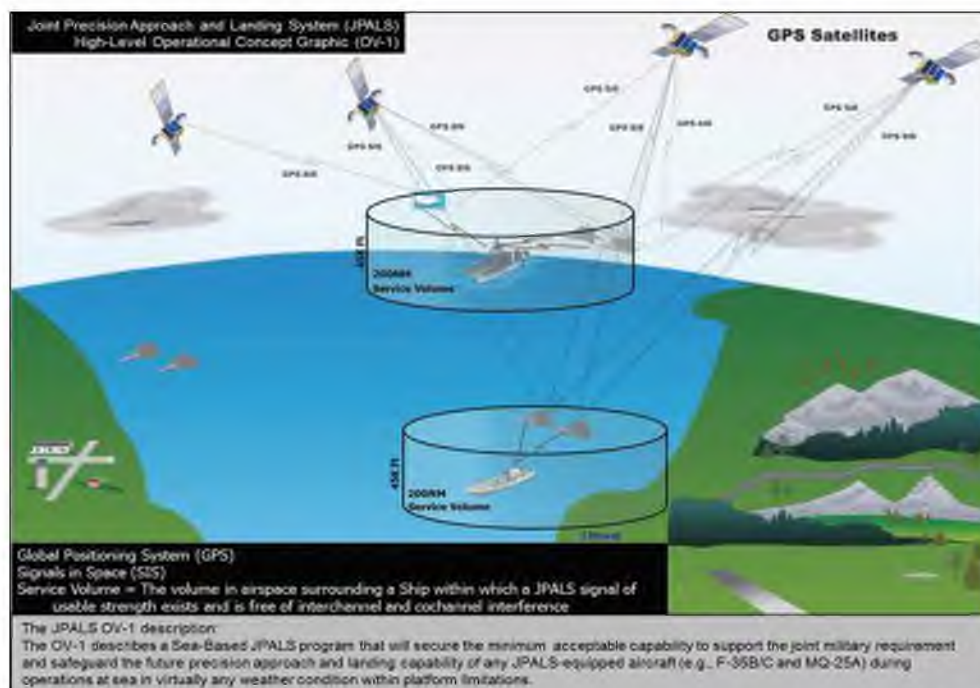




RCS: DD-A&T(Q&A)823-238



Joint Precision Approach and Landing System (JPALS)

As of FY 2021 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

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

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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)
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

Program Information

Program Name

Joint Precision Approach and Landing System (JPALS)

DoD Component

Navy

Responsible Office

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References

SAR Baseline (Development Estimate)

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

Approved APB

Assistant Secretary of the Navy (Research, Development & Acquisition) (ASN(RDA)) Approved Acquisition Program Baseline (APB) dated April 26, 2019

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.

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(RD&A)) approved Milestone B and authorized the JPALS program to enter the EMD phase. At Milestone B, ASN(RD&A) also authorized award of the EMD contract and approved an LRIP quantity of up to 12 units.

In September 2016, the JPALS EMD contract was awarded to Raytheon for the procurement of two Engineering Development Model (EDM) units, the upgrade of the original eight EDM units, and the completion of the JPALS developmental effort. In November 2016, the previous JPALS Increment 1A contract with Raytheon was completed and the JPALS program accepted delivery of eight EDM units and the Increment 1A Technical Data Package.

An Integrated Baseline Review (IBR) was held in March 2017 and a Critical Design Review was held in May 2017. An Operational Test Readiness Review for JPALS Ultra High Frequency (UHF) Data Broadcast (UDB) and a Gate 6/IBR review were completed in August 2017. Operational Tests on JPALS UDB to include M-Demo and Cyber Testing were completed in September 2017. Early Operational Capability (EOC) of JPALS UDB was declared in June 2018. JPALS systems are currently supporting F-35B/C Block 3F operational ship deployments. Additionally, Commander, Operational Test Forces (COTF) performed an operational assessment of JPALS UDB during the CVN-72 F-35C Initial Operational Test & Evaluation (IOT&E).

A JPALS LRIP ADM was approved in December 2017, increasing LRIP quantities from 12 to 23 units utilizing Variation in Quantity based on budget availability. Therefore, there will not be a need for a FRP decision since there is no programmatic production requirement beyond the 23 LRIP units. The IOC definition for JPALS was updated based on a revised JPALS IOT&E Phase 2 definition that decoupled JPALS IOC from external programs such as F-35 and MQ-25A. As a result of the IOC definition update, the PM estimate for IOC has changed from September 2024 to November 2020. JPALS will utilize a JPALS-equipped aircraft to evaluate the JPALS ship system during IOT&E Phase 2 per agreement reached between OPNAV N98; COTF; and Director, Operational Test and Evaluation. JPALS IOT&E Phase 2 will be conducted on the JPALS two-way capability using an F-35B/C equipped with Block 3F (or later) UDB capability and an F/A-18 JPALS Test Bed equipped with full two-way capability. JPALS Follow-on Operational Test and Evaluation will be conducted with F-35B/C and MQ-25A when the respective platforms have integrated JPALS full two-way capability. As a result of programmatic changes, the MDA approved an updated APB in March 2018. A waiver was granted for the 2018 Gate 6/Configuration Steering Board due to system maturity.

The first JPALS two-way capable EDM was delivered in January 2018 and installed on CVN-69. A Test Readiness Review for JPALS two-way capability was completed in April 2018 to enable entry into Integrated Test. Developmental Test (DT) events began in FY 2018 with IT-B3 (LH) completed in May 2018 and IT-B1 (Shore) completed in October 2018. DT on JPALS two-way M-Demo was completed in September 2018. Production Readiness Review was conducted in December 2018.

JPALS Ship System was regression tested to verify JPALS UDB capability in December 2018 on CVN-72 with an F-35 Block 3F equipped aircraft. An Operational Assessment was conducted concurrently with IT-B2 (CVN) on CVN-69 in April 2019. System Verification Review (SVR) was divided into two phases due to ship availability; SVR-1 was conducted in December 2018 completing 75% of the requirements traceability and verified critical hardware requirements were met. SVR-2 was conducted November 2019, which verified software related guidance quality, System of System Integration, Shipboard Power, E3 and Datalink requirements. In April 2019, the MDA approved the ADM for Milestone C which included the annual Configuration Steering Board and authorized JPALS to enter into LRIP phase.

The JPALS LRIP contract was awarded May 2019. LRIP Post Award Conference was conducted June 2019. LRIP IBR was conducted October 2019. LRIP Option 1 was awarded December 2019.

In December 2018, an optional EDM was delivered to the MQ-25A program in support of their development efforts. Additionally, the F-35 JSF Program Office (JPO) procured one optional JPALS EDM for Italy's Cavour Aircraft Carrier. Italy provided a Directed Source Letter to procure the unit from Raytheon and utilized the cooperative program through the JPO to fund the procurement. The initial Cavour Aircraft Carrier ship survey was completed in February 2018.

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 and the JPALS Ship System in support of Queen Elizabeth Class carrier program. The case Period of Performance (PoP) expired in December 2016 and the UK is still exploring options to extend the PoP to support additional technical discussions prior to an eventual procurement decision. There are no Technology Security/Foreign Disclosure issues related to the technical services case with the UK. A JPALS EDM is being temporarily installed aboard Queen Elizabeth Class carrier in FY 2020 to support United States Marine Corps F-35B Joint Deployments.

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.
1st Quarter FY 2018	JPALS APB was signed March 2018. Block 1 TRR was conducted in April 2018. Class J&A was signed June 2018. Declared EOC June 2018. Completed M-Demo in September 2018. Conducted SVR-1 and PRR December 2018. Completed IT-B3 and IT-B1 hardware and Software validation efforts. F-35 with JPALS UDB capability was flown against CVN-72 at sea for Block 1 regression test in December 2018.
1st Quarter FY 2019	Completed Milestone C decision review with annual CSB in March 2019. ADM signed April 2019 authorized JPALS to enter LRIP phase and SVR 2 to be conducted within six months of IT-B2 completion. Conducted IT-B2 on CVN-69 April 2019 and conducted an Operational Assessment. JPALS LRIP contract awarded May 2019. SVR 2 conducted November 2019. LRIP Option 1 awarded December 2019.

Threshold Breaches

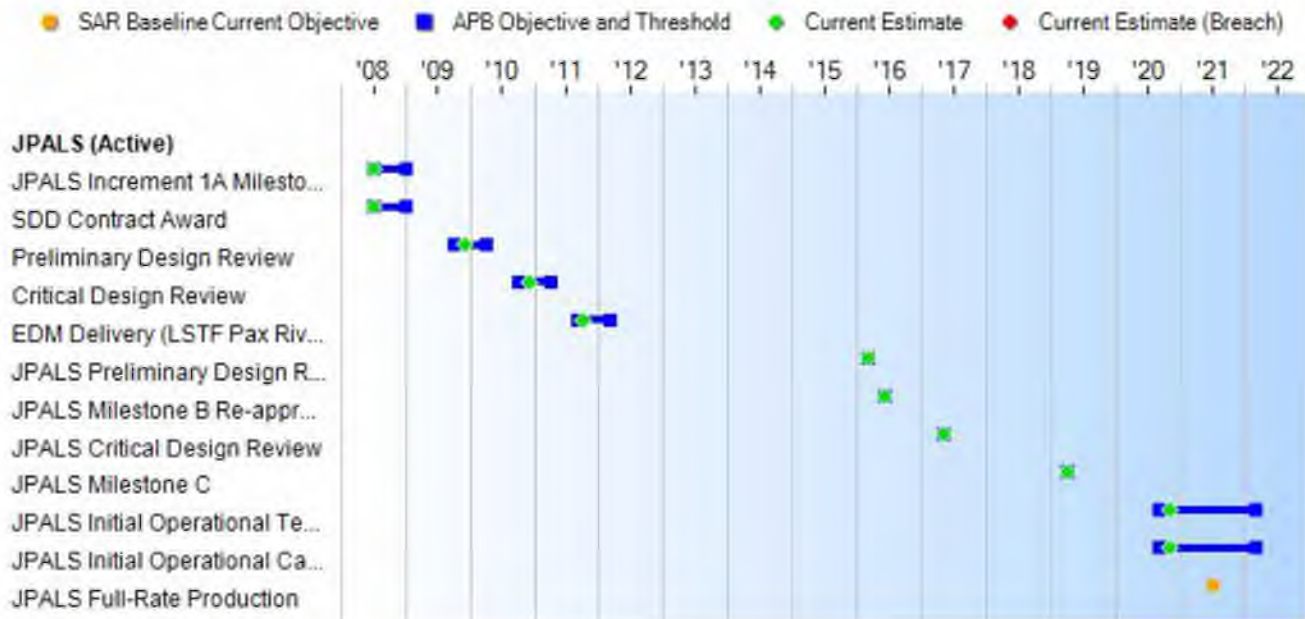
APB Breaches

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 Production 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	Mar 2016	Mar 2016	
JPALS Milestone B Re-approval	Jun 2016	Jun 2016	Jun 2016	Jun 2016	
JPALS Critical Design Review	Mar 2017	May 2017	May 2017	May 2017	
JPALS Milestone C	Mar 2019	Apr 2019	Apr 2019	Apr 2019	(Ch-1)
JPALS Initial Operational Test and Evaluation	Jan 2020	Sep 2020	Mar 2022	Nov 2020	(Ch-2)
JPALS Initial Operational Capability	Sep 2020	Sep 2020	Mar 2022	Nov 2020	(Ch-2)
JPALS Full-Rate Production	Jul 2021	N/A	N/A	N/A	

Change Explanations

(Ch-1) The current Milestone C estimate has changed from March 2019 to April 2019 due to the completion of Milestone C decision review.

(Ch-2) The current Initial Operational Test and Evaluation estimate has changed from July 2020 to November 2020 and the Initial Operational Capability estimate changed from September 2020 to November 2020 due to delay in ship availability.

Acronyms and Abbreviations

CDR - Critical Design Review

DT&E - Developmental Test and Evaluation

EDM - Engineering Development Model

IOT&E - Initial Operational Test and Evaluation

LSTF - Landing Systems Test Facility

PAX - Patuxent

SDD - System Development and Demonstration

Track to Budget

RDT&E

Appn	BA	PE	
Navy	1319	04	0603860N
Project	Name		
2329	Joint Precision Approach and Landing System (Shared)		

Notes

This project also funds follow-on development efforts.

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	(Shared)
Navy	1810	08	0305014N
	Line Item	Name	
	9020	Spares and Repair Parts	(Shared)

Notes

This project also funds follow-on procurement efforts.

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 Production Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Production Objective	Current Estimate
RDT&E	1424.0	1384.7	1523.2	1382.0	1396.4	1349.9	1348.6
Procurement	395.7	343.4	377.7	332.8	456.9	389.5	377.9
Flyaway	--	--	--	234.8	--	--	266.4
Recurring	--	--	--	234.8	--	--	266.4
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	98.0	--	--	111.5
Other Support	--	--	--	65.6	--	--	74.9
Initial Spares	--	--	--	32.4	--	--	36.6
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	1735.5	N/A	1722.2	1860.1	1746.2	1733.3

Current APB Cost Estimate Reference

JPALS SCP dated March 04, 2019

Cost Notes

In April 2019, the program achieved Milestone C. The milestone decision was supported by both a POE and an ICE. Ultimately, the POE was recommended as the Component Cost Position (CCP) for the program and used to set the APB and other program costs. No risks were identified in the CCP. The ICE pointed out the system Operational Assessment occurring after Milestone C as a potential cost and schedule impact. Since Milestone C, this event completed without impact to cost or schedule. Additionally, the ICE pointed out potential opportunities during sustainment if reliability assumptions were proved to be conservative. Sufficient reliability data is not currently available to realize this opportunity but the program will continue to monitor observed reliability and adjust the estimate accordingly.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Production	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 2021 President's Budget / December 2019 SAR (TY\$ M)									
Appropriation	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
RDT&E	1238.4	51.3	33.6	25.3	0.0	0.0	0.0	0.0	1348.6
Procurement	56.3	107.5	124.1	70.4	10.8	3.8	1.6	3.4	377.9
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 2021 Total	1301.5	158.8	157.7	95.7	10.8	3.8	1.6	3.4	1733.3
PB 2020 Total	1297.8	166.3	155.8	82.0	21.3	3.3	4.9	5.7	1737.1
Delta	3.7	-7.5	1.9	13.7	-10.5	0.5	-3.3	-2.3	-3.8

Funding Notes

O&S phase follow-on ECP efforts begin in FY 2023 and are included in the JPALS O&S estimate. These costs are not part of the Total Acquisition Cost. Three units previously procured with RDT&E will be converted to production units through SCN funding. These three conversion units will remain counted in RDT&E.

Quantity Summary										
FY 2021 President's Budget / December 2019 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
Development	10	0	0	0	0	0	0	0	0	10
Production	0	4	8	9	2	0	0	0	0	23
PB 2021 Total	10	4	8	9	2	0	0	0	0	33
PB 2020 Total	10	4	9	8	2	0	0	0	0	33
Delta	0	0	-1	1	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
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	--	--	--	--	--	--	83.2
2017	--	--	--	--	--	--	102.2
2018	--	--	--	--	--	--	104.0
2019	--	--	--	--	--	--	99.1
2020	--	--	--	--	--	--	51.3
2021	--	--	--	--	--	--	33.6
2022	--	--	--	--	--	--	25.3
Subtotal	10	--	--	--	--	--	1348.6

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	--	--	--	--	--	--	128.1
2015	--	--	--	--	--	--	41.5
2016	--	--	--	--	--	--	81.6
2017	--	--	--	--	--	--	98.4
2018	--	--	--	--	--	--	97.8
2019	--	--	--	--	--	--	91.4
2020	--	--	--	--	--	--	46.4
2021	--	--	--	--	--	--	29.8
2022	--	--	--	--	--	--	22.0
Subtotal	10	--	--	--	--	--	1382.0

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	34.2	--	--	34.2	8.5	42.7	
2020	7	70.4	--	--	70.4	25.9	96.3	
2021	8	75.8	--	--	75.8	37.1	112.9	
2022	2	32.8	--	--	32.8	23.7	56.5	
2023	--	3.8	--	--	3.8	4.3	8.1	
2024	--	--	--	--	--	0.2	0.2	
2025	--	--	--	--	--	0.2	0.2	
Subtotal	20	217.0	--	--	217.0	99.9	316.9	

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	31.3	--	--	31.3	7.8	39.1	
2020	7	63.2	--	--	63.2	23.3	86.5	
2021	8	66.8	--	--	66.8	32.6	99.4	
2022	2	28.3	--	--	28.3	20.5	48.8	
2023	--	3.2	--	--	3.2	3.7	6.9	
2024	--	--	--	--	--	0.2	0.2	
2025	--	--	--	--	--	0.2	0.2	
Subtotal	20	192.8	--	--	192.8	88.3	281.1	

Cost Quantity Information			
1810 Procurement Other Procurement, Navy			
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2016 \$M	
2019	3	36.2	
2020	7	68.7	
2021	8	68.2	
2022	2	19.7	
2023	--	--	
2024	--	--	
2025	--	--	
Subtotal	20	192.8	

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	0.1	0.5
2019	1	11.9	--	--	11.9	1.0	12.9
2020	1	9.6	0.1	--	9.7	1.5	11.2
2021	1	8.6	0.1	--	8.7	2.5	11.2
2022	--	0.9	10.3	--	11.2	2.7	13.9
2023	--	0.5	0.9	--	1.4	1.3	2.7
2024	--	1.7	0.8	--	2.5	1.1	3.6
2025	--	--	0.5	--	0.5	0.9	1.4
2026	--	--	0.6	--	0.6	0.4	1.0
2027	--	--	1.2	--	1.2	0.1	1.3
2028	--	--	1.1	--	1.1	--	1.1
Subtotal	3	33.8	15.6	--	49.4	11.6	61.0

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	0.1	0.5
2019	1	10.5	--	--	10.5	0.9	11.4
2020	1	8.3	0.1	--	8.4	1.3	9.7
2021	1	7.3	0.1	--	7.4	2.1	9.5
2022	--	0.8	8.6	--	9.4	2.2	11.6
2023	--	0.4	0.7	--	1.1	1.1	2.2
2024	--	1.4	0.6	--	2.0	0.9	2.9
2025	--	--	0.4	--	0.4	0.7	1.1
2026	--	--	0.5	--	0.5	0.3	0.8
2027	--	--	0.9	--	0.9	0.1	1.0
2028	--	--	0.8	--	0.8	--	0.8
Subtotal	3	29.3	12.7	--	42.0	9.7	51.7

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	11.5
2020	1	9.0
2021	1	8.8
2022	--	--
2023	--	--
2024	--	--
2025	--	--
2026	--	--
2027	--	--
2028	--	--
Subtotal	3	29.3

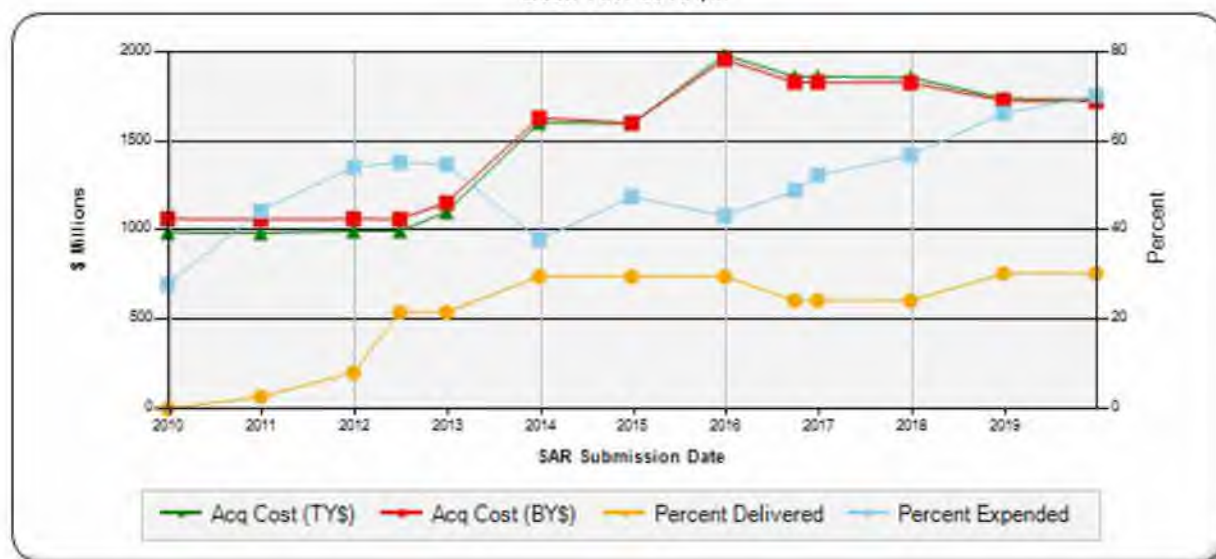
Annual Funding 1205 MILCON Military Construction, Navy and Marine Corps		
Fiscal Year	TY \$M	
	Total Program	
2008		6.8
Subtotal		6.8

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

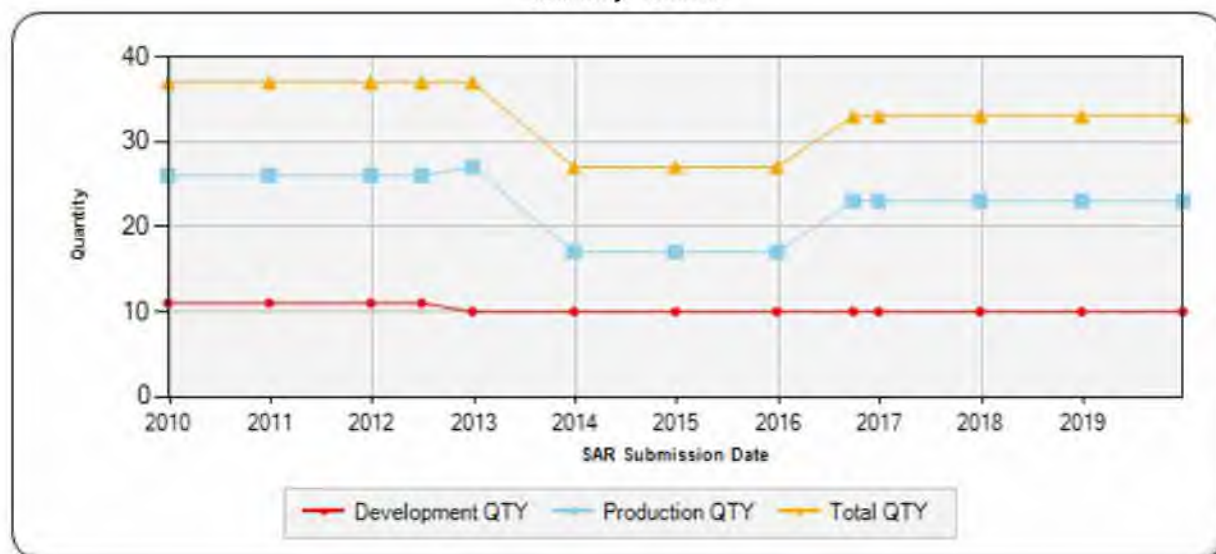
Charts

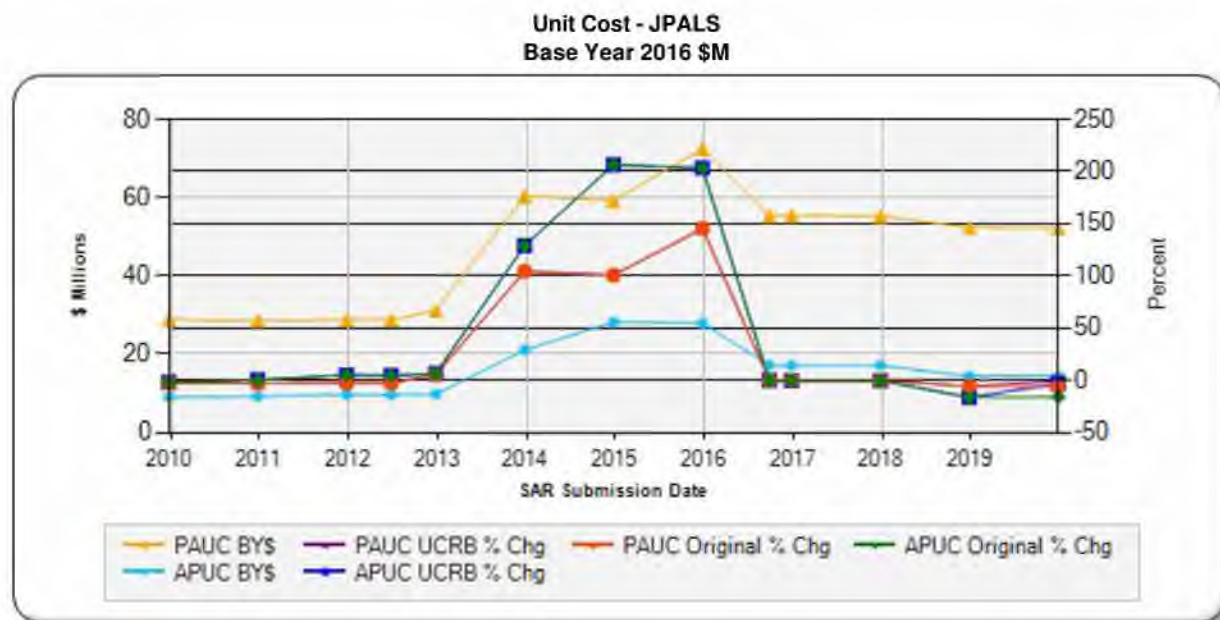
JPALS first began SAR reporting in December 2009

Program Acquisition Cost - JPALS
Base Year 2016 \$M



Quantity - JPALS





Risks

Significant Schedule and Technical Risks

Significant Schedule and Technical Risks	
Milestone B (July 2008)	
1.	Cost: JPALS Increment 1 APB Execution. Risk closed in August 2008 when the Acquisition Strategy update was signed and approved.
2.	Schedule: Software Development Schedule may not support the first Test Readiness Review (TRR). Risk closed in October 2008 with the schedule re-baselined.
3.	Technical: System Certification Requirements. Certification policy, procedures, instructions, requirements, and organizational roles and responsibilities have been established. Risk closed in August 2013.
4.	Technical: JPALS Integration Strategy with existing ship systems. Risk closed in Feb 2010 with the Engineering Change Proposal (ECP) and Plan of Action and Milestones (POA&M) for integration of JPALS with existing ship systems was approved.
5.	Schedule: Lack of co-location with System Development and Demonstration (SDD) prime contractor. Risk closed in October 2008 with successful implementation of the Integrated Data Environment (IDE).
6.	Technical: JPALS Data Link Radio System may not be compatible with the Local Area Augmentation System (LAAS) VHF Data Broadcast (VDB) requirements. Risk was closed in Jan 2009. Risk was realized.
Revised Milestone B (June 2016)	
1.	Technical: System Does Not Account for Observed Global Positioning System (GPS) Carrier Frequency Phase Tracking Anomalies. Mitigation: Determine cause and corrective actions to address GPS signal carrier frequency phase tracking anomalies to minimize or eliminate changes to meet guidance quality performance requirements. Risk was closed in 3Q FY 2018.
2.	Technical: Specific Continuity. Risk closed in September 2016 with prototyping a new algorithm design in the hardware.
3.	Schedule: Anti-tamper levels to Critical Program Information (CPI) designated components in JPALS. Risk closed in September 2016 with the signoff of the revised CPI list.
4.	Cost: JPALS M-Code Capability. Mitigation: Plan for and conduct M-Code trade study during Engineering and Manufacturing Development (EMD) contract to determine cost of and design options for JPALS M-Code implementation and alignment with aircraft platform need. M-Code waiver granted and risk was closed in September 2017.
Current Estimate (December 2019)	
1.	Technical: Ship GPS Sensor Unit (SGSU) Upgrade. The Digital Integrated GPS Anti-jam Receiver (DIGAR) GPS receiver used in JPALS Block 1 ship system is obsolete and not enough parts exist to produce all units for the 23 production systems. Mitigation: Develop and approve ECP. Cut into production line. Planned risk closure: 4Q FY 2020.

Risks

Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Baseline Estimate (April 2019)	
1.	The current baseline estimate reflects the SCP that was approved in support of the JPALS Milestone B and used as the basis for the Milestone B APB. The current baseline is based upon a cost risk adjusted model that reflects costs at the 50% Confidence level to account for schedule uncertainty, production uncertainty and other risks and uncertainties.
Original Baseline Estimate (December 2008)	
1.	The DAE conducted a DAB review for the JPALS Increment 1A program on June 21, 2008, and designated JPALS Increment 1A as a MDAP ACAT ID and approved Milestone B for Increment 1A. The original baseline estimate was developed in support of the JPALS Milestone B APB for Increment 1A and was approved by USD AT&L in December 2008.
Revised Original Estimate (June 2016)	
1.	Same as the Current Baseline Estimate (June 2016)
Current Procurement Cost (December 2019)	
1.	The Current Baseline Estimate is the most recent Risk and Sensitivity assessment completed on the program. An updated Risk and Sensitivity assessment was completed to support Milestone C.

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) ADM
Start Year	2019	2019
End Year	2021	2022

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, Assistant Secretary of the Navy (Research, Development & Acquisition) (ASN(RD&A)) signed an ADM increasing the LRIP quantity to 23 JPALS units with Variation in Quantity flexibility based on budget availability; therefore, current End Year changed from 2023 to 2022. On April 26, 2019 an ADM approved entry into LRIP phase.

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

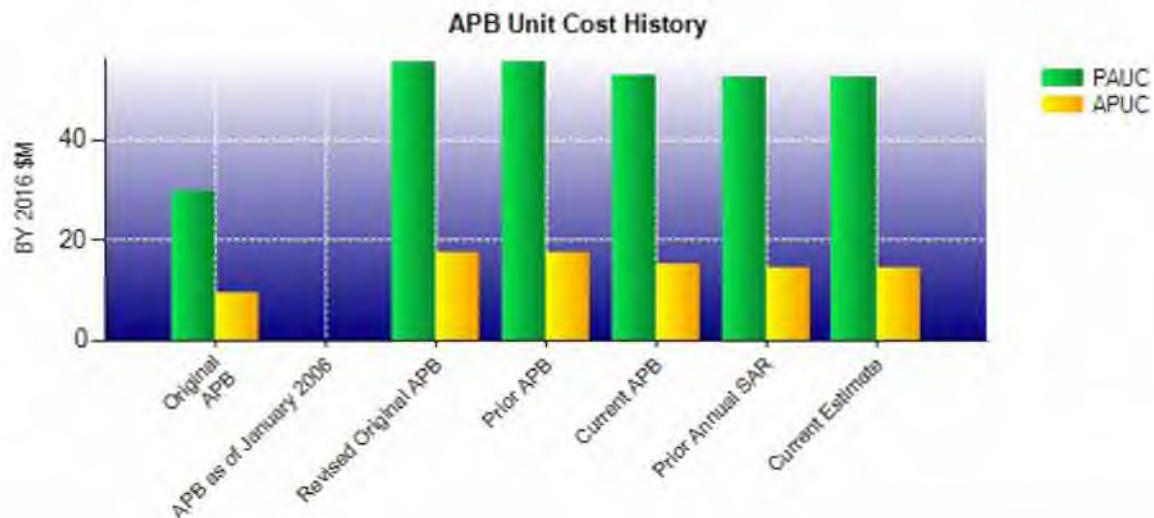
The United Kingdom (UK) has a technical services FMS case that allowed for the exchange of pre-procurement technical information and services for both the AN/SPN-41B Instrument Carrier Landing System and the JPALS Ship System in support of Queen Elizabeth Class carrier program. The case Period of Performance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

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 (Apr 2019 APB)	Current Estimate (Dec 2019 SAR)	
Program Acquisition Unit Cost			
Cost	1735.5	1722.2	
Quantity	33	33	
Unit Cost	52.591	52.188	-0.77
Average Procurement Unit Cost			
Cost	343.4	332.8	
Quantity	23	23	
Unit Cost	14.930	14.470	-3.08
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 2019 SAR)	
Program Acquisition Unit Cost			
Cost	1827.1	1722.2	
Quantity	33	33	
Unit Cost	55.367	52.188	-5.74
Average Procurement Unit Cost			
Cost	395.7	332.8	
Quantity	23	23	
Unit Cost	17.204	14.470	-15.89



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	Mar 2018	55.367	17.204	56.367	19.865
Current APB	Apr 2019	52.591	14.930	52.915	16.935
Prior Annual SAR	Dec 2018	52.306	14.396	52.639	16.361
Current Estimate	Dec 2019	52.188	14.470	52.524	16.430

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	0.103	0.000	-0.761	0.000	-1.385	0.000	-1.800	-3.843	52.524

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	0.061	0.000	-1.091	0.000	0.178	0.000	-2.583	-3.435	16.430

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	Apr 2019
IOC	N/A	Sep 2020	N/A	Nov 2020
Total Cost (TY \$M)	N/A	1860.1	N/A	1733.3
Total Quantity	N/A	33	N/A	33
PAUC	N/A	56.367	N/A	52.524

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	+1.2	+1.3	--	+2.5
Quantity	--	--	--	--
Schedule	--	-25.4	--	-25.4
Engineering	--	--	--	--
Estimating	-43.6	-1.3	--	-44.9
Other	--	--	--	--
Support	--	-55.2	--	-55.2
Subtotal	-42.4	-80.6	--	-123.0
Current Changes				
Economic	+0.8	+0.1	--	+0.9
Quantity	--	--	--	--
Schedule	--	+0.3	--	+0.3
Engineering	--	--	--	--
Estimating	-6.2	+5.4	--	-0.8
Other	--	--	--	--
Support	--	-4.2	--	-4.2
Subtotal	-5.4	+1.6	--	-3.8
Adjustments	--	--	--	--
Total Changes	-47.8	-79.0	--	-126.8
Current Estimate	1348.6	377.9	6.8	1733.3

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	--	+1.4	--	+1.4
Schedule	--	-19.0	--	-19.0
Engineering	--	--	--	--
Estimating	-36.4	-2.6	--	-39.0
Other	--	--	--	--
Support	--	-44.4	--	-44.4
Subtotal	-36.4	-64.6	--	-101.0
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	+0.1	--	+0.1
Engineering	--	--	--	--
Estimating	-5.6	+5.4	--	-0.2
Other	--	--	--	--
Support	--	-3.8	--	-3.8
Subtotal	-5.6	+1.7	--	-3.9
Adjustments	--	--	--	--
Total Changes	-42.0	-62.9	--	-104.9
Current Estimate	1382.0	332.8	7.4	1722.2

Previous Estimate: December 2018

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+0.8
Decrease due to revised Milestone C requirements. (Estimating)	-2.6	-3.0
Decrease due to budget realignments. (Estimating)	-2.3	-2.5
Adjustment for current and prior escalation. (Estimating)	-0.7	-0.7
RDT&E Subtotal	-5.6	-5.4

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+0.1
Movement of 1 procurement from FY2020 to FY2021 (OPN). (Schedule)	0.0	+0.2
Additional Schedule Variance to capture costs associated with system installation (OPN). (Schedule)	+0.1	+0.1
Revised system unit costs based on negotiated contract prices (OPN). (Estimating)	+9.1	+9.9
Revised system installation costs and schedule based on Milestone C requirements (OPN). (Estimating)	-9.7	-11.0
Revised system unit costs based on negotiated contract prices (SCN). (Estimating)	+6.2	+7.2
Revised system installation costs and schedule based on Milestone C requirements (SCN). (Estimating)	0.0	-0.3
Revised EDM conversion plan resulting in cost shift from FY 2023 to FY 2022 (SCN). (Estimating)	-0.3	-0.4
Adjustment for current and prior escalation. (Estimating)	+0.1	0.0
Adjustment for current and prior escalation. (Support)	-0.1	0.0
Decrease in Other Support based on revised Milestone C staffing and contract support requirements (OPN). (Support)	-1.5	-1.4
Increase in Initial Spares based on negotiated contract prices (OPN). (Support)	+0.5	+0.5
Decrease in Other Support based on revised Milestone C staffing and contract support requirements (SCN). (Support)	-2.3	-2.7
Decrease in Initial Spares based on negotiated contract prices (SCN). (Support)	-0.4	-0.6
Procurement Subtotal	+1.7	+1.6

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	279.6	N/A	12	279.6	279.6

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to award of contract options for two Engineering Development Model (EDM) units. One EDM was procured for the F-35 JSF Program Office (JPO) for Italy's Cavour Aircraft Carrier in support of the F-35B. Italy provided a Directed Source Letter to procure the unit from Raytheon and utilized the cooperative program through the JPO to fund the procurement. Additionally, one unit was procured for MQ-25A development efforts by the MQ-25 program. Other contract additions were made to account for contractor support to fielded EDM units and system obsolescence resolutions.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2020)	+1.5	-0.7
Previous Cumulative Variances	+0.4	-1.1
Net Change	+1.1	+0.4

Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to efficient close out of EMD tasks. The previously reported Ship Processor unit testing contributed to the cumulative positive variance and continued efficient resolution of Software Trouble Reports has also generated positive performance.

The favorable net change in the schedule variance is due to the close out of numerous, minor overdue tasks.

Contract Identification

Appropriation: Procurement
Contract Name: JPALS LRIP
Contractor: Raytheon
Contractor Location: 1801 Hughes Drive
Fullerton, CA 92833
Contract Number: N00019-19-C-0020/2
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: May 22, 2019
Definitization Date: May 22, 2019

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
49.1	49.7	4	118.8	120.3	11	118.8	118.8

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the award of LRIP option for seven additional units.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2020)	+2.0	+2.6
Previous Cumulative Variances	--	--
Net Change	+2.0	+2.6

Cost and Schedule Variance Explanations

The favorable cumulative cost variance is due to efficiencies in manufacturing support and production engineering support.

The favorable cumulative schedule variance is due to early receipt of materials.

Notes

The contractor contains CLINs with different contract types (i.e. Firm Fixed Price and Fixed Price Incentive Fee). Earned value is collected on CLIN0001 only and reported in the Contract Variance section of this report.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	10	10	10	100.00%
Production	0	0	23	0.00%
Total Program Quantity Delivered	10	10	33	30.30%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	1733.3	Years Appropriated	20
Expended to Date	1215.9	Percent Years Appropriated	71.43%
Percent Expended	70.15%	Appropriated to Date	1460.3
Total Funding Years	28	Percent Appropriated	84.25%

The above data is current as of February 10, 2020.

Notes	
RDT&E costs include 10 ship system Engineering Development Model (EDM) units. Procurement/Production costs data includes 20 Other Procurement, Navy (OPN) and 3 Naval Sea Systems Command (NAVSEA), Shipbuilding Conversion, Navy (SCN) funded ship system units.	

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	March 05, 2019
Source of Estimate:	SCP
Quantity to Sustain:	26
Unit of Measure:	System
Service Life per Unit:	20.00 Years
Fiscal Years in Service:	FY 2021 - FY 2048

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 following: 20 production systems funded by Other Procurement, Navy (OPN); 3 Engineering Development Model (EDM) funded by RDT&E that will be converted to the production configuration and funded with Shipbuilding and Conversion, Navy (SCN); and 3 systems procured by Naval Sea Systems Command (NAVSEA) and funded by 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 C to reflect quantity, schedule, scope changes, and other technical inputs reflected in the Milestone C CARD. The inclusion of recertification costs, as stated in the CARD, generated a notable change between the prior Milestone B estimate and the current estimate. There was also an update to account for expected Engineering Change Proposals (ECPs) for M-Code and ARC-210 Gen 6. A ramp down schedule was included for each unit after 20 years of service. Three EDM units will 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

JPALS will be supported by two levels of maintenance: organizational and depot. The Depot Source of Repair (DSOR) will be commercial, as specified in the Joint DSOR Decision. Supply support for the system will transition to the Naval Supply Systems Command at the system Material Support Date.

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) Average Annual Cost Per System	AN/SPN-46(V)3 (Antecedent) Average Annual Cost Per System
Unit-Level Manpower	0.000	0.716
Unit Operations	0.000	0.000
Maintenance	0.462	0.051
Sustaining Support	0.754	0.027
Continuing System Improvements	0.221	0.408
Indirect Support	0.000	0.000
Other	--	0.000
Total	1.437	1.202

Item	Total O&S Cost \$M		
	JPALS (Active)		AN/SPN-46(V)3 (Antecedent)
	Current Production APB Objective/Threshold	Current Estimate	
Base Year	747.3	822.0	747.3
Then Year	1027.6	N/A	1027.6

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 2048. \$747.3M = \$1.437M * 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 2018 SAR	435.3	
Programmatic/Planning Factors	3.4	Increase due to updated procurement and installation profile.
Cost Estimating Methodology	-61.3	Decrease due to updated maintenance estimate methodology and Milestone C model corrections.
Cost Data Update	156.0	Increase due to incorporation of updated Bill of Material (BOM) unit prices.
Labor Rate	-14.1	Decrease due to updated In Service Engineering Activity (ISEA) and Software Support Activity rates.
Energy Rate	0.0	
Technical Input	228.0	Increase due to inclusion of recurring certification costs and updated ISEA manpower estimates.

Other	0.0
Total Changes	312.0
Current Estimate	747.3

Disposal Estimate Details

Date of Estimate: March 05, 2019
Source of Estimate: SCP
Disposal/Demilitarization Total Cost (BY 2016 \$M): 13.0

The TY\$ value is \$21.7M. Disposal cost is assumed to be 40% of the installation cost of a new system.