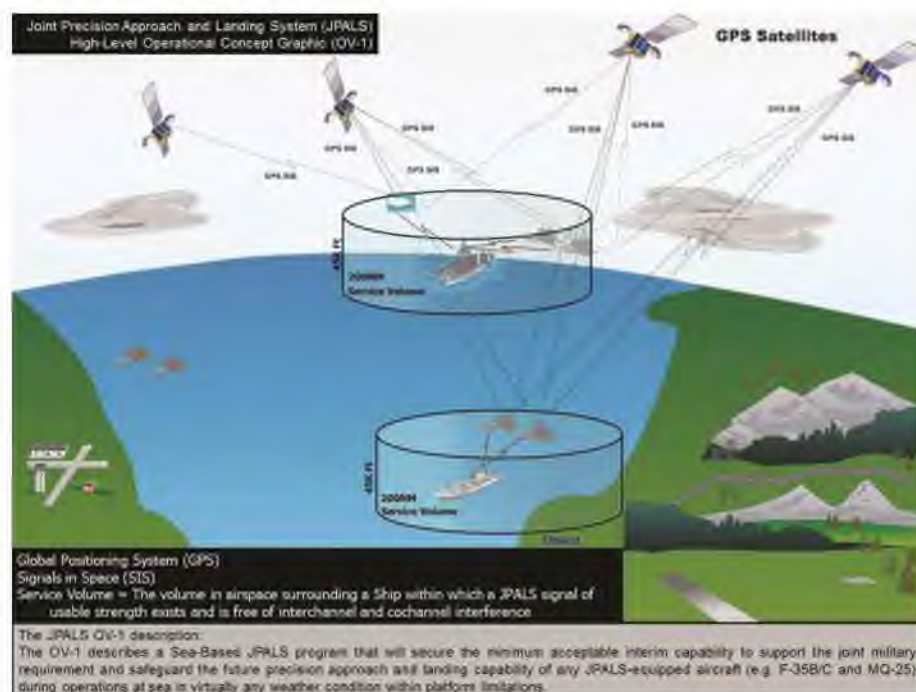




Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-238



Joint Precision Approach and Landing System (JPALS)

As of FY 2019 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

~~This document contains information that may be exempt from mandatory disclosure under the FOIA.~~

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Sensitivity Originator

Organization: COMNAVAIRSYSCOM PEO(T) PMA-213

Organization Email:

Organization Phone: 301-737-2119

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

Joint Precision Approach and Landing System (JPALS)

DoD Component

Navy

Responsible Office

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Date Assigned: July 23, 2015

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References

SAR Baseline (Development Estimate)

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated June 15, 2016

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated June 15, 2016

Mission and Description

Joint Precision Approach and Landing System (JPALS), in conjunction with the F-35B/C Joint Strike Fighter program, will provide precision guidance in support of coupled flight to 200 feet height above touchdown for the F-35B to Amphibious Assault (LH) type ships and precision guidance in support of auto-land for the F-35C and MQ-25A Unmanned Aerial Vehicle to Nuclear Aircraft Carriers (CVN). JPALS will also support the F-35B/C and MQ-25A interim Precision Approach and Landing Capability (PALC).

When delivered, the JPALS program will secure the minimum acceptable capability to support the military requirement and safeguard the future PALC requirements of any JPALS-equipped aircraft (e.g., F-35B/C and MQ-25A) during operations at sea in virtually any weather condition within platform limitations. These enhancements will support the Joint Force Commander's (JFC's) vital sea-based combat capabilities across a broad range of military operations in an uncertain future.

JPALS is a Global Positioning System-based precision approach and landing system that will function in more operational environments, and support all DoD sea-based applications. The National Defense Strategy of the United States of America calls for highly mobile forces that can rapidly respond to crises worldwide. Success in meeting this challenge requires the ability to land aviation assets virtually anywhere, at any time. JPALS will provide this capability by being rapidly deployable, survivable, and interoperable with U.S. allies. JPALS will support manned and unmanned aircraft and will be able to operate during restricted emission control conditions.

Executive Summary

Program Highlights Since Last Report

The Joint Precision Approach and Landing System (JPALS) is a ship-based system installed on Nuclear Aircraft Carriers (CVN) and Amphibious Assault (LH) type ships, providing the minimum acceptable capability to support the military requirement and safeguard the future Precision Approach Landing Capability requirements of F-35B/C, MQ-25A Unmanned Aerial Vehicle and all future CVN and LH based air platforms during operations at sea in virtually any weather condition. JPALS supports the Joint Force Commander's vital sea-based combat capabilities across a broad range of military operations in an uncertain future.

JPALS is a Global Positioning System based precision approach and landing system that will function in more operational environments than the legacy systems and will support all CVN and LH type ships. JPALS provides on-deck, over the air inertial alignment capability, relative navigation capability, surveillance capability for Low Observable and Unmanned Aircraft, and precision guidance capability that supports coupled flight approaches for the F-35B and future platforms to LH type ships and coupled flight approaches to auto-land for the F-35C, MQ-25A, and future platforms to CVN type ships.

Block 3F F-35 B/C aircraft will deploy with JPALS Ultra High Frequency (UHF) Data Broadcast (UDB) capability beginning in FY 2018. To support this requirement, JPALS will field an Early Operational Capability (EOC) to allow Engineering Development Model (EDM) units to be used for F-35 operational ship deployments.

On June 15, 2016, USD(AT&L) approved the JPALS APB and delegated MDA for the JPALS program to the Navy and designated the program as ACAT IC. On June 27, 2016, Assistant Secretary of the Navy (Research, Development & Acquisition) (ASN(RDA)) approved Milestone B and authorized the JPALS program to enter the EMD phase. At Milestone B, ASN(RDA) also authorized award of the EMD contract and approved an LRIP quantity of up to 12 units. On December 4, 2017, ASN(RDA) updated the Milestone B ADM and approved an increase to the LRIP quantity to 23 units to support the FY 2019 production plans.

On September 21, 2016, the JPALS EMD contract was awarded to Raytheon for the procurement of two EDM units, the upgrade of the original eight EDM units, and the completion of the JPALS developmental effort. A Critical Design Review was held May 17-18, 2017. The program initiated an M-Code trade study to determine cost of and design options for JPALS M-Code implementation and alignment with aircraft platform need. JPALS began Initial Operational Test and Evaluation (IOT&E) with an M-Demo and Cyber operational test in September 2017. In December 2017, JPALS completed all pre-work required to support shipboard certification upon the F-35 B/C Block 3F aircraft software fleet release. In August 2017, the program completed an Operational Test Readiness Review in preparation for the IOT&E Phase 1. IOT&E Phase 1 began in FY 2017 and included the Cyber Cooperative Vulnerability Penetration Testing of the JPALS UDB capability conducted by COTF. IOC was also aligned with the completion of IOT&E Phase 2 in FY 2020.

Product development and data collection efforts will continue in support of further development of the JPALS ship system configuration. Integrated Test (IT)-B1, IT-B2, and IT-B3 developmental test events are planned to occur in FY 2018. Operational Test (OT)-B2 will be conducted concurrent with IT-B2 and IT-B3 and will support IOT&E Phase 1 of JPALS UDB in support of EOC and Milestone C. Commander, Operational Test Force (COTF) will observe F-35 operations with JPALS UDB during F-35B/C Block 3F shipboard OT in order to support IOT&E Phase 1 of JPALS UDB.

JPALS air platform integration costs are accounted for in the respective air platform program budgets. To reduce costs and limit schedule dependencies on supported air platforms schedules, a platform representative JPALS equipped aircraft is being used for testing of the JPALS ship system.

The United Kingdom (UK) has a technical services FMS case that allowed for the exchange of pre-procurement technical information and services for both the AN/SPN-41B Instrument Carrier Landing System (ICLS) and the JPALS Ship System in support of Queen Elizabeth Class (QEC) carrier program. The UK followed this case with a procurement case for the AN/SPN-41B ICLS. The case Period of Performance (PoP) expired in December 2016, but the UK is currently exploring options to extend the PoP on the case to support additional technical discussions regarding JPALS for the QEC carriers.

prior to eventual establishment of a procurement FMS case. There are no Technology Security/Foreign Disclosure issues related to the technical services case with the UK.

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
1st Quarter FY 2008	In 2008, the JPALS Increment 1A program completed Milestone B and was designated a MDAP ACAT ID. The ADM, APB, Acquisition Strategy (AS), and Section 2366a of Title 10 Milestone B Certification were approved and signed by the USD(AT&L) in July 2008. Also in July, a full and open competition was conducted and the JPALS Increment 1A EMD contract was awarded to Raytheon. Following the award, the Government Accountability Office received a bid protest against the award. In September 2008, a contract restart letter was issued and the ADM included the revised dates. In December 2008, the APB was approved.
1st Quarter FY 2009	In 2009, the JPALS Increment 1A program completed the following System Engineering Technical Review (SETR) events: System Requirements Review (SRR) in January, Integrated Baseline Review (IBR) in April, System Functional Review (SFR) in June, and Preliminary Design Review (PDR) in December. The system allocated baseline was reviewed and approved at PDR.
1st Quarter FY 2010	In 2010, as part of the Gate 6 Post-PDR review in May, a Configuration Steering Board (CSB) was completed. The JPALS Increment 1A Critical Design Review (CDR) was conducted in December. There were no CDD requirement changes. The Naval Air Systems Command (NAVAIR) Technical Review Board determined the JPALS Increment 1A Technical Baseline was stable and performance, cost, and schedule risks were acceptable.
1st Quarter FY 2011	In 2011, all CDR Requests for Action (RFA) were completed and the product baseline was stable. There were no CDD requirements changes. The program office used the should-cost initiative process to offset cost growth within the existing program budget.
1st Quarter FY 2012	In 2012, the program conducted a successful Test Readiness Review (TRR) and commenced Integrated Test (IT) in May. As a result of several shifts in CVN-77 installation availability between 2009 and 2012, the shipboard IT and Operational Assessment (OA) were delayed. A schedule breach to Milestone C in the JPALS Increment 1A APB was reported.
1st Quarter FY 2013	In 2013, the schedule necessitated a decrease in one unit from RDT&E and an increase in one unit to Other Procurement, Navy (OPN) resulting in a new procurement quantity of 27 units. In addition to the increase of one unit to the procurement profile, the program realized fixed cost increases as a result of extending the production schedule. The combination of the increase to the procurement units and the increase in fixed costs caused the program to realize a breach to procurement cost in the approved JPALS Increment 1A APB. The Navy performed an internal analysis of the overall Department of the Navy Precision Approach and Landing Capability (PALC) requirements. The result of the internal analysis was a Navy proposal to accelerate the incorporation of capabilities planned for future increments into the JPALS program. The Navy also determined that legacy aircraft would no longer be retrofit with JPALS, but would use current legacy landing systems. All of the changes culminated in a critical Nunn-McCurdy unit cost breach to the PAUC and APUC. The Secretary of the Navy notified Congress of the breach in March 2014.
1st Quarter FY 2014	In 2014, USD(AT&L) signed the Nunn-McCurdy ADM for the restructured JPALS program in June, which certified the program in lieu of termination. Accordingly, the JPALS Milestone B decision of July 2008 was rescinded. JPALS was directed to continue auto-land trade studies and risk reduction efforts through Third Quarter FY 2016; and return to the DAB for Milestone B approval for the restructured JPALS program no later than Third Quarter FY 2016.
1st Quarter FY 2015	In 2015, Developmental Test (DT) for the restructured program was completed and a Letter of Observation (LOO) was signed by Commander, Operational Test and Evaluation Force (COTF). The auto-land trade studies were also completed and defined the path forward to meet the auto-land requirements for manned and unmanned air vehicles. All JPALS ship system requirements were developed and a successful Government-led SRR was completed in March. A successful

	SFR was conducted in November. In support of the Nunn-McCurdy ADM and in preparation for returning to the DAB for Milestone B approval, a contract extension was awarded in July. The program completed a successful Navy Gate 4 Review in June. The Navy Gate 5 Review with the Assistant Secretary of the Navy for Research, Development & Acquisition (ASN(RDA)) and the DAB Readiness Meeting (DRM) were conducted in October. USD(AT&L) conducted a JPALS Development Request For Proposal (RFP) Release Decision Point (DRRDP) DAB review in November. A signed ADM authorizing the release of the EMD RFP was released in November.
1st Quarter FY 2016	A successful PDR was conducted in March. The USD(AT&L) approved the JPALS APB, delegated the MDA for the JPALS program to the Navy, and designated the program as ACAT IC in June. ASN(RDA) signed the ADM approving Milestone B authorizing the JPALS program to enter the EMD phase and to award the EMD contract. In September, the JPALS EMD contract was awarded to Raytheon.
1st Quarter FY 2017	The JPALS IBR was conducted in March and CDR was conducted in May. An OTRR was completed in August and IOT&E Phase 1 began in September with the completion of the JPALS Block 0 M-demo and Cyber testing. JPALS certification efforts aboard LHD-1 (USS WASP) and CVN-72 (USS Abraham Lincoln) were completed in December to support F-35 Block 3F fleet release and JPALS EOC. ASN(RD&A) increased the approved LRIP quantity to 23 units in December 2017.

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

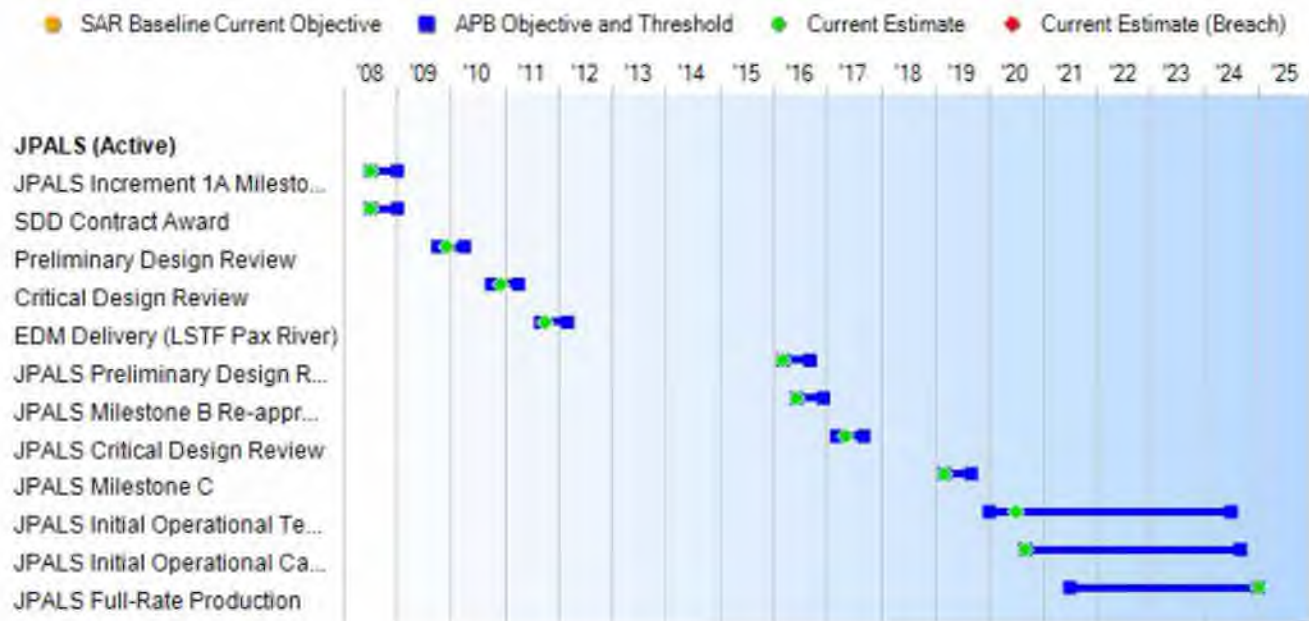
Current UCR Baseline

PAUC	None
APUC	None

Original UCR Baseline

PAUC	None
APUC	None

Schedule



Schedule Events					
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold	Current Estimate		
JPALS Increment 1A Milestone B	Jul 2008	Jul 2008	Jan 2009	Jul 2008	
SDD Contract Award	Jul 2008	Jul 2008	Jan 2009	Jul 2008	
Preliminary Design Review	Oct 2009	Oct 2009	Apr 2010	Dec 2009	
Critical Design Review	Oct 2010	Oct 2010	Apr 2011	Dec 2010	
EDM Delivery (LSTF Pax River)	Sep 2011	Sep 2011	Mar 2012	Oct 2011	
JPALS Preliminary Design Review	Mar 2016	Mar 2016	Sep 2016	Mar 2016	
JPALS Milestone B Re-approval	Jun 2016	Jun 2016	Dec 2016	Jun 2016	
JPALS Critical Design Review	Mar 2017	Mar 2017	Sep 2017	May 2017	
JPALS Milestone C	Mar 2019	Mar 2019	Sep 2019	Mar 2019	
JPALS Initial Operational Test and Evaluation	Jan 2020	Jan 2020	Jul 2024	Jul 2020	(Ch-1)
JPALS Initial Operational Capability	Sep 2020	Sep 2020	Sep 2024	Sep 2020	(Ch-1)
JPALS Full-Rate Production	Jul 2021	Jul 2021	Jan 2025	Jan 2025	

Change Explanations

(Ch-1) The current estimate for IOT&E has changed from Jul 2024 to Jul 2020 and IOC from Sep 2024 to Sep 2020 due to utilizing a JPALS-equipped aircraft to evaluate the JPALS ship system during IOT&E Phase 2 per agreement reached between OPNAV N98; Commander, Operational Test Forces; and Director, Operational Test and Evaluation.

Acronyms and Abbreviations

CDR - Critical Design Review
EDM - Engineering Development Model
IOT&E - Initial Operational Test and Evaluation
LSTF - Landing Systems Test Facility
PAX - Patuxent
SDD - System Development and Demonstration

(U//FOUO) Performance

(U//FOUO) Performance Characteristics			
SAR Baseline Development Estimate	Current APB Development Objective/Threshold	Demonstrated Performance	Current Estimate
(b)(4)			

Requirements Reference

CDD dated March 11, 2016

Change Explanations

(b)(4)

Acronyms and Abbreviations

(b)(4)

Track to Budget

RDT&E

Appn	BA	PE
------	----	----

Navy 1319 04 0603860N

Project	Name
2329	JPALS

Procurement

Appn	BA	PE
------	----	----

Navy 1611 02 0204112N

Line Item	Name
-----------	------

2001 Carrier Replacement Program (Shared)
2086 CVN Refueling Overhauls (Shared)

Navy 1611 02 0204411N

Line Item	Name
-----------	------

3041 LHA Replacement (Shared)

Navy 1810 02 0305014N

Line Item	Name
-----------	------

2867 Joint Precision Approach and Landing System

Navy 1810 08 0305014N

Line Item	Name
-----------	------

9020 Spares and Repair Parts (Shared)

MILCON

Appn	BA	PE
------	----	----

Navy 1205 01 0805376N

Project	Name
---------	------

P977 Facilities Restoration and Modification - RDT&E (Sunk)

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2016 \$M			BY 2016 \$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	1424.0	1424.0	1566.4	1422.4	1396.4	1396.4	1391.4
Procurement	395.7	395.7	435.3	395.0	456.9	456.9	456.6
Flyaway	--	--	--	248.4	--	--	286.1
Recurring	--	--	--	248.4	--	--	286.1
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	146.6	--	--	170.5
Other Support	--	--	--	111.8	--	--	130.1
Initial Spares	--	--	--	34.8	--	--	40.4
MILCON	7.4	7.4	8.1	7.4	6.8	6.8	6.8
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1827.1	1827.1	N/A	1824.8	1860.1	1860.1	1854.8

Current APB Cost Estimate Reference

JPALS SCP dated May 06, 2016

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.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	10	10	10
Procurement	23	23	23
Total	33	33	33

Quantity Notes

Unit of Measure: The physical architecture of JPALS consists of multiple equipment racks, processing equipment, sensors, radios, and antennas.

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	1032.4	106.4	101.6	52.6	33.0	28.9	31.1	5.4	1391.4
Procurement	0.2	0.4	49.0	73.8	77.0	21.1	27.6	207.5	456.6
MILCON	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2019 Total	1039.4	106.8	150.6	126.4	110.0	50.0	58.7	212.9	1854.8
PB 2018 Total	1039.7	106.4	152.8	127.8	113.8	52.0	177.0	91.6	1861.1
Delta	-0.3	0.4	-2.2	-1.4	-3.8	-2.0	-118.3	121.3	-6.3

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	10	0	0	0	0	0	0	0	0	10
Production	0	0	0	4	4	4	1	2	8	23
PB 2019 Total	10	0	0	4	4	4	1	2	8	33
PB 2018 Total	10	0	0	4	4	4	1	10	0	33
Delta	0	0	0	0	0	0	0	-8	8	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
2001	--	--	--	--	--	--	7.4
2002	--	--	--	--	--	--	13.2
2003	--	--	--	--	--	--	15.3
2004	--	--	--	--	--	--	17.7
2005	--	--	--	--	--	--	25.9
2006	--	--	--	--	--	--	32.4
2007	--	--	--	--	--	--	36.0
2008	--	--	--	--	--	--	66.7
2009	--	--	--	--	--	--	74.1
2010	--	--	--	--	--	--	134.5
2011	--	--	--	--	--	--	118.8
2012	--	--	--	--	--	--	64.0
2013	--	--	--	--	--	--	75.5
2014	--	--	--	--	--	--	126.8
2015	--	--	--	--	--	--	41.6
2016	--	--	--	--	--	--	80.3
2017	--	--	--	--	--	--	102.2
2018	--	--	--	--	--	--	106.4
2019	--	--	--	--	--	--	101.6
2020	--	--	--	--	--	--	52.6
2021	--	--	--	--	--	--	33.0
2022	--	--	--	--	--	--	28.9
2023	--	--	--	--	--	--	31.1
2024	--	--	--	--	--	--	4.8
2025	--	--	--	--	--	--	0.4
2026	--	--	--	--	--	--	0.2
Subtotal	10	--	--	--	--	--	1391.4

Annual Funding							
1319 RDT&E Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 2016 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2001	--	--	--	--	--	--	9.5
2002	--	--	--	--	--	--	16.8
2003	--	--	--	--	--	--	19.2
2004	--	--	--	--	--	--	21.7
2005	--	--	--	--	--	--	30.9
2006	--	--	--	--	--	--	37.5
2007	--	--	--	--	--	--	40.6
2008	--	--	--	--	--	--	73.9
2009	--	--	--	--	--	--	81.1
2010	--	--	--	--	--	--	145.0
2011	--	--	--	--	--	--	125.1
2012	--	--	--	--	--	--	66.3
2013	--	--	--	--	--	--	77.4
2014	--	--	--	--	--	--	128.2
2015	--	--	--	--	--	--	41.5
2016	--	--	--	--	--	--	78.8
2017	--	--	--	--	--	--	98.7
2018	--	--	--	--	--	--	101.0
2019	--	--	--	--	--	--	94.7
2020	--	--	--	--	--	--	48.1
2021	--	--	--	--	--	--	29.6
2022	--	--	--	--	--	--	25.4
2023	--	--	--	--	--	--	26.8
2024	--	--	--	--	--	--	4.1
2025	--	--	--	--	--	--	0.3
2026	--	--	--	--	--	--	0.2
Subtotal	10	--	--	--	--	--	1422.4

Annual Funding								
1810 Procurement Other Procurement, Navy								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2019	3	31.5	--	--	31.5	10.7	42.2	
2020	3	43.1	--	--	43.1	23.9	67.0	
2021	3	44.9	--	--	44.9	24.9	69.8	
2022	--	9.3	--	--	9.3	4.6	13.9	
2023	--	--	--	--	--	14.1	14.1	
2024	8	93.9	--	--	93.9	64.2	158.1	
2025	--	20.3	--	--	20.3	12.3	32.6	
2026	--	--	--	--	--	10.1	10.1	
Subtotal	17	243.0	--	--	243.0	164.8	407.8	

Annual Funding								
1810 Procurement Other Procurement, Navy								
Fiscal Year	Quantity	BY 2016 \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2019	3	29.1	--	--	29.1	9.9	39.0	
2020	3	39.1	--	--	39.1	21.7	60.8	
2021	3	39.9	--	--	39.9	22.2	62.1	
2022	--	8.1	--	--	8.1	4.0	12.1	
2023	--	--	--	--	--	12.1	12.1	
2024	8	78.7	--	--	78.7	53.8	132.5	
2025	--	16.7	--	--	16.7	10.1	26.8	
2026	--	--	--	--	--	8.1	8.1	
Subtotal	17	211.6	--	--	211.6	141.9	353.5	

Cost Quantity Information		
1810 Procurement Other Procurement, Navy		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2016 \$M
2019	3	37.6
2020	3	39.3
2021	3	39.1
2022	--	--
2023	--	--
2024	8	95.6
2025	--	--
2026	--	--
Subtotal	17	211.6

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	--	0.1	--	--	0.1	--	0.1	
2017	--	0.1	--	--	0.1	--	0.1	
2018	--	0.4	--	--	0.4	--	0.4	
2019	1	5.9	--	--	5.9	0.9	6.8	
2020	1	5.9	--	--	5.9	0.9	6.8	
2021	1	6.3	--	--	6.3	0.9	7.2	
2022	1	6.2	--	--	6.2	1.0	7.2	
2023	2	11.5	--	--	11.5	2.0	13.5	
2024	--	2.1	--	--	2.1	--	2.1	
2025	--	0.6	--	--	0.6	--	0.6	
2026	--	0.2	--	--	0.2	--	0.2	
2027	--	2.5	--	--	2.5	--	2.5	
2028	--	1.3	--	--	1.3	--	1.3	
Subtotal	6	43.1	--	--	43.1	5.7	48.8	

Annual Funding								
1611 Procurement Shipbuilding and Conversion, Navy								
Fiscal Year	Quantity	BY 2016 \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2016	--	0.1	--	--	0.1	--	0.1	
2017	--	0.1	--	--	0.1	--	0.1	
2018	--	0.4	--	--	0.4	--	0.4	
2019	1	5.3	--	--	5.3	0.8	6.1	
2020	1	5.2	--	--	5.2	0.8	6.0	
2021	1	5.5	--	--	5.5	0.7	6.2	
2022	1	5.3	--	--	5.3	0.8	6.1	
2023	2	9.6	--	--	9.6	1.6	11.2	
2024	--	1.7	--	--	1.7	--	1.7	
2025	--	0.5	--	--	0.5	--	0.5	
2026	--	0.2	--	--	0.2	--	0.2	
2027	--	1.9	--	--	1.9	--	1.9	
2028	--	1.0	--	--	1.0	--	1.0	
Subtotal	6	36.8	--	--	36.8	4.7	41.5	

Cost Quantity Information		
1611 Procurement Shipbuilding and Conversion, Navy		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2016 \$M
2016	--	--
2017	--	--
2018	--	--
2019	1	6.6
2020	1	6.4
2021	1	6.2
2022	1	5.9
2023	2	11.7
2024	--	--
2025	--	--
2026	--	--
2027	--	--
2028	--	--
Subtotal	6	36.8

Annual Funding 1205 MILCON Military Construction, Navy and Marine Corps		
Fiscal Year	TY \$M	
	Total Program	
2008		6.8
Subtotal		6.8

Annual Funding 1205 MILCON Military Construction, Navy and Marine Corps		
Fiscal Year	BY 2016 \$M	
	Total Program	
2008		7.4
Subtotal		7.4

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	6/27/2016	12/4/2017
Approved Quantity	12	23
Reference	Assistant Secretary of the Navy (Research, Development & Acquisition) Milestone B ADM	Assistant Secretary of the Navy (Research, Development & Acquisition) Milestone B ADM
Start Year	2019	2019
End Year	2021	2023

The Current Total LRIP Quantity is more than 10% of the total production quantity in order to establish an initial production base for the system to support operational deployment schedules.

On December 4, 2017, ASN(RD&A) signed an ADM increasing the LRIP quantity to 23 JPALS units with Variation in Quantity flexibility based on budget availability.

Foreign Military Sales

Country	Date of Sale	Quantity	Total Cost \$M	Description
United Kingdom	6/1/2012	1	3.9	This is a technical services case.

Notes

The United Kingdom (UK) has a technical services Foreign Military Sales (FMS) case that allowed for the exchange of pre-procurement technical information and services for both the AN/SPN-41B Instrument Carrier Landing System (ICLS) and the JPALS Ship System in support of Queen Elizabeth Class (QEC) carrier program. The UK followed this case with a procurement case for the AN/SPN-41B ICLS. The case Period of Performance (PoP) expired in December 2016, but the UK is currently exploring options to extend the PoP on the case to support additional technical discussions regarding JPALS for the QEC carriers prior to eventual establishment of a procurement FMS case. There are no Technology Security/Foreign Disclosure issues related to the technical services case with the UK.

Acronyms and Abbreviations

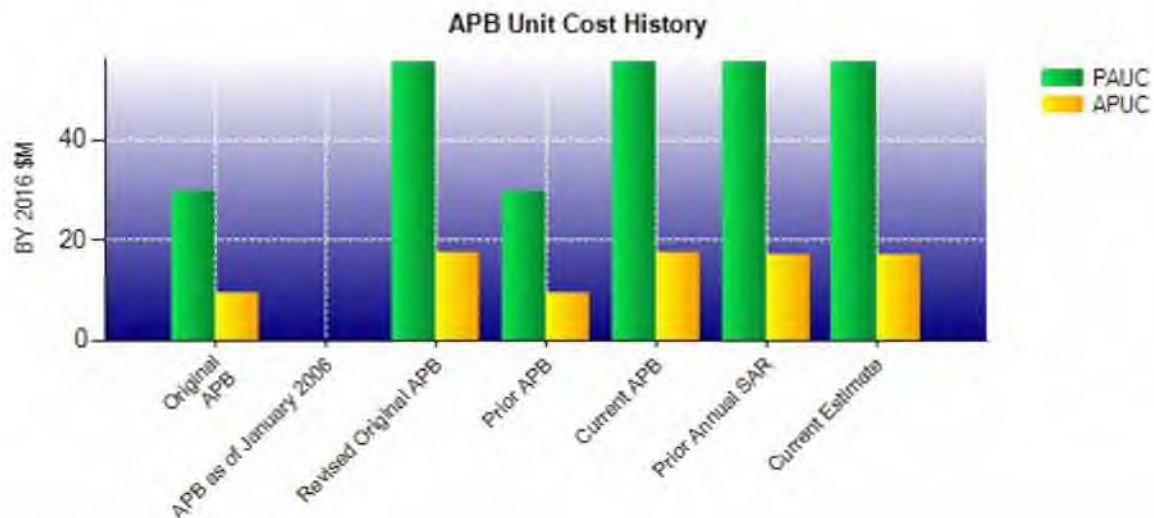
FMS - Foreign Military Sales
 ICLS - Instrument Carrier Landing System
 JPALS - Joint Precision Approach and Landing System
 PoP - Period of Performance
 QEC - Queen Elizabeth Class
 UK - United Kingdom

Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2016 \$M	BY 2016 \$M	% Change
	Current UCR Baseline (Jun 2016 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	1827.1	1824.8	
Quantity	33	33	
Unit Cost	55.367	55.297	-0.13
Average Procurement Unit Cost			
Cost	395.7	395.0	
Quantity	23	23	
Unit Cost	17.204	17.174	-0.17
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2016 \$M	BY 2016 \$M	% Change
	Revised Original UCR Baseline (Jun 2016 APB)	Current Estimate (Dec 2017 SAR)	
Program Acquisition Unit Cost			
Cost	1827.1	1824.8	
Quantity	33	33	
Unit Cost	55.367	55.297	-0.13
Average Procurement Unit Cost			
Cost	395.7	395.0	
Quantity	23	23	
Unit Cost	17.204	17.174	-0.17



APB Unit Cost History					
Item	Date	BY 2016 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Dec 2008	29.527	9.204	27.889	9.748
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	Jun 2016	55.367	17.204	56.367	19.865
Prior APB	Dec 2008	29.527	9.204	27.889	9.748
Current APB	Jun 2016	55.367	17.204	56.367	19.865
Prior Annual SAR	Dec 2016	55.352	17.161	56.397	19.870
Current Estimate	Dec 2017	55.297	17.174	56.206	19.852

SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
56.367	-0.155	0.000	0.100	0.000	-0.136	0.000	0.030	-0.161	56.206

Current SAR Baseline to Current Estimate (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
19.865	-0.139	0.000	0.143	0.000	-0.061	0.000	0.043	-0.014	19.852

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	Jun 2016	N/A	Jun 2016
Milestone C	N/A	Mar 2019	N/A	Mar 2019
IOC	N/A	Sep 2020	N/A	Sep 2020
Total Cost (TY \$M)	N/A	1860.1	N/A	1854.8
Total Quantity	N/A	33	N/A	33
PAUC	N/A	56.367	N/A	56.206

Cost Variance

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	1396.4	456.9	6.8	1860.1
Previous Changes				
Economic	+0.5	+1.0	--	+1.5
Quantity	--	--	--	--
Schedule	--	-0.3	--	-0.3
Engineering	--	--	--	--
Estimating	+0.4	+4.7	--	+5.1
Other	--	--	--	--
Support	--	-5.3	--	-5.3
Subtotal	+0.9	+0.1	--	+1.0
Current Changes				
Economic	-2.4	-4.2	--	-6.6
Quantity	--	--	--	--
Schedule	--	+3.6	--	+3.6
Engineering	--	--	--	--
Estimating	-3.5	-6.1	--	-9.6
Other	--	--	--	--
Support	--	+6.3	--	+6.3
Subtotal	-5.9	-0.4	--	-6.3
Total Changes	-5.0	-0.3	--	-5.3
Current Estimate	1391.4	456.6	6.8	1854.8

Summary BY 2016 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	1424.0	395.7	7.4	1827.1
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	-1.2	--	-1.2
Engineering	--	--	--	--
Estimating	+0.5	+4.5	--	+5.0
Other	--	--	--	--
Support	--	-4.3	--	-4.3
Subtotal	+0.5	-1.0	--	-0.5
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	+1.3	--	+1.3
Engineering	--	--	--	--
Estimating	-2.1	-5.7	--	-7.8
Other	--	--	--	--
Support	--	+4.7	--	+4.7
Subtotal	-2.1	+0.3	--	-1.8
Total Changes	-1.6	-0.7	--	-2.3
Current Estimate	1422.4	395.0	7.4	1824.8

Previous Estimate: December 2016

RDT&E		\$M	
Current Change Explanations		Base Year	Then Year
Revised escalation indices. (Economic)		N/A	-2.4
Addition of CyberSecurity directives and Information Assurance mandates. (Estimating)		+2.9	+3.2
Decrease due to Service-Wide Funding adjustment. (Estimating)		-2.2	-2.3
Decrease due to revised government staffing requirements. (Estimating)		-3.4	-4.0
Revised Test & Evaluation estimate to align with latest program schedule. (Estimating)		-0.5	-1.3
Realignment of contract costs based on latest Earned Value reporting. (Estimating)		+0.2	0.0
Adjustment for current and prior escalation. (Estimating)		+0.9	+0.9
RDT&E Subtotal		-2.1	-5.9

Procurement		\$M	
Current Change Explanations		Base Year	Then Year
Revised escalation indices. (Economic)		N/A	-4.2
Stretch-out of procurement buy profile from FY 2023 to FY 2024 due to funding constraints (Other Procurement, Navy (OPN)). (Schedule)		0.0	+1.8
Additional Schedule variance due to the support costs associated with the installation (OPN). (Schedule)		+1.3	+1.8
Revised estimate due to rate changes (OPN). (Estimating)		-0.9	-1.0
Revised estimate to reflect refinement of unit installation costs (Shipbuilding and Conversion, Navy (SCN)). (Estimating)		-4.8	-5.1
Increase in Other Support due to revised staffing requirements aligned to modified procurement buy profile (OPN). (Support)		+3.5	+4.8
Increase in Initial Spares due to updated spares requirements and modified procurement buy profile (OPN). (Support)		+1.1	+1.3
Increase in Initial Spares due to updated spares requirements (SCN). (Support)		+0.1	+0.2
Procurement Subtotal		+0.3	-0.4

Contracts

Contract Identification	
Appropriation:	RDT&E
Contract Name:	JPALS Engineering & Manufacturing Development Contract
Contractor:	Raytheon Company
Contractor Location:	1801 Hughes Drive Fullerton, CA 92833-2200
Contract Number:	N00019-16-C-0052
Contract Type:	Cost Plus Incentive Fee (CPIF)
Award Date:	September 21, 2016
Definitization Date:	September 21, 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
254.6	N/A	10	259.9	N/A	10	259.9	259.9

Target Price Change Explanation
The difference between the Initial Contract Price Target and the Current Contract Price Target is due to inclusion of aircraft integration efforts for the ARC-210 radio.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (2/8/2018)	-1.0	-1.8
Previous Cumulative Variances	+0.7	-0.6
Net Change	-1.7	-1.2

Cost and Schedule Variance Explanations
The unfavorable net change in the cost variance is due to resolving additional Software Trouble Reports (STRs), Hardware and Mechanical Drawings, and additional resources to support planning in the System Engineering (SEIT) IPT.
The unfavorable net change in the schedule variance is due to delays in the Firmware implementation and the delay of Interactive Electronic Technical Manual validation activities.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	8	8	10	80.00%
Production	0	0	23	0.00%
Total Program Quantity Delivered	8	8	33	24.24%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	1854.8	Years Appropriated	18
Expended to Date	1053.7	Percent Years Appropriated	64.29%
Percent Expended	56.81%	Appropriated to Date	1146.2
Total Funding Years	28	Percent Appropriated	61.80%

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

RDT&E costs include 10 ship system EDM units. Procurement/Production costs data includes 17 OPN and 6 NAVSEA, SCN funded ship system units.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	May 06, 2016
Source of Estimate:	SCP
Quantity to Sustain:	26
Unit of Measure:	System
Service Life per Unit:	20.00 Years
Fiscal Years in Service:	FY 2020 - FY 2045

JPALS will be installed on 24 Navy ships and at 2 Naval Air Technical Training Center (NATTC) trainers.

The sustainment quantity of 26 systems is based on the 17 production systems funded by Other Procurement, Navy (OPN); 3 Engineering Development Model (EDM) funded by RDT&E will be converted to the production configuration funded with OPN; and 6 systems procured by the Naval Sea Systems Command (NAVSEA) funded by Shipbuilding and Conversion, Navy (SCN). The remaining 7 of the 33 total delivered were considered test assets and therefore not explicitly identified in the O&S estimate.

The O&S estimate was updated for Milestone B to reflect quantity, schedule, and scope changes of the Technical and Programmatic Baseline following the JPALS Engineering Technical Assurance Board review in January 2016. There was an increase in one NATTC trainer and the schedule was aligned with ship availability. A ramp down schedule was included for each unit after 20 years of service. Three EDM units are expected to become permanent installs at which time the program office will assume responsibility for the sustainment of the units. These units are included in the RDT&E and sustainment quantities, but are not included within the production/procurement schedule.

JPALS: 24 Nuclear Aircraft Carriers (CVN)/Amphibious Assault (LH) Class Ships and 2 NATTC Trainers

Total Operating Years: 520 operating years

Annual Operation Tempo: 4,000 hours per ship and 2,080 hours per NATTC trainer

Sustainment Strategy

The current maintenance plan of JPALS will use a 2-level Organizational-Depot (O-D) maintenance concept. The sustainment strategy plans to leverage the existing support infrastructure on current Fleet Landing Systems and tailor to JPALS. In addition, the program is conducting a Product Support Business Case Analysis (BCA) to support Milestone C, which includes performance-based logistics considerations for Supply Chain Management, and will identify the Lead System Integrator for the In-Service Engineering Activity (ISEA) and Software Support Activity (SSA). Based on the BCA, the program office will determine the most efficient path forward for the logistics support structure. The maintenance approach is based on a historical average of 4,000 annual operating hours for every ship beginning in the year of installation or certification and utilizes the predicted reliability and maintainability rates. JPALS is expected to be removed from a decommissioned ship and installed on a similar new type ship. The decommissioning schedule is based on a 50-year service life of the ship. Hardware and software improvements are based on comparable system historical percentages.

Antecedent Information

The antecedent system associated with this estimate is the AN/SPN-46(V)3. The AN/SPN-46(V)3 will remain in service on the ships as the landing system for legacy aircraft. AN/SPN-46(V)3 continues to experience service life adjustments

and system modifications that make the total O&S costs volatile. In addition, the capture of O&S data in available reporting systems has changed significantly over time. The Visibility and Management of Operating and Support costs database, the Navy's official system for collecting and reporting O&S costs, provides costs from 1997 to present. The cost data for platforms in existence prior to 1997 is either unavailable or incomplete. Sufficient historical data and resources do not exist to create comparable prior Total O&S Costs.

Annual O&S Costs BY2016 \$M			
Cost Element	JPALS (Active)		AN/SPN-46(V)3 (Antecedent)
	Average Annual Cost Per System		Average Annual Cost Per System
Unit-Level Manpower	0.000		0.716
Unit Operations	0.000		0.000
Maintenance	0.480		0.051
Sustaining Support	0.256		0.027
Continuing System Improvements	0.110		0.408
Indirect Support	0.000		0.000
Other	--		0.000
Total	0.846		1.202

Item	Total O&S Cost \$M			
	JPALS (Active)			AN/SPN-46(V)3 (Antecedent)
	Current Development APB Objective/Threshold	Current Estimate		
Base Year	440.0	484.0	440.0	N/A
Then Year	627.6	N/A	627.6	N/A

Equation to Translate Annual Cost to Total Cost

JPALS Average Annual Unit O&S Cost * operating system years = Total JPALS O&S Cost

The unitized costs are based on the operating years. This is the cumulative total of system operating through FY 2045. \$440M = \$0.846M * 520 operating years. The small delta between this calculated value and the total O&S cost shown is due to rounding. The unitized costs include the NATTC units, OPN ships, and SCN ships.

O&S Cost Variance		
Category	BY 2016 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2016 SAR	440.0	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	0.0	
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	

Technical Input	0.0
Other	0.0
Total Changes	0.0
Current Estimate	440.0

Disposal Estimate Details

Date of Estimate: May 06, 2016
Source of Estimate: SCP
Disposal/Demilitarization Total Cost (BY 2016 \$M): Total costs for disposal of all System are 23.5

The TY\$ value is \$39.9M. Disposal cost is assumed to be 60% of installation cost of the new system.