--	--	--	--	--	--	10.9
2007	--	--	--	--	--	--	35.3
2008	--	--	--	--	--	--	92.9
2009	--	--	--	--	--	--	92.5
2010	--	--	--	--	--	--	164.9
2011	--	--	--	--	--	--	204.2
2012	--	--	--	--	--	--	138.8
2013	--	--	--	--	--	--	193.9
2014	--	--	--	--	--	--	112.7
2015	--	--	--	--	--	--	126.3
2016	--	--	--	--	--	--	227.1
2017	--	--	--	--	--	--	141.3
2018	--	--	--	--	--	--	32.1
2019	--	--	--	--	--	--	27.1
2020	--	--	--	--	--	--	26.8
2021	--	--	--	--	--	--	53.8
2022	--	--	--	--	--	--	62.0
2023	--	--	--	--	--	--	52.0
Subtotal	--	--	--	--	--	--	1794.6

Annual Funding							
1319 RDT&E Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 2013 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2006	--	--	--	--	--	--	12.1
2007	--	--	--	--	--	--	38.4
2008	--	--	--	--	--	--	99.1
2009	--	--	--	--	--	--	97.4
2010	--	--	--	--	--	--	171.2
2011	--	--	--	--	--	--	207.0
2012	--	--	--	--	--	--	138.4
2013	--	--	--	--	--	--	191.4
2014	--	--	--	--	--	--	109.7
2015	--	--	--	--	--	--	121.4
2016	--	--	--	--	--	--	214.7
2017	--	--	--	--	--	--	131.4
2018	--	--	--	--	--	--	29.3
2019	--	--	--	--	--	--	24.3
2020	--	--	--	--	--	--	23.6
2021	--	--	--	--	--	--	46.4
2022	--	--	--	--	--	--	52.4
2023	--	--	--	--	--	--	43.1
Subtotal	--	--	--	--	--	--	1751.3

RDT&E budget includes reduction of \$342M for removal of the Self-Defense Test Ship effort and an additional \$71M for Aegis Solid State Backfit effort in FY21-23.

Annual Funding								
1611 Procurement Shipbuilding and Conversion, Navy								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2016	1	186.6	--	20.0	206.6	55.7	262.3	
2017	2	287.5	--	--	287.5	64.1	351.6	
2018	2	278.5	--	--	278.5	61.6	340.1	
2019	3	422.3	--	--	422.3	77.2	499.5	
2020	2	282.1	--	--	282.1	49.7	331.8	
2021	3	468.2	--	--	468.2	74.1	542.3	
2022	3	476.4	--	--	476.4	73.2	549.6	
2023	3	484.8	--	--	484.8	73.3	558.1	
2024	2	329.1	--	--	329.1	49.1	378.2	
2025	1	167.5	--	--	167.5	24.6	192.1	
Subtotal	22	3383.0	--	20.0	3403.0	602.6	4005.6	

Annual Funding 1611 Procurement Shipbuilding and Conversion, Navy								
Fiscal Year	Quantity	BY 2013 \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2016	1	168.2	--	18.0	186.2	50.2	236.4	
2017	2	254.5	--	--	254.5	56.8	311.3	
2018	2	242.0	--	--	242.0	53.5	295.5	
2019	3	359.9	--	--	359.9	65.8	425.7	
2020	2	235.7	--	--	235.7	41.6	277.3	
2021	3	383.6	--	--	383.6	60.7	444.3	
2022	3	382.6	--	--	382.6	58.8	441.4	
2023	3	381.7	--	--	381.7	57.8	439.5	
2024	2	254.1	--	--	254.1	37.9	292.0	
2025	1	126.8	--	--	126.8	18.6	145.4	
Subtotal	22	2789.1	--	18.0	2807.1	501.7	3308.8	

SCN funding included under PEO SHIPS Program Element (PE): 0204222N

Annual Funding 1205 MILCON Military Construction, Navy and Marine Corps		
Fiscal Year	TY \$M	
	Total Program	
2009		27.5
Subtotal		27.5

Annual Funding 1205 MILCON Military Construction, Navy and Marine Corps	
Fiscal Year	BY 2013 \$M
	Total Program
2009	28.6
Subtotal	28.6

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	10/4/2013	10/4/2013
Approved Quantity	16	16
Reference	Milestone B ADM	Milestone B ADM
Start Year	2016	2016
End Year	2023	2023

The Current Total LRIP Quantity is more than 10% of the total production quantity due to timing of Initial Operational Test and Evaluation, IOC, and the need to meet the shipbuilding plan. The Milestone B ADM dated October 4, 2013 included approval for a planned LRIP quantity not to exceed 16 units.

Foreign Military Sales

None

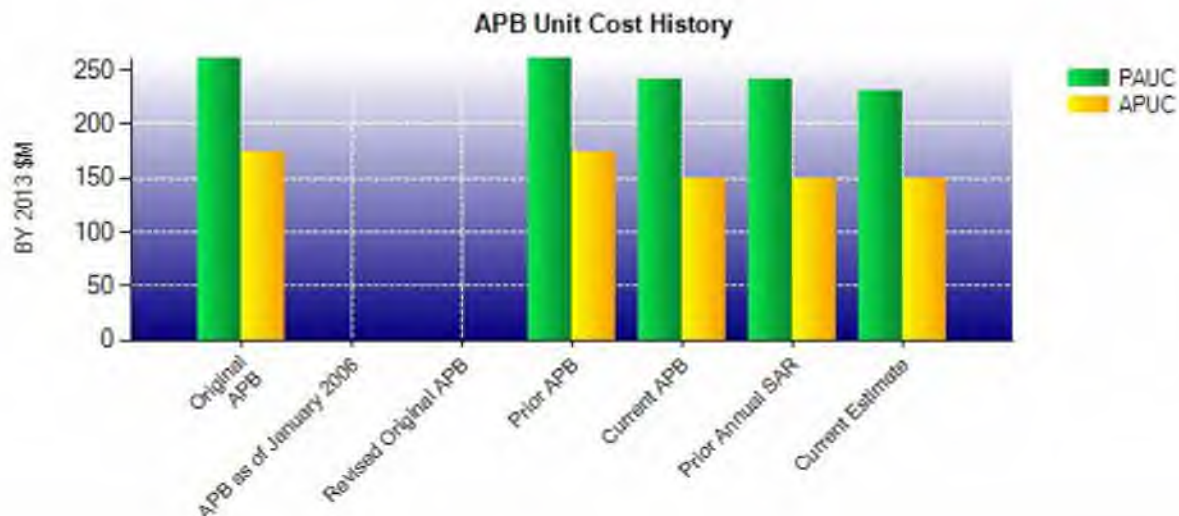
Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2013 \$M	BY 2013 \$M	% Change
	Current UCR Baseline (Jun 2017 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	5293.5	5088.7	
Quantity	22	22	
Unit Cost	240.614	231.305	-3.87
Average Procurement Unit Cost			
Cost	3278.3	3308.8	
Quantity	22	22	
Unit Cost	149.014	150.400	+0.93

Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2013 \$M	BY 2013 \$M	% Change
	Original UCR Baseline (Oct 2013 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	5735.7	5088.7	
Quantity	22	22	
Unit Cost	260.714	231.305	-11.28
Average Procurement Unit Cost			
Cost	3846.9	3308.8	
Quantity	22	22	
Unit Cost	174.859	150.400	-13.99



APB Unit Cost History					
Item	Date	BY 2013 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Oct 2013	260.714	174.859	302.845	214.727
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	Oct 2013	260.714	174.859	302.845	214.727
Current APB	Jun 2017	240.614	149.014	280.168	185.236
Prior Annual SAR	Dec 2016	240.614	149.014	280.168	185.236
Current Estimate	Dec 2017	231.305	150.400	264.895	182.073

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		
302.845	0.750	0.000	0.677	15.214	-5.305	0.000	-34.013	-22.677	280.168	

Current SAR Baseline to Current Estimate (TY \$M)										
PAUC Production Estimate	Changes								PAUC Current Estimate	
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total		
280.168	-1.855	0.000	-1.659	-12.318	0.673	0.000	-0.114	-15.273	264.895	

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	
214.727	1.418	0.000	0.677	0.000	2.427	0.000	-34.013	-29.491	185.236

Current SAR Baseline to Current Estimate (TY \$M)									
APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
185.236	-1.673	0.000	-1.659	0.000	0.282	0.000	-0.114	-3.164	182.073

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	Jul 2013	Oct 2013	Sep 2013
Milestone C	N/A	Jul 2017	Apr 2017	Apr 2017
IOC	N/A	Sep 2023	Feb 2024	Feb 2024
Total Cost (TY \$M)	N/A	6662.6	6163.7	5827.7
Total Quantity	N/A	22	22	22
PAUC	N/A	302.845	280.168	264.895

Cost Variance

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	2061.0	4075.2	27.5	6163.7
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	+0.3	--	+0.3
Other	--	--	--	--
Support	--	-0.3	--	-0.3
Subtotal	--	--	--	--
Current Changes				
Economic	-4.0	-36.8	--	-40.8
Quantity	--	--	--	--
Schedule	--	-36.5	--	-36.5
Engineering	-271.0	--	--	-271.0
Estimating	+8.6	+5.9	--	+14.5
Other	--	--	--	--
Support	--	-2.2	--	-2.2
Subtotal	-266.4	-69.6	--	-336.0
Total Changes	-266.4	-69.6	--	-336.0
CE - Cost Variance	1794.6	4005.6	27.5	5827.7
CE - Cost & Funding	1794.6	4005.6	27.5	5827.7

Summary BY 2013 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	1986.6	3278.3	28.6	5293.5
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	+0.3	--	+0.3
Other	--	--	--	--
Support	--	-0.3	--	-0.3
Subtotal	--	--	--	--
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	+18.9	--	+18.9
Engineering	-242.4	--	--	-242.4
Estimating	+7.1	+5.2	--	+12.3
Other	--	--	--	--
Support	--	+6.4	--	+6.4
Subtotal	-235.3	+30.5	--	-204.8
Total Changes	-235.3	+30.5	--	-204.8
CE - Cost Variance	1751.3	3308.8	28.6	5088.7
CE - Cost & Funding	1751.3	3308.8	28.6	5088.7

Previous Estimate: September 2017

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-4.0
Removal of requirement for unmanned Self-Defense Test Ship at-sea testing in support of the DDG 51 Flt III and Aegis Advanced Capability Build 20 requirements. (Engineering)	-302.5	-342.0
Additional funding to adapt a scaled AMDR on a DDG Flt IIA. (Engineering)	+60.1	+71.0
Realignment of funds to match latest program estimate. (Estimating)	+6.4	+7.9
Adjustment for current and prior escalation. (Estimating)	+0.7	+0.7
RDT&E Subtotal	-235.3	-266.4

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-36.8
Acceleration of procurement buy profile to match DDG 51 Flight III shipbuilding profile from FY 2025 - FY 2027 to FY 2019, FY 2021 - FY 2023. (Schedule)	0.0	-59.0
Additional schedule variance due to acceleration of four units from FY 2025 - FY 2027 to FY 2019, FY 2021 - FY 2023. (Schedule)	+18.9	+22.5
Adjustment for current and prior escalation. (Estimating)	+5.2	+5.9
Adjustment for current and prior escalation. (Support)	+1.2	+1.4
Increase in Other Support reflects changes to align with the DDG 51 Flight III shipbuilding profile. (Support)	+4.7	-2.4
Increase in Initial Spares reflects changes to align with the DDG 51 Flight III shipbuilding profile. (Support)	+0.5	-1.2
Procurement Subtotal	+30.5	-69.6

Contracts

Contract Identification	
Appropriation:	RDT&E
Contract Name:	AMDR Engineering and Manufacturing Development (CLIN 0001)
Contractor:	Raytheon Company
Contractor Location:	1001 Boston Post Rd E Marlborough, MA 01752-3770
Contract Number:	N00024-14-C-5315
Contract Type:	Cost Plus Incentive Fee (CPIF)
Award Date:	October 10, 2013
Definitization Date:	October 10, 2013

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
385.7	N/A	0	388.5	N/A	0	555.1	537.1

Target Price Change Explanation
The difference between the Initial Contract Price Target and the Current Contract Price Target is due to a Request for Equitable Adjustment (REA) contract modification that addressed the delay due to a bid protest. The bid protest was subsequently withdrawn.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/21/2017)	-135.6	-7.6
Previous Cumulative Variances	-121.2	-10.2
Net Change	-14.4	+2.6

Cost and Schedule Variance Explanations
The unfavorable net change in the cost variance is due to continued Digital Receiver-Exciter and Digital Beamforming testing and problem resolution; software defect resolution; and additional efforts to complete DT-3 test cases, scenarios, and scripts.
The favorable net change in the schedule variance is due to completing DT-3 test events; completing system analysis and verification, validation and assessment (VV&A) activity; and final completion and submittal of navigation system final qualification test report.

Notes
The difference between the current contract price and the current Estimate at Completion is due to cost growth described in the "Cost and Schedule Variance Explanations" section and adding a new requirement for procurement, installation, and test of diesel generators to be used at the Advanced Radar Detection Laboratory for radar developmental testing.
This contract is more that 90% complete; therefore, this is the final report for this contract.

Contract Identification

Appropriation: Procurement
Contract Name: AMDR Low Rate Initial Production (CLIN 0201)
Contractor: Raytheon Company
Contractor Location: 1001 Boston Post Rd E
 Marlborough, MA 01752-3770
Contract Number: N00024-14-C-5315/2
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: December 13, 2016
Definitization Date: December 13, 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
182.2	202.5	1	182.2	202.5	1		202.5

Cost and Schedule Variance Explanations

Cost and Schedule Variance reporting is not required on this (FPIF) contract.

General Contract Variance Explanation

Cost and Schedule variances are not reported for this contract yet because earned value management reporting does not start until February 2018.

Notes

Integrated Baseline Review was conducted on November 2, 2017 for the first three LRIP units. Currently no contractor Estimate at Completion or variance information as initial EVM data will be available February 2018.

Contract Identification

Appropriation: Procurement
Contract Name: AMDR Low Rate Initial Production (CLIN 0303AA)
Contractor: Raytheon Company
Contractor Location: 1001 Boston Post Rd E
 Marlborough, MA 01752-3770
Contract Number: N00024-14-C-5315/3
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: May 01, 2017
Definitization Date: May 01, 2017

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
128.5	142.8	1	128.5	142.8	1		142.8

Cost and Schedule Variance Explanations

Cost and Schedule Variance reporting is not required on this (FPIF) contract.

General Contract Variance Explanation

Cost and Schedule variances are not reported for this contract yet because earned value management reporting does not start until February 2018.

Notes

Integrated Baseline Review was conducted on November 2, 2017 for the first three LRIP units. Currently no contractor Estimate at Completion or variance information as initial EVM data will be available February 2018.

Contract Identification

Appropriation: Procurement
Contract Name: AMDR Low Rate Initial Production (CLIN 0303AB)
Contractor: Raytheon Company
Contractor Location: 1001 Boston Post Rd E
 Marlborough, MA 01752-3770
Contract Number: N00024-14-C-5315/4
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: May 01, 2017
Definitization Date: May 01, 2017

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
126.5	140.6	1	126.5	140.6	1		140.6

Cost and Schedule Variance Explanations

Cost and Schedule Variance reporting is not required on this (FPIF) contract.

General Contract Variance Explanation

Cost and Schedule variances are not reported for this contract yet because earned value management reporting does not start until February 2018.

Notes

Integrated Baseline Review was conducted on November 2, 2017 for the first three LRIP units. Currently no contractor Estimate at Completion or variance information as initial EVM data will be available February 2018.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	0	0	22	0.00%
Total Program Quantity Delivered	0	0	22	0.00%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	5827.7	Years Appropriated	13
Expended to Date	1615.6	Percent Years Appropriated	65.00%
Percent Expended	27.72%	Appropriated to Date	2554.4
Total Funding Years	20	Percent Appropriated	43.83%

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

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	January 19, 2018
Source of Estimate:	POE
Quantity to Sustain:	22
Unit of Measure:	System
Service Life per Unit:	40.00 Years
Fiscal Years in Service:	FY 2021 - FY 2071

Each AMDR System includes four fully populated AMDR-S array faces and a Radar Suite Controller.

Sustainment Strategy

In order to meet Operational Availability (Ao) KPP and O&S Cost Key System Attribute requirements AMDR will implement a performance-based product support strategy involving Naval Surface Warfare Center (NSWC) Crane Division, NSWC Port Hueneme Division, and NSWC Dahlgren Division, Defense Logistics Agency, Naval Supply Systems Command, and Center for Surface Combat Systems Dahlgren.

The AMDR system employs a two level maintenance philosophy (organizational to depot) with onboard maintenance performed by the ship's crew. The ship's operational tempo is assumed to be 180 days on station. Maintenance (preventative and corrective) can occur anytime during the 180 days on station as long as the system is not degraded by the maintenance activity. Commercial Off The Shelf (COTS) processing equipment refresh and upgrades will be implemented using a 'refresh by attrition' approach combined with an eight year refresh cycle. The planned software sustainment strategy for AMDR includes post-delivery routine software maintenance and software updates every two years to address new threats and other emergent capability requirements.

Antecedent Information

The antecedent system is AN/SPY-1D(V). AN/SPY-1D(V) has fielded 32 systems, each with a planned service life of 35 years. The source of the cost estimate is the Naval Sea Systems Command Systems Engineering Directorate - Cost Engineering and Industrial Analysis Division AN/SPY-1D(V) FRP ICE dated November 14, 2011 with the following adjustment: incorporated same forward pricing rate recommendation (FPRR) escalation rate as AMDR and added hardware modification costs based on percentage allocation of Aegis weapon system MK-7 hardware modification cost. The AN/SPY-1D(V) Sustaining Support cost element does not include costs for Operating Equipment Replacement, whereas AMDR does.

Annual O&S Costs BY2013 \$M		
Cost Element	AMDR Average Annual Cost Per System	AN/SPY-1D(V) (Antecedent) Average Annual Cost Per System
Unit-Level Manpower	--	0.191
Unit Operations	--	--
Maintenance	1.995	2.542
Sustaining Support	1.916	1.489
Continuing System Improvements	0.419	1.417
Indirect Support	--	0.085
Other	--	--
Total	4.330	5.724

For AMDR, Unit-Level Manpower, Unit Operations, and Indirect Support are not reported because these costs are considered Ship Level costs. The antecedent column for AN/SPY-1D(V) includes Unit Level Manpower and Indirect Support costs since manpower costs were included in the AN/SPY-1D(V) cost estimate.

Item	Total O&S Cost \$M			
	AMDR			AN/SPY-1D(V) (Antecedent)
	Current Production APB Objective/Threshold		Current Estimate	
Base Year	3821.4	4203.5	3810.4	6410.8
Then Year	7402.7	N/A	7326.9	N/A

Current Estimate includes System Operations and Maintenance, Navy (OMN) (TY \$7,114.5M, BY \$3,701.1M) and Fleet OMN (TY \$212.4M, BY 2013 \$109.3M).

Equation to Translate Annual Cost to Total Cost

Total System O&S [BY 2013 \$3,810.4M] = unitized cost [BY 2013 \$4.330M] * number of systems [22] * service life per system [40].

O&S Cost Variance		
Category	BY 2013 \$M	Change Explanations
Prior SAR Total O&S Estimates - Sep 2017 SAR	3821.4	
Programmatic/Planning Factors	-11.0	The change is to align AMDR to adjusted DDG 51 production schedule.
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	-11.0
Current Estimate	3810.4

Disposal Estimate Details

Date of Estimate: April 20, 2017
Source of Estimate: POE
Disposal/Demilitarization Total Cost (BY 2013 \$M): Total costs for disposal of all System are 22.8