AIR AND MISSILE DEFENSE RADAR (AMDR)

December 2021 Selected Acquisition Report (SAR)

DECEMBER 31, 2021
DEPARTMENT OF THE NAVY

Contents

Common Acronyms and Abbreviations
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(A&S) - Under Secretary of Defense (Acquisition and Sustainment)
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

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Mission and Description

Developed under the Air and Missile Defense Radar (AMDR) program, the AN/SPY-6(V)1 is the Navy's next generation radar system that will address Ballistic Missile Defense (BMD) and Air Defense (AD) capability gaps identified in the Maritime Air and Missile Defense of Joint Forces (MAMDJF) Initial Capabilities Document (ICD). AN/SPY-6(V)1 is an Integrated Air and Missile Defense (IAMD) radar providing sensitivity for long range detection and engagement of advanced threats. The AN/SPY-6(V)1 is currently planned to be deployed on the Arleigh Burke Class Guided Missile Destroyer Flight III with four arrays each populated with 37 Radar Modular Assemblies (RMAs) which achieves the Capability Production Document (CPD) sensitivity threshold.

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, the EMD contract was awarded to Raytheon on October 10, 2013.

The EMD phase included integration and test of a single-faced AN/SPY-6(V)1 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. Developmental Testing (DT)-3 live testing commenced on September 6, 2016, and included multiple live Air, Surface, Electronic Attack/Electronic Protection (EA/EP), Ballistic Missile Defense (BMD), Integrated Air and Missile Defense, missile communications test set, satellites, and sphere tracking tests. The Vigilant Janus BMD flight test analysis resulted in the March 2018 decision to close DT-3 and direction to conduct a retest. The Vigilant Nemesis retest, successfully executed in January 2019, demonstrated the AN/SPY-6(V)1 capability to detect, track, and discriminate an AEGIS Readiness Assessment Vehicle-CZ complex short-range ballistic missile target and support the design of the AEGIS Baseline (BL) 10 combat system. AN/SPY-6(V)1 testing will continue at PMRF against live Air, Surface, EA/EP, BMD, satellites and sphere targets and other agency Targets of Opportunity (TOOs). During this continued testing and integration period, the SPY-6 team has supported combat system integration with the AEGIS Baseline 10 development team at the Combat System Engineering Development Site (CSEDS). Significant combat system integration and test efforts have also been completed at PMRF using the BL10 Virtual Test Environment installed at the Advanced Radar Development Evaluation Laboratory (ARDEL). During this integration, the radar has supported several multi-mission tracking exercises and BMD TOOs while being commanded by the combat system.

The EMD phase contract includes options for nine LRIP units. The program received Milestone C approval on April 27, 2017 and subsequently exercised contract options for three LRIP systems. In April 2018, the AMDR program received an ADM that authorized award of one additional FY 2018 LRIP radar system, and upon successful Vigilant Nemesis test, authorized award of up to five additional LRIP radar systems. On March 14, 2019 three additional options were exercised, and on December 20, 2019 two additional options were exercised bringing the exercised options to a total of nine units. A third ADM dated April 26, 2019, authorized the award of one additional LRIP unit, bringing the total authorized to ten units. This was followed by a fourth ADM issued October 09, 2021, which authorized the AMDR program to procure its remaining six AN/SPY-6(V)1 LRIP units, subject to authorization by Congress of DDG 51 Flight III associated with each unit. Units 10 and beyond are included with the Hardware Production and Sustainment (HP&S) contract, awarded March 13, 2022.

The AMDR program is executing on schedule and within budget. The first three shipset deliveries have been completed for DDG 125, DDG 128 and DDG 129 while DDG 126 deliveries are underway. The program supported the successful completion of the DDG 125 AEGIS Light-Off (ALO) milestone in December 2021. The program's focus continued on installation support as well as production and test of the follow-on units, and the continued integration activities with AEGIS BL10. Software deliveries, integration, and testing continues with BL10 to support stage testing and ship trials subsequent to the ALO milestone achieved in December 2021. AN/SPY-6(V)1 has design co-dependencies with the combat system that requires further planned software work for integration with AEGIS Basline10.

There are no significant software related issues with the 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)
March 2018	Vigilant Janus flight test
April 2018	Exercised contract option for a fourth Low Rate Initial Production unit
December 2018	Awarded Integration and Production Support contract to Raytheon
January 2019	Vigilant Nemesis flight test
March 2019	Exercised contract options for three more Low Rate Initial Production units bringing the unit total to seven.
December 2019	Exercised contract options for two more Low Rate Initial Production units bringing the unit total to nine
October 2020	Completion of DDG 125 SPY-6 deliveries.
March 2021	Completion of DDG 128 SPY-6 deliveries.
December 2021	Completion of the DDG 125 AEGIS Light-Off (ALO)
March 2022	Completion of DDG 129 SPY-6 deliveries.
March 2022	Awarded the Hardware Production and Sustainment contract.

Schedule

Schedule Events

Schedule Events					
Events	**Development APB Objective**	**Current APB Development Objective/Threshold**		**Current Estimate/ Actual**	**Deviation**
Milestone B	Oct 2013	Oct 2013	Oct 2013	Oct 4, 2013	
System CDR	Apr 2015	Apr 2015	Apr 2015	Apr 29, 2015	
Milestone C	Apr 2017	Apr 2017	Apr 2017	Apr 27, 2017	
DT-3 Complete	Aug 2017	Aug 2017	Mar 2018	Mar 30. 2018	
IYND	Sep 2019	N/A	N/A	N/A	
IOT&E Complete	Feb 2024	Feb 2024	Aug 2024	Aug 2024	
IOC	Feb 2024	Feb 2024	Aug 2024	Aug 2024	

Significant Schedule Risks

Significant Schedule Risks	
Milestone A (September 2010)	
1.	High Power Amplifiers, Transmit Receive Modules, and Power Supplies with the potential to meet the power requirements for AMDR full functionality and capability.
2.	Active Array Physical Architectures and Scalability to achieve requirements to accommodate larger or smaller radar systems as specific requirements dictate.
3.	Distributed Receiver Exciters required to meet tactical design requirements with tactically representative waveforms.
4.	Large Aperture Digital Beam Forming and Calibration development to accomplish 1000 element, 40 channel unit showing calibration and digital beam forming.
Milestone B (October 2013)	
1.	High Power Amplifiers, Transmit Receive Modules, and Power Supplies with the potential to meet the power requirements for AMDR full functionality and capability.
2.	Distributed Receiver Exciters required to meet tactical design requirements with tactically representative waveforms.
3.	Large Aperture Digital Beam Forming and Calibration development to accomplish 1000 element, 40 channel unit showing calibration and digital beam forming.
4.	Multi-Mission Scheduling and Discrimination Software concerned with all aspects of Ballistic Missile Defense discrimination and radar resource management, including determination of resource needs across mission areas and functions within those missions, prioritization of those resources, and the scheduling of the associated radar pulse trains.
Milestone C (April 2017)	
1.	Ship Integration to conform to allowable size, weight, power, and/or cooling constraints.
2.	AMDR Integration to align with AEGIS Advanced Capability Build 20 functional allocations and capabilities requirements and development plan.

3.	Software and Architecture to support EMD phase Developmental Testing activities and Agile software development and testing to support critical System Engineering Technical Reviews and test events leading up to Interim Program Review in Q2 FY2018.
	Current Estimate (December 2021)
1.	There are other Radio Frequency (RF) systems on board each of the AMDR supported ship classes (DDG FLT II, Backfit DDG 51), that operate concurrently. If sufficient electromagnetic isolation between AMDR and other electromagnetic dependent systems on the ship's topside and off board environments cannot be achieved, then electromagnetic CONOPS may be required to successfully integrate AMDR with other collocated equipment and/or topside design changes may be needed to the various ship classes.
2.	If a well-tested initial deceptive Electronic Protection (EP) architecture and capability is not delivered as part of Baseline (BL) 10.0, Then the Flight III combat system will be vulnerable to deceptive Electronic Attack (EA) threats, negatively impacting Developmental and Operational Testing (DT/OT).

Performance

Performance Characteristics					
Development APB Objective	**Current APB Development Objective/Threshold**		**Demonstrated Performance (include Date of Demonstration)**	**Current Estimate/Actual**	**Deviation**
Availability					
Ao ≥0.99	Ao ≥0.98	(T=O) 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 Time to Live (TTL).	Ships Force performs>= 99% of corrective and preventative maintenance procedures, as defined in the maintenance manual, within the Time to Repair (TTR) specified to achieve the AN/SPY-6(V)1 Ao Key Performance Parameter (KPP).	(T=O) Ships Force performs>= 99% of corrective and preventative maintenance procedures, as defined in the maintenance manual, within the Time to Repair (TTR) specified to achieve the AN/SPY-6(V)1 Ao KPP.	TBD	Ships Force will be sufficiently trained to keep AN/SPY-6(V)1 operating at or above the Ao KPP threshold of 0.98	
Net Ready					
Will satisfy applicable Net Ready KPP elements for all operational activities and information exchanges.	Exemption: Net Ready KPP is not applicable to AN/SPY-6(V)1 due to the lack of Joint Interfaces and Joint Information Exchanges.	(T=O) Exemption: Net Ready KPP is not applicable to AN/SPY-6 (V)1 due to the lack of Joint Interfaces and Joint Information Exchanges.	N/A - Exempt	Exemption – AN/SPY-6(V)1 is an embedded element of the AEGIS combat system and does not produce, consume or process joint information.	
Energy Efficiency					
Two reduced power states for AMDR-S, the platform CMS: more than 1100 kW total prime power; more than 850 kW total prime power	Two reduced power states to minimize consumption: State 1 than 1100 kW total prime power; State 2 than 850 kW total prime power.	(T=O) Two reduced power states to minimize platform fuel consumption: State 1 consumes no more than 1100 kW total prime power; State 2 consumes no	TBD	Reduced Power Substate 1 consumes 1100kW total power; Reduced Power Substate 2 consumes 850kW total power	

Performance Characteristics					
Development APB Objective	**Current APB Development Objective/Threshold**		**Demonstrated Performance (include Date of Demonstration)**	**Current Estimate/Actual**	**Deviation**
		more than 850 kW total prime power.			
Survivability					
(Objective = Threshold) Exemption – AMDR will be integrated into the DDG 51 hull with no decrease in based on DDG 51 live fire equivalent testing (DDG 81 shock trial)	Exemption - AN/SPY-6(V)1 will be integrated into the DDG 51 Flt III with no decrease in survivability of the hull (DDG 81 shock trial)	(T=O) Exemption AN/SPY-6(V)1 will be integrated into the DDG 51 Flt III with no decrease in based on DDG 51 live fire equivalent testing (DDG 81 shock trial)	N/A - Exempt	Exemption – AN/SPY-6(V)1 will not decrease the survivability of the DDG 51 hull based on live fire equivalent testing (DDG 81 shock trial)	
Force Protection					
(Objective = Threshold) Exemption - Will support host platform requirement	Exemption - AN/SPY-6(V)1 will support host platform requirement	(T=O) Exemption AN/SPY-6(V)1 will support host platform requirement	N/A - Exempt	Exemption - Will support host platform requirement	

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

Requirements Source:
The AMDR Capability Production Document (CPD) was approved by the JROC on March 26, 2018 (JROCM 025-18). The CPD reflects lessons learned from the AMDR EMD Phase and includes updates relative to the AMDR CDD. The AMDR CDD was approved by the JROC on June 27, 2013 (JROCM 123-13). Specific KPP values have been established in the CDD/CPD and those requirements have been flowed down to the AMDR System Requirements Document and the contractor's A-Specification.
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 system. This APB represents only the S-band radar capabilities from the AMDR CDD/CPD. The X-band capabilities in the AMDR CDD will be addressed in a separate future Program of Record.

Acquisition Budget Estimate

Total Acquisition Cost

		Development APB	APB AMDR (Current) 02/06/2020)		Budget Estimate PB 2023		
Category	Base Year	Objective (BY$)	Objective (BY$)	Threshold (BY$)	BY$	TY$	Deviation
RDT&E	2013	1986.6	1920.7	2185.3	1787.6	1851.9	
Procurement	2013	3278.3	3270	3606.1	4035.1	5255.3	
MILCON	2013	28.6	28.6	31.5	28.6	27.5	
Acq. O&M	2013	0.0	0.0	0.0	0.0	0.0	
Total							
PAUC	2013	260.71	237.2	264.7	225.1	274.4	
APUC	2013	148.64	148.6	163.9	152.5*	202.1	

* Note that Budget Estimate PB 2023 APUC value was adjusted to exclude activities beyond MS C planned efforts which include additional Land Based Testing and System Engineering Baseline 10 efforts.

Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	0	0
Procurement	22	26

Budget Notes:

1) Total Acquisition Cost includes RDT&E, Procurement, and Military Construction. Numbers reflect PB 2023. For Procurement (SCN), note that cost aligns with PMS 400D Budget Estimate Submissions (BES) 2023 Budget Controls. Updates pending Hardware Production and Sustainment contract award and PB 2023 locked controls.
2) Procurement funding for AMDR is also included in the DDG 51 SAR under Program Element: 0204222N. AMDR ship-set procured with FY 2016 funds will be used for an FY 2018 FLT III.
3) RDT&E funding includes $16.3M reduction in FY 2021 due to congressional mark related to hardware production and sustainment early to need. FY 2022 updated based on $9.192M reduction in PB 2023 controls.

   RDT&E associated with efforts outside the scope of the original AMDR (AN/SPY-6(V)1) APB (i.e., AN/SPY-6(V)2 and(V)3, DDG 51 FLT IIA backfit, and Advanced Distributed Radar capability enhancement) is excluded from this report (i.e., $82.1M in FY 2019-2022). However, funding for all AN/SPY-6(V) Family of Radars development is captured under RDT&E Program Element 0604522N.

Quantity Notes:

1) This SAR aligns with PB 2023.

Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Procurement Cost (December 2021)	
1.	AMDR (BY 2013$M): Total Procurement Cost - $4,035.1; APUC - $152.5 Risk and Sensitivity analysis - AMDR procurement cost for non-negotiated AMDR units
2.	In the Milestone C ICE, CAPE identified the risk of production approval absent the completion of planned Developmental Testing (DT)-3 activities. There is a risk of discovering issues during testing that could result in the need for design changes. Note: The ICE prepared for Milestone C is the most recent ICE. An ICE was not prepared for the current estimate.
Original Baseline Estimate (September 2018)	
1.	AMDR (BY 2013$M): Total Acquisition Cost - $5,735.7 (Qty 22); PAUC - $260.7; APUC - $174.9 Risk and Sensitivity analysis - AMDR full and open competition (EMD and 9 LRIP Options) - AMDR EMD phase aggressive software schedule
2.	In the Milestone B ICE, CAPE assessed technical risk as modest for a new development program of AMDR's scale. Software development was identified as the primary concern, particularly with regard to its potential schedule impacts (i.e., completion of development testing, authority to begin LRIP, and delivery of the first production radar). AMDR system weight was identified as an additional concern (i.e., increased weight of AMDR compared to AN/SPY-1D(V) could affect the ship's center of gravity and the service life).
Revised Original Estimate (N/A)	
None	
Current Baseline Estimate (February 2020)	
1.	AMDR (BY 2013$M): Total Acquisition Cost - $5219.3 (Qty 22); PAUC - $237.2; APUC - $148.6
2.	In the Milestone C ICE, CAPE identified the risk of production approval absent the completion of planned Developmental Testing (DT)-3 activities. There is a risk of discovering issues during testing that could result in the need for design changes. Note: The ICE prepared for Milestone C is the most recent ICE. An ICE was not prepared for the current baseline.

Unit Cost

Current Baseline Compared with Current Estimate

Category ($M)	Current APB	Current Estimate	% Change	NMC Breach
PAUC				
Cost	5219.3	5851.3		-
Quantity	22	26		-
Unit Cost	237.2	225.1	-5.2%	
APUC				
Cost	3270.0	4035.1		-
Quantity	22	26		-
Unit Cost	148.6	152.5*	+2.6%	

Original Baseline Compared with Current Estimate

Category ($M)	Current APB	Current Estimate	% Change	NMC Breach
PAUC				
Cost	5735.7	5851.3		-
Quantity	22	26		-
Unit Cost	260.7	225.1	-13.7%	
APUC				
Cost	3846.9	4035.1		-
Quantity	22	26		-
Unit Cost	174.9	152.5*	-12.8%	

Unit Cost Notes:
* Note that APUC value was adjusted to exclude activities beyond MS C planned efforts which include additional Land Based Testing and System Engineering Baseline 10 efforts.

Contracts

Contract Data ($TYM)		
Contract Number	N00024-19-C-5501	
Effort Number	6	
Modification Number	P00037	
Award Date	December 08, 2018	
Definitization Date	December 18, 2018	
Order Number		
CAGE Code/CAGE Legal Name		
Contract Title	AMDR Integration and Production Support (I&PS)	
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752	
Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price:	Current Target Price:	
Initial Ceiling Price	Current Ceiling Price	
Contract's EAC: 213.07	PM's EAC: 213.07	
Initial Quantity: 0	Current Quantity: 0	Delivered Quantity: 0
BAC	BCWP	ACWP
BCWS	Cost Variance	Schedule Variance

Contract Notes:

1. The program will not be collecting EVM data on the I&PS contract because it is exclusively level of effort. The program will collect monthly cost data on planned and actual dollars and hours by tasking to assess and manage Contractor performance.

2. The table above reflects incremental funding for exercised options. Contract includes options that were extended through FY 2024.

Contract Data ($TYM)		
Contract Number	N00024-14-C-5315	
Effort Number	4	
Modification Number	P00101	
Award Date	May 1, 2017	
Definitization Date	May 1 2017	
Order Number		
CAGE Code/CAGE Legal Name		
Contract Title	AMDR Low Rate Initial Production (CLIN 0303AB)	
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752	
Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 126.52	Current Target Price: 126.52	
Initial Ceiling Price: 140.59	Current Ceiling Price: 140.59	
Contract's EAC: 152.70	PM's EAC: 158.38	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 112.25	BCWP: 110.24	ACWP: 149.85
BCWS: 112.25	Cost Variance: -39.61/-35.93%	Schedule Variance: -2.01/-1.79%

Contract Notes:
1. May 1, 2017 Exercised LRIP option (CLIN0303AB): $126,522,977.00.

2. IBR conducted on Nov 2, 2017 for the first three LRIP units.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. Recent EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

Cost Variance:
Negative Cost Variance of ($39.6M) for CLIN 0303AB is mainly driven by higher material cost over plan (Processing Hardware, Mechanical Structure, TRIMMS) and DC to DC Converters Touch and Support due to increased support required to address issues found during the initial builds.

Schedule Variance:
Negative Schedule Variance of ($2.0M) for CLIN 0303AB is mainly driven by schedule burndown due to early receipt of material (DC to DC Converters, Non-LRU Hardware, and material distribution (pegging) off the shipset (TRIMMS).

Contract Data ($TYM)		
Contract Number	N00024-14-C-5315	
Effort Number	5	
Modification Number	P00101	
Award Date	April 19, 2018	
Definitization Date	April 19, 2018	
Order Number		
CAGE Code/CAGE Legal Name		
Contract Title	AMDR Low Rate Initial Production (CLIN 0401)	
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752	
Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 136.53	Current Target Price: 136.53	
Initial Ceiling Price: 151.71	Current Ceiling Price: 151.71	
Contract's EAC: 136.73	PM's EAC: 146.16	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 120.58	BCWP: 116.92	ACWP: 133.80
BCWS: 120.58	Cost Variance: -16.88/-14.43%	Schedule Variance: -3.66/-3.04%

Contract Notes:
1. April 19, 2018 Exercised LRIP option (CLIN0401): $136,529,350.00.

2. IBR conducted on November 16, 2018 for the fourth LRIP unit.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. Recent EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

Cost Variance:
Negative Cost Variance of ($16.9M) for CLIN 0401 is mainly driven by increased in the support level over bid for additional testing and inspections (TRIMMS), higher material cost over bid (DREX), and material distribution (pegging) off the shipset (Array Cooling, TRIMMS).

Schedule Variance:
Negative Schedule Variance of ($3.7 M) for CLIN 0401 is mainly driven by material distribution (pegging) off the shipset (TRIMMS) and schedule burndown due to early receipt of material (DC to DC Converters, Array Cooling).

Contract Data ($TYM)		
Contract Number	N00024-14-C-5315	
Effort Number	7	
Modification Number	P00101	
Award Date	March 11, 2019	
Definitization Date	March 14, 2019	
Order Number		
CAGE Code/CAGE Legal Name		
Contract Title	AMDR Low Rate Initial Production (CLIN 0503AA)	
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752	
Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 123.32	Current Target Price: 123.32	
Initial Ceiling Price: 137.03	Current Ceiling Price: 137.03	
Contract's EAC: 133.90	PM's EAC: 138.73	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 114.70	BCWP: 109.11	ACWP: 129.06
BCWS: 114.29	Cost Variance: -19.94/-18.28%	Schedule Variance: -5.17/-4.53%

Contract Notes:
1. On March 14, 2019 LRIP option (CLIN0503AA) was exercised: $123,320,400.

2. Integrated Baseline Review (IBR) conducted on October 22, 2019 for LRIP units five through seven.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. Recent EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

Cost Variance:
Negative Cost Variance of ($19.9M) for CLIN 0503AA is mainly driven by manufacturing material driven by pricing variances over bid (Transmit Receive Integrated Microwave Module (TRIMM) Assembly material, Array Power Uninterruptible Power Supply, Radar Modular Assembly (RMA) Chassis) and corrections to the material dashboard (Mechanical Structure).

Schedule Variance:
Negative Schedule Variance of ($5.2M) for CLIN 0503AA is mainly driven by late receipt of materials (Radome/Radio Frequency (RF) Radiator, Multi-Band Frequency Synthesizer (MBFS)) and positive schedule burn down for early receipt of material (Radome/RF Radiator), and material distribution (pegging) off the shipset (TRIMMS, Platform Integration, Distributed Receive/Exciters (DREX)s).

Contract Data ($TYM)	
Contract Number	N00024-14-C-5315
Effort Number	8
Modification Number	P00101
Award Date	March 11, 2019
Definitization Date	March 14, 2019
Order Number	
CAGE Code/CAGE Legal Name	
Contract Title	AMDR Low Rate Initial Production (CLIN 0503AB)
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752

Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 122.67	Current Target Price: 122.67	
Initial Ceiling Price: 136.31	Current Ceiling Price: 136.31	
Contract's EAC: 131.11	PM's EAC: 138.67	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 113.53	BCWP: 93.74	ACWP: 106.56
BCWS: 108.55	Cost Variance: -12.82/-13.68%	Schedule Variance: -14.81/-13.64%

Contract Notes:
1. On March 14, 2019 LRIP option (CLIN0503AB) was exercised: $122,672,151.

2. IBR conducted on October 22, 2019 for LRIP units five through seven.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. Recent EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

5. Despite the contract being awarded on March 11, 2019, the initial LRIP option which included the initial funding increment was not provided until three days later on March 14, 2019 (definitization date).

Cost Variance:
Negative Cost Variance of ($12.8M) for CLIN 0503AB mainly driven by manufacturing material price variances over bid (TRIMMS, Mechanical Structure, Platform Integration).

Schedule Variance:
Negative Schedule Variance ($14.8M) for CLIN 0503AB mainly driven by material distribution (pegging) off of the shipset (Mechanical Structure, TRIMMS), positive cumulative schedule burn down for early receipt of material (Non Line Replaceable Unit (LRU) RF Major Supplier Hardware, Radome/RF Radiator) and late receipt of material (Mechanical Structure).

Contract Data ($TYM)	
Contract Number	N00024-14-C-5315
Effort Number	9
Modification Number	P00101
Award Date	March 11, 2019
Definitization Date	March 14, 2019
Order Number	
CAGE Code/CAGE Legal Name	
Contract Title	AMDR Low Rate Initial Production (CLIN 0503AC)
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752

Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 156.67	Current Target Price: 156.67	
Initial Ceiling Price: 174.09	Current Ceiling Price: 174.09	
Contract's EAC: 128.04	PM's EAC: 145.80	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 136.17	BCWP: 78.56	ACWP: 73.32
BCWS: 111.31	Cost Variance: 5.24/6.67%	Schedule Variance: -32.75/-29.43%

Contract Notes:
1. On March 14, 2019 LRIP option (CLIN0503AC) was exercised: $156,665,464.

2. IBR conducted on October 22, 2019 for LRIP units five through seven.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. Recent EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

5. Cost for this shipset reflects a single buy purchase.

Cost Variance:
Positive Cost Variance of $5.2M from CLIN 0503AC due to adjustments to the material dashboard (TRIMMS).

Schedule Variance:
Negative Schedule Variance of ($32.8M) for CLIN 0503AC due to material distribution (pegging) off of the shipset (Non-LRU RF Hardware, TRIMMS, Platform Integration), late receipt of material (Dual Converter (DC) to DC Converters, Mechanical Structure), cumulative schedule burn down for early receipt of material (Radar Signal Processing, Radome/RF Hardware, Mechanical Structure), and late receipt of material to baseline plan (Mechanical Structure).

Contract Data ($TYM)		
Contract Number	N00024-14-C-5315	
Effort Number	10	
Modification Number	P00101	
Award Date	December 20, 2019	
Definitization Date	December 20, 2019	
Order Number		
CAGE Code/CAGE Legal Name		
Contract Title	AMDR Low Rate Initial Production (CLIN 0602AA)	
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752	
Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 125.17	Current Target Price: 125.17	
Initial Ceiling Price: 139.08	Current Ceiling Price: 139.08	
Contract's EAC: 129.08	PM's EAC: 137.59	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 111.52	BCWP: 79.32	ACWP: 87.42
BCWS: 83.50	Cost Variance: -8.10/-10.21%	Schedule Variance: -4.19/-5.01%

Contract Notes:
1. On December 20, 2019 the AMDR program exercised contract options for two LRIP units and associated non-recurring engineering.

2. IBR conducted on November 19, 2020 for LRIP units eight and nine.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

Cost Variance:
Negative Cost Variance of ($8.1M) for CLIN 0602AA is driven mainly by correction/alignment to the material dashboard and material price variances over bid (DC to DC Converters).

Schedule Variance:
Negative Schedule Variance of ($4.2M) for CLIN 0602AA driven by schedule burndown for early receipt of material (Non-LRU RF Hardware, Mechanical Structure) and to material distribution (pegging) off of the shipset (TRIMMS).

Contract Data ($TYM)		
Contract Number	N00024-14-C-5315	
Effort Number	11	
Modification Number	P00101	
Award Date	December 20, 2019	
Definitization Date	December 20, 2019	
Order Number		
CAGE Code/CAGE Legal Name		
Contract Title	AMDR Low Rate Initial Production (CLIN 0602AB)	
Contract Address	1001 Boston Post Rd East, Marlborough, MA 01752	
Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price: 124.77	Current Target Price: 124.77	
Initial Ceiling Price: 138.64	Current Ceiling Price: 138.64	
Contract's EAC: 134.33	PM's EAC: 160.04	
Initial Quantity: 1	Current Quantity: 1	Delivered Quantity: 0
BAC: 109.30	BCWP: 46.38	ACWP: 53.22
BCWS: 53.25	Cost Variance: -6.85/-14.76%	Schedule Variance: -6.87/-12.90%

Contract Notes:
1. On December 20, 2019 the AMDR program exercised contract options for two LRIP units and associated non-recurring engineering.

2. IBR conducted on November 19, 2020 for LRIP units eight and nine.

3. EVM table based on Integrated Program Management Report (IPMR) delivered March 21, 2022 and reflects performance through February 27, 2022.

4. EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

Cost Variance:
Negative Cost Variance of ($6.8M) for CLIN 0602AB is driven primarily by material pricing over bid (TRIMMS) and a correction/alignment to the material dashboard for the Digital Beamformer.

Schedule Variance:
Negative Schedule Variance of ($6.9M) for CLIN 0602AB driven mainly by material distribution (pegging) off the Shipset 9 (DC to DC Converters, DREXs) and schedule burndown for early receipt of material (Non-LRU RF Hardware, DC to DC Converters).

Technologies and Systems Engineering

Significant Technical Risks

Significant Technical Risks	
Current Estimate (December 2021)	
1.	There are other RF systems on board each of the AMDR supported ship classes (DDG FLT II, Backfit DDG 51), that operate concurrently. If sufficient electromagnetic isolation between AMDR and other electromagnetic dependent systems on the ship's topside and off board environments cannot be achieved, then electromagnetic CONOPS may be required to successfully integrate AMDR with other collocated equipment and/or topside design changes may be needed to the various ship classes.
2.	If a well-tested initial deceptive Electronic Protection (EP) architecture and capability is not delivered as part of Baseline (BL) 10.0, then the Flight III combat system will be vulnerable to deceptive Electronic Attack (EA) threats, negatively impacting Developmental and Operational Testing (DT/OT)

Deliveries and Expenditures

Deliveries				
Delivered to Date	**Planned to Date**	**Actual to Date**	**Total Quantity**	**Percent Delivered**
Development	0	0	0	0.00%
Production	4	3	26	11.54%
Total Program Quantity Delivered	4	3	26	11.54%

Expended and Appropriated (TY $M)

Total Acquisition Cost: $7,134.7
Expended to Date: $3,179.8
Percent Expended: 44.6
Total Funding Years: 23
Years Appropriated: 17
Percent Years Appropriated: 73.9%
Appropriated to Date: $4,391.64
Percent Appropriated: 61.6%

The above data is current as of April 18, 2022.

Deliveries and Expenditures Notes:
Recent EMD/LRIP contract modification changed multiple radar delivery dates to more closely align with DDG-51 FLT III contract need dates (Schedule A). These modifications have been coordinated with SHIPS.

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	2024	2024

Rationale if Current Total LRIP Quantity exceeds 10% of the total Procurement quantities:
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.

Operating and Support Costs

Total Program O&S Cost Compared with Baseline

	Current APB Objective (BY$)	Current APB Threshold (BY$)	Current Estimate (BY$)	Current Estimate (TY$)	Deviation
Total O&S ($Millions)	3821.0	4203.1	4629.0	N/A	

Deviation Explanation:
Increases in the AMDR radar system estimate from the APB to the current estimate are due to programmatic updates (addition of four ships), cost estimating methodology modifications, and design maturity.

O&S Cost Breakdown

For AMDR, Unit-Level Manpower, Unit Operations, and Indirect Support are not reported because these costs are considered Ship Level costs. Current Estimate includes System Operations and Maintenance, Navy (OMN) (TY $9,196.4M, BY 2013 $4,473.6M) and Fleet OMN (TY $327.3M, BY 2013 $155.4M).

Category (BY$ Million)	AN/SPY-6(V)1
Unit-Level Manpower	
Unit Operations	
Maintenance	1.601
Sustaining Support	2.383
Continued System Improvements	0.467
Other	
Total O&S	4.451

Cost Estimate Source: Program Office Estimate

O&S Cost Notes:

a. Disposal/Demilitarization Cost Estimate and Source of Estimate:
$18.4 (BY$Million), Source of Estimate POE

b. 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.

c. For Each Acquired System or System Variant:
   i. Quantity to Sustain: 26
   ii. First Operational Fiscal Year: 2021
   iii. Final Operational Fiscal Year: 2075

iv. Unit Expected Service Life post-delivery (Years): 40

d. Antecedent System(s) O&S Costs:

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.