Selected Acquisition Report (SAR)

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

Air and Missile Defense Radar (AMDR)

As of FY 2017 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

Table of Contents

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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References

SAR Baseline (Development Estimate)

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated October 03, 2013

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated October 3, 2013

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 (MAMDJF) 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 Guided Missile Destroyer (DDG) 51 Flight III.

Executive Summary

After completing Concept Studies (CS) and Technology Development (TD) phase contracts with Raytheon, Northrop Grumman, and Lockheed Martin, the 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 EMD phase 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. Additional activities during the EMD phase include a hardware and a system Critical Design Review (CDR) to assess the completeness of the detailed design and how it supports the performance requirements. The AMDR hardware CDR was completed December 3, 2014 and the System CDR was completed on April 29, 2015. EMD will also include integration and test of a single-faced AMDR-S/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 EMD phase will conclude in an AMDR Milestone C decision.

Program testing began following a successful Developmental Test (DT-2) Test Readiness Review (TRR), which completed on June 9, 2015. Testing will continue through EMD phase with the DT-3 Test Readiness Review scheduled for Q4 FY 2016. Software Baseline Review (SBR) 2 was completed on June 10, 2015.

The FY 2016 budget included a $9M reduction for program execution. There are currently no schedule or technical issues for the program.

The program required one waiver to Section 2366b criteria. The provision requiring that a program "...has received a Preliminary Design Review (PDR) and conducted a formal post-PDR assessment" was deferred until the EMD phase. The delta hardware PDR was completed on May 21, 2014 and the system delta PDR was completed on August 27, 2014. The post-PDR Assessment was signed on June 22, 2015.

USD(AT&L) also approved proceeding into EMD without Director, Operational Test & Evaluation approval of the AMDR Test and Evaluation Master Plan, "... because of an unresolved issue regarding the need for an unmanned test asset for close-in Aegis ship self defense engagement testing." The PB 2017 budget includes $175M, added in FY2019-2021, to support long lead hardware procurement for unmanned Self-Defense Test Ship (SDTS) at-sea testing in support of DDG-51 Flight III and Aegis Advanced Capability Build (ACB) 20 requirements.

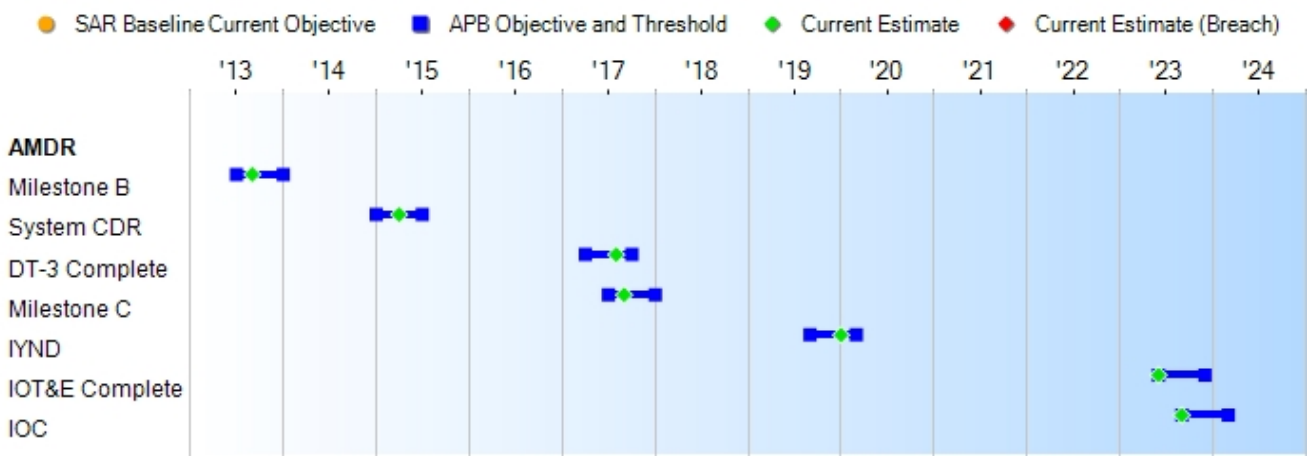
There are no significant software-related issues with this program at this time.

Threshold Breaches

APB Breaches		
Schedule		☐
Performance		☐
Cost	RDT&E	☐
	Procurement	☐
	MILCON	☐
	Acq O&M	☐
O&S Cost		☐
Unit Cost	PAUC	☐
	APUC	☐

Nunn-McCurdy Breaches		
Current UCR Baseline		
	PAUC	None
	APUC	None
Original UCR Baseline		
	PAUC	None
	APUC	None

Schedule



Schedule Events					
Events	**SAR Baseline Development Estimate**	**Current APB Development Objective/Threshold**		**Current Estimate**	
Milestone B	Jul 2013	Jul 2013	Jan 2014	Sep 2013	
System CDR	Jan 2015	Jan 2015	Jul 2015	Apr 2015	
DT-3 Complete	Apr 2017	Apr 2017	Oct 2017	Aug 2017	(Ch-1)
Milestone C	Jul 2017	Jul 2017	Jan 2018	Sep 2017	
IYND	Sep 2019	Sep 2019	Mar 2020	Jan 2020	
IOT&E Complete	Jun 2023	Jun 2023	Dec 2023	Jun 2023	
IOC	Sep 2023	Sep 2023	Mar 2024	Sep 2023	

Change Explanations

(Ch-1) The current estimate for DT-3 Complete has changed from September 2017 to August 2017 to reflect current planned DT-3 completion date.

Acronyms and Abbreviations

CDR - Critical Design Review
DT&E - Developmental Test and Evaluation
DT-3 - Developmental Test-3
IOT&E - Initial Operational Test and Evaluation
IYND - In Yard Need Date

Performance

Performance Characteristics				
SAR Baseline Development Estimate	**Current APB Development Objective/Threshold**		**Demonstrated Performance**	**Current Estimate**
Availability				
Ao ≥0.99	Ao ≥0.99	Ao ≥0.98	TBD	Ao ≥0.99
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.	TBD	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	TBD	Exemption - Will support host platform requirement

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 Memo) 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 (TLRP) and Top Level Requirements (TLR) documents developed by the program. AMDR capability will be codified in a CPD in support of Milestone C.

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 Radar Suite Controller (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

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
Navy	04	0603513N

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

Notes: Applies to FY 2006 - 2007

Appn	BA	PE
Navy	05	0604307N

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

Notes: Applies to FY 2006 - 2007

Appn	BA	PE
Navy	05	0604501N

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

Notes: Applies to FY 2008 - 2014

Appn	BA	PE
Navy	05	0604522N

Project	Name
3186	Air and Missile Defense Radar (AMDR) System - Air and Missile Defense Radar

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

Procurement

Appn	BA	PE
Navy	02	0204222N

Line Item	Name	
2122	DDG 51	(Shared)

Notes: Applies to FY 2016 – 2026

MILCON

Appn	BA	PE
Navy	01	0805376N

Project	Name	
P422	Advanced Radar Detection Laboratory	(Sunk)

Notes: Applies to FY 2009

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2013 $M			BY 2013 $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	1860.0	1860.0	2046.0	1849.4	1911.1	1911.1	1901.9
Procurement	3846.9	3846.9	4231.6	3254.1	4724.0	4724.0	4016.3
Flyaway	--	--	--	2637.7	--	--	3258.7
Recurring	--	--	--	2619.8	--	--	3238.7
Non Recurring	--	--	--	17.9	--	--	20.0
Support	--	--	--	616.4	--	--	757.6
Other Support	--	--	--	519.9	--	--	638.3
Initial Spares	--	--	--	96.5	--	--	119.3
MILCON	28.8	28.8	31.7	28.6	27.5	27.5	27.5
Acq O&M	0.0	0.0	--	0.0	0.0	0.0	0.0
Total	5735.7	5735.7	N/A	5132.1	6662.6	6662.6	5945.7

Confidence Level

Confidence Level of cost estimate for current APB: 50%

Based on the AMDR Independent Cost Estimate (ICE) prepared for the Milestone B Defense Acquisition Board (DAB) review (memo dated May 29, 2013), it is about equally likely that the estimate will prove too low or too high.

Cost Notes

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 - 2021 RDT&E totals reflect PB 2017 controls and include $175M to support long lead hardware procurement for unmanned Self-Defense Test Ship (SDTS) at-sea testing in support of DDG 51 Flight III and Aegis Advanced Capability Build 20 requirements. Procurement and MILCON are unchanged from PB 2016.

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

Cost and Funding

Funding Summary

Appropriation Summary									
FY 2017 President's Budget / December 2015 SAR (TY$ M)									
Appropriation	Prior	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	To Complete	Total
RDT&E	1172.6	232.7	144.4	31.9	172.2	47.0	37.8	63.3	1901.9
Procurement	0.0	262.3	351.6	340.1	337.8	344.2	352.2	2028.1	4016.3
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 2017 Total	1200.1	495.0	496.0	372.0	510.0	391.2	390.0	2091.4	5945.7
PB 2016 Total	1203.3	504.1	503.5	372.8	366.7	374.1	382.8	2091.4	5798.7
Delta	-3.2	-9.1	-7.5	-0.8	143.3	17.1	7.2	0.0	147.0

Quantity Summary										
FY 2017 President's Budget / December 2015 SAR (TY$ M)										
Quantity	Undistributed	Prior	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	0	1	2	2	2	2	2	11	22
PB 2017 Total	0	0	1	2	2	2	2	2	11	22
PB 2016 Total	0	0	1	2	2	2	2	2	11	22
Delta	0	0	0	0	0	0	0	0	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
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	--	--	--	--	--	--	126.5
2016	--	--	--	--	--	--	232.7
2017	--	--	--	--	--	--	144.4
2018	--	--	--	--	--	--	31.9
2019	--	--	--	--	--	--	172.2
2020	--	--	--	--	--	--	47.0
2021	--	--	--	--	--	--	37.8
2022	--	--	--	--	--	--	32.9
2023	--	--	--	--	--	--	30.4
Subtotal	--	--	--	--	--	--	1901.9

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	--	--	--	--	--	--	191.3
2014	--	--	--	--	--	--	109.7
2015	--	--	--	--	--	--	121.5
2016	--	--	--	--	--	--	220.0
2017	--	--	--	--	--	--	134.1
2018	--	--	--	--	--	--	29.1
2019	--	--	--	--	--	--	153.8
2020	--	--	--	--	--	--	41.1
2021	--	--	--	--	--	--	32.4
2022	--	--	--	--	--	--	27.7
2023	--	--	--	--	--	--	25.1
Subtotal	--	--	--	--	--	--	1849.4

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	178.7	--	20.0	198.7	63.6	262.3
2017	2	282.5	--	--	282.5	69.1	351.6
2018	2	273.1	--	--	273.1	67.0	340.1
2019	2	272.3	--	--	272.3	65.5	337.8
2020	2	278.7	--	--	278.7	65.5	344.2
2021	2	287.2	--	--	287.2	65.0	352.2
2022	2	292.7	--	--	292.7	66.1	358.8
2023	3	447.3	--	--	447.3	96.6	543.9
2024	2	303.9	--	--	303.9	67.0	370.9
2025	3	464.5	--	--	464.5	97.3	561.8
2026	1	157.8	--	--	157.8	34.9	192.7
Subtotal	22	3238.7	--	20.0	3258.7	757.6	4016.3

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	160.2	--	17.9	178.1	57.1	235.2
2017	2	248.5	--	--	248.5	60.8	309.3
2018	2	235.6	--	--	235.6	57.8	293.4
2019	2	230.3	--	--	230.3	55.4	285.7
2020	2	231.1	--	--	231.1	54.3	285.4
2021	2	233.5	--	--	233.5	52.8	286.3
2022	2	233.3	--	--	233.3	52.6	285.9
2023	3	349.5	--	--	349.5	75.5	425.0
2024	2	232.8	--	--	232.8	51.3	284.1
2025	3	348.8	--	--	348.8	73.1	421.9
2026	1	116.2	--	--	116.2	25.7	141.9
Subtotal	22	2619.8	--	17.9	2637.7	616.4	3254.1

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

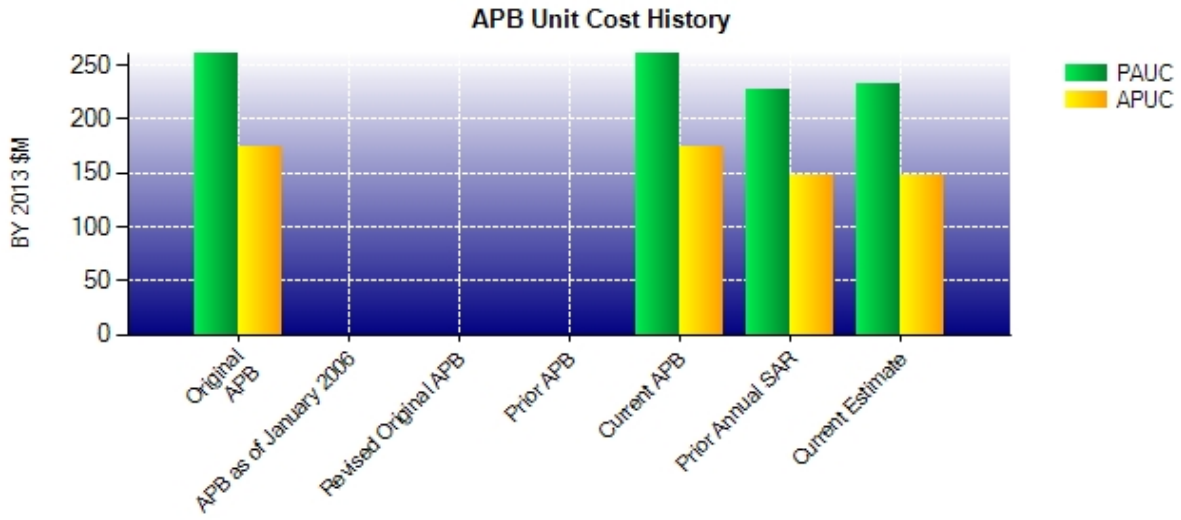
Unit Cost

Unit Cost Report

Item	BY 2013 $M Current UCR Baseline (Oct 2013 APB)	BY 2013 $M Current Estimate (Dec 2015 SAR)	% Change
Program Acquisition Unit Cost			
Cost	5735.7	5132.1	
Quantity	22	22	
Unit Cost	260.714	233.277	-10.52
Average Procurement Unit Cost			
Cost	3846.9	3254.1	
Quantity	22	22	
Unit Cost	174.859	147.914	-15.41

Item	BY 2013 $M Original UCR Baseline (Oct 2013 APB)	BY 2013 $M Current Estimate (Dec 2015 SAR)	% Change
Program Acquisition Unit Cost			
Cost	5735.7	5132.1	
Quantity	22	22	
Unit Cost	260.714	233.277	-10.52
Average Procurement Unit Cost			
Cost	3846.9	3254.1	
Quantity	22	22	
Unit Cost	174.859	147.914	-15.41

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	N/A	N/A	N/A	N/A	N/A
Current APB	Oct 2013	260.714	174.859	302.845	214.727
Prior Annual SAR	Dec 2014	227.409	148.173	263.577	182.559
Current Estimate	Dec 2015	233.277	147.914	270.259	182.559

SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY $M)									
Initial PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
302.845	0.418	0.000	0.000	7.955	-13.668	0.000	-27.291	-32.586	270.259

Current SAR Baseline to Current Estimate (TY $M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
214.727	1.123	0.000	0.000	0.000	-6.000	0.000	-27.291	-32.168	182.559

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	N/A	Sep 2013
Milestone C	N/A	Jul 2017	N/A	Sep 2017
IOC	N/A	Sep 2023	N/A	Sep 2023
Total Cost (TY $M)	N/A	6662.6	N/A	5945.7
Total Quantity	N/A	22	N/A	22
PAUC	N/A	302.845	N/A	270.259

Cost Variance

Summary TY $M				
Item	**RDT&E**	**Procurement**	**MILCON**	**Total**
SAR Baseline (Development Estimate)	1911.1	4724.0	27.5	6662.6
Previous Changes				
Economic	-10.4	+17.6	+0.2	+7.4
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-145.8	-125.8	-0.2	-271.8
Other	--	--	--	--
Support	--	-599.5	--	-599.5
Subtotal	-156.2	-707.7	--	-863.9
Current Changes				
Economic	-5.3	+7.1	--	+1.8
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	+175.0	--	--	+175.0
Estimating	-22.7	-6.2	--	-28.9
Other	--	--	--	--
Support	--	-0.9	--	-0.9
Subtotal	+147.0	--	--	+147.0
Total Changes	-9.2	-707.7	--	-716.9
CE - Cost Variance	1901.9	4016.3	27.5	5945.7
CE - Cost & Funding	1901.9	4016.3	27.5	5945.7

Summary BY 2013 $M				
Item	**RDT&E**	**Procurement**	**MILCON**	**Total**
SAR Baseline (Development Estimate)	1860.0	3846.9	28.8	5735.7
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-145.4	-103.2	-0.2	-248.8
Other	--	--	--	--
Support	--	-483.9	--	-483.9
Subtotal	-145.4	-587.1	-0.2	-732.7
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	+155.5	--	--	+155.5
Estimating	-20.7	-4.8	--	-25.5
Other	--	--	--	--
Support	--	-0.9	--	-0.9
Subtotal	+134.8	-5.7	--	+129.1
Total Changes	-10.6	-592.8	-0.2	-603.6
CE - Cost Variance	1849.4	3254.1	28.6	5132.1
CE - Cost & Funding	1849.4	3254.1	28.6	5132.1

Previous Estimate: December 2014

RDT&E	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-5.3
Funding increase to support long lead hardware procurement for unmanned Self-Defense Test Ship at-sea testing in support of the Guided Missile Destroyer (DDG) 51 Flight III and Aegis Advanced Capability Build (ACB) 20 requirements (Engineering)	+155.5	+175.0
Revised estimate to align funding to POE and to reflect implementation of cost reduction initiatives (Estimating)	-23.8	-25.9
Adjustment for current and prior escalation. (Estimating)	+3.1	+3.2
RDT&E Subtotal	+134.8	+147.0

Procurement	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+7.1
Adjustment for current and prior escalation. (Estimating)	-0.5	-0.4
Revised estimate to align funding to POE (Estimating)	-4.3	-5.8
Adjustment for current and prior escalation. (Support)	0.0	-0.2
Decrease in Other Support. (Support)	-0.8	-0.7
Decrease in Initial Spares. (Support)	-0.1	0.0
Procurement Subtotal	-5.7	0.0

Contracts

Contract Identification

Appropriation: RDT&E
Contract Name: AMDR Engineering and Manufacturing Development
Contractor: Raytheon Company
Contractor Location: 528 Boston Post Road
Sudbury, MA 01776
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	422.2	436.4

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 (12/31/2015)	-45.1	-6.3
Previous Cumulative Variances	-9.2	-2.9
Net Change	-35.9	-3.4

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to design issues with the Digital Receiver/Exciters, but is also impacted by complexities due to ship fit issues with the mechanical structure. In order to maintain schedule, Raytheon and subcontractor General Dynamics have both provided additional Systems Engineering and Program Management Support on site at the subcontractor's facility. The majority of this cost variance is not expected to be recovered.

The unfavorable net change in the schedule variance is due to design issues with the digital receivers/exciters resulting in a significantly late delivery to the near field range. Raytheon took several actions to mitigate this schedule slip as much as possible but this still caused a delay in the start of the array test for Developmental Test-2. There remains a schedule margin of about a month for the delivery of the array to Pacific Missile Range Facility and the majority of this schedule variance is expected to recover by April 2016.

EVM data based on Integrated Program Management Report delivered by Raytheon on January 21, 2016 and reflects data through December 31, 2015.

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 requirement for procurement, installation, and test of diesel generators to be used at the Advanced Radar Detection Laboratory for radar developmental testing.

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	5945.7	Years Appropriated	11
Expended to Date	1181.0	Percent Years Appropriated	52.38%
Percent Expended	19.86%	Appropriated to Date	1695.1
Total Funding Years	21	Percent Appropriated	28.51%

The above data is current as of February 09, 2016.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	May 29, 2013
Source of Estimate:	CAPE ICE
Quantity to Sustain:	22
Unit of Measure:	System
Service Life per Unit:	40.00 Years
Fiscal Years in Service:	FY 2021 - FY 2070

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

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 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) Full Rate Production ICE dated November 14, 2011. 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	--	0.192
Unit Operations	--	--
Maintenance	1.177	2.047
Sustaining Support	2.722	1.047
Continuing System Improvements	0.852	0.204
Indirect Support	--	0.086
Other	--	--
Total	4.751	3.576

Costs above reflect average annual cost per system. For AMDR, Unit-Level Manpower, Unit Operations, and Indirect Support are not reported because they 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, while for AMDR these costs were captured in the DDG 51 costs.

Item	Total O&S Cost $M			
	AMDR			AN/SPY-1D(V) (Antecedent)
	Current Development APB Objective/Threshold		Current Estimate	
Base Year	4181.3	4599.4	4181.3	4005.6
Then Year	7857.3	N/A	7857.3	N/A

Objective O&S costs include System Operations and Maintenance, Navy (OMN) (TY $6,415.1M, BY 2013 $3,385.7M) and Fleet OMN (TY $1,442.1M, BY 2013 $795.6M).

Equation to Translate Annual Cost to Total Cost

Total System O&S [BY 2013 $4,181.3M] = unitized cost [BY 2013 $4.751M] * 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 - Dec 2014 SAR	4181.3	
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	4181.3

Disposal Estimate Details

Date of Estimate:	May 29, 2013
Source of Estimate:	CAPE ICE
Disposal/Demilitarization Total Cost (BY 2013 $M):	Total costs for disposal of all System are 30.2

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