PAIRS CASE 2022-C-0396

F-15 EAGLE PASSIVE ACTIVE WARNING SURVIVABILITY SYSTEM (F-15 EPAWSS)

Selected Acquisition Report (SAR)

AS OF THE FY 2023 PRESIDENT'S BUDGET

U.S. AIR FORCE

Contents

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Mission and Description

The F-15 is a versatile 4th-generation fighter aircraft and is central to Combatant Commanders' ability to fulfill the National Defense Strategy (Joint Lethality in Contested Environments) for numerous operational plans (OPLANS) and contingency plans (CONPLANS) in near-peer conflicts. The proliferation of fourth generation enemy aircraft, sophisticated "double-digit" anti-aircraft missile systems, and other threat systems pose a significant threat to F-15 survivability. Therefore, it is necessary to invest in the F-15 platform to ensure it remains viable well into the 21st century. The F-15 Eagle Passive Active Warning and Survivability System (EPAWSS) replaces the legacy, analog, functionally-obsolete F-15 Tactical Electronic Warfare System. F-15 EPAWSS is a 21st century, digital electronic warfare suite which includes electronic detection and identification, geolocation, electronic countermeasures (jamming), and countermeasures dispensing (chaff/flares), providing advanced, game-changing capabilities for the modern fight. Specifically, EPAWSS enables the F-15 to detect, identify, and locate Radio Frequency (RF) threats as well as deny, degrade, deceive, disrupt, and defeat RF and electro-optical / infrared threat systems in contested environments with dense RF backgrounds.

Executive Summary

Program Highlights Since Last Report

Significant Accomplishments:

The program is using a tailored acquisition strategy that split Milestone C into two decision points, which takes hardware procurement off the critical path and accelerates capability delivery by 16-months. The program formally entered into the low-rate production phase in December 2020, achieving Milestone C via Decision Point #1 (Production Decision) and awarding the Lot 1 effort for six Electronic Warfare (EW) kits. The program then definitized the $952M Low-Rate Initial Production contract on September 28, 2021, setting the stage to deliver 43 EPAWSS-modified F-15E aircraft. Lots 2 and 3 (18 and 19 EW kits, respectively) are contract options slated for award in FY 2022 and FY 2023. At Milestone C Decision Point #2 (Deployment Decision, May/June 2022) the program will seek approval to begin hardware installations on the operational aircraft, which are planned to begin in June 2022.

The program completed an aggressive year of Integrated Test & Evaluation in 2021, consisting of 652 flight test missions against 26 threat systems, seven ground tests, two cybersecurity vulnerability tests, and two large force exercises which demonstrated system-level performance in operationally-realistic scenarios. The EW hardware qualification is 99% complete, Boeing and BAE Systems delivered four increments of updated mission-system software, and performance meets the vast majority of specifications. Finally, the program continued logistics/sustainment planning efforts: Boeing and the USAF conducted two maintenance demonstrations to verify mean-time-to-repair data and Boeing delivered a second round of interim maintenance and flight technical publications. The overarching product support package in support of Initial Operational Capability (IOC) is ahead of schedule. Overall, the program made excellent progress in 2021 and remains on-track to meet key schedule objectives, such as the start of Initial Operational Test & Evaluation (IOT&E, Spring 2023), Full Rate Production Decision Point (FRP, Winter 2024), and IOC (Spring 2025).

In January 2022, the acting Service Acquisition Executive signed an Acquisition Decision Memorandum formally approving the program to mitigate Diminishing Manufacturing Sources and Materiel Shortages (DMSMS, parts-obsolescence) issues for the duration of EPAWSS production. The program is now in a position to protect future EPAWSS production in support of F-15EX and F-15E for both Low-Rate and Full Rate Production.

In February 2022, the program team completed the final planned test event at the Air Force Research Lab Integrated Demonstrations and Applications Laboratory (AFRL IDAL) at Wright-Patterson AFB. The final report is in work, but quick-look results illustrate the system is meeting specifications in a dense signal environment. Also in February 2022, Boeing delivered the final software package containing new functional content, which is demonstrating outstanding performance in flight test. The program will now focus on addressing problem reports and refining overall system performance in the remaining two software deliveries planned in June and September 2022.

Significant Issues:

The program has two known performance issues. First, the system is mis-identifying some signals from the background radio-frequency environment as threats. This results in display clutter and decreased operational effectiveness. This is commonly referred to as "Mis-ID" and is a challenge for all EW systems. The program is addressing this through iterative software integration informed by modeling/simulation and ground/flight testing. The latest software package showed significant improvement in this area at the IDAL and in flight test, and the program will likely close this issue in mid-2022 pending final analyses. Second, the system will not meet a Capabilities Development Document (CDD) Key System Attribute for low-band direction-finding performance for all threat systems. Performance is operationally useful and, therefore, Air Combat Command has accepted performance as-is. An updated CDD is in formal staffing within the Air Force and will be approved in ~May 2022.

Funding stability continues to be a challenge. The program previously experienced cost and schedule growth caused by delays in EW hardware development and aircraft modifications. This resulted in a Significant Nunn-McCurdy breach in 2019, a shortfall in FY 2020 RDT&E funding, and additional funding disconnects and phasing issues in FY 2022-2024. The FY 2021 Appropriation Act eliminated FY 2021 aircraft procurement and spares funding and reduced organic depot-standup funding by $37M. With no aircraft procurement funding in FY 2021, the program is technically a 'new start' effort in FY 2022, which delayed the planned Lot 2 contract award from November 2022 to April 2022, eliminating all production schedule margin and putting the forecasted IOC date at-risk.

The program is actively mitigating and/or monitoring the following key risks: DMSMS; funding instability; ability to meet manufacturing commitments; incorporation of aircraft modifications into F-15 Programmed Depot Maintenance; standup of the contractor modification facility; remaining software integration and performance maturation work-to-go; and completion of the hardware qualification.

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	**DESCRIPTION**
Apr 2022	FY 2023 PB reduced F-15EX procurement quantity from 144 to 80 (new total quantity 299).
Feb 2022	Final mission system software delivered containing new functional content.
Jan 2022	Delivered sixth (final) test at Air Force Research Lab Integrated Demonstrations & Applications Laboratory (system performance in dense radio-frequency background environment).
Sep 2021	Program definitized Low-Rate Initial-Production (LRIP) Contract.
Aug 2021	Completed third (final) installed-system test at Benefield Anechoic Chamber (BAF).
Aug 2021	Modified eighth and final developmental test aircraft.
May 2021	Participated in an Operationally-focused Large Force Exercise (Northern Edge).
Apr 2021	Completed modification and first flight of seventh developmental test aircraft.
Feb 2021	The Production Acquisition Program Baseline (APB) was signed.
Dec 2020	The LRIP Undefinitized Contract Action was approved.
Dec 2020	Conducted the Milestone C-Decision Point 1 (Production Decision).
Aug 2020	Restructured development contract from cost-type to firm-fixed-price.
Jun 2020	Completed modification and first flight of sixth developmental test aircraft.
Mar 2020	Completed modification and first flight of fifth developmental test aircraft.
Feb 2020	Completed modification and first flight of fourth developmental test aircraft.
Jan 2020	Provided program deviation report for schedule breach (IOT&E Start; Full Rate Production Decision and F-15E and F-15C Required Assets Available).
Jan 2020	An AF force structure decision added 144 F-15EX to APB (new total quantity 363).
Nov 2019	Conducted modification and first flight of third developmental test aircraft.
Sep 2019	Conducted modification and first flight of second developmental test aircraft.
Apr 2019	Conducted first installed-system (interoperability) test at BAF.
Apr 2019	Conducted modification and first flight of first developmental test aircraft.
Apr 2019	Provided a Program Deviation Report for Significant Nunn-McCurdy Breach for Program Acquisition Unit Cost.
Jun 2017	An AF force structure decision removed 194 F-15C models from APB (new total quantity 219).
Feb 2017	Completed Critical Design Review.
Dec 2016	Completed Milestone B.
Nov 2016	The Development Contract was awarded.
Nov 2016	The Original APB (217 F-15E and 196 F-15C, total quantity 413) was approved.
Jul 2016	Completed the Preliminary Design Review.
Aug 2015	Milestone A was approved.

Schedule

Schedule Events

Schedule Events					
Events	SAR Baseline Development Estimate	Current APB Production Objective/Threshold		Current Estimate	Deviations
Milestone A	Aug 2015	Aug 2015	Aug 2015	August 14, 2015	
Preliminary Design Review	Jul 2016	Jul 2016	Jul 2016	July 15, 2016	
Milestone B	Nov 2016	Nov 2016	Nov 2016	November 2, 2016	
Critical Design Review	Mar 2017	Feb 2017	Feb 2017	February 7, 2017	
Milestone C Decision Point #1	N/A	Dec 2020	Dec 2020	December 1, 2020	
Milestone C Decision Point #2	N/A	May 2022	Nov 2022	June 2022	
IOT&E Start	Sep 2020	Apr 2023	Oct 2023	April 2023	
Full Rate Production Decision	Jan 2022	Apr 2024	Oct 2024	Apr 2024	
F-15E RAA	Jul 2022	Apr 2025	Oct 2025	Apr 2025	
F-15C RAA	Jun 2023	N/A	N/A	N/A	

Schedule Notes

Conducted Milestone B briefing on September 23, 2016; Milestone Decision Authority (MDA) signed Acquisition Decision Memorandum (ADM) on November 2, 2016.

The MDA approved an updated Acquisition Strategy in September 2018, directing the program to use two decision points in-lieu of a single Milestone C decision:

Decision Point #1 (October 30, 2020) was the formal Production Decision and constituted the statutory Milestone C event – authorized entry into the production phase and award of the LRIP contract. The MDA signed the ADM on December 1, 2020.

Milestone C Decision Point #2 (Deployment Decision) will authorize the start of LRIP installations on operational F-15E aircraft (anticipated in May/June 2022)

F-15C RAA is not applicable due to USAF FY 2018 PB force structure decision to remove F-15C models from the program baseline

F-15E RAA consists of 24 EPAWSS-modified F-15E aircraft at a single location along with delivery of training equipment and material, support equipment, spares, technical data, and mission planning/Mission Data File Generation software. Air Combat Command is in the process of updating RAA requirements based on evolving Force Generation concepts, likely reducing from 24 aircraft to 12 – anticipating approval May 2022.

Significant Schedule Risks

Significant Schedule Risks	
Current Estimate (FY 2023 PB)	
1.	IF the program is unsuccessful in ongoing mitigations for DMS, the number/frequency of DMS issues becomes unmanageable, or the program fails to award a purchase order on-time, THEN there may be insufficient hardware for production, resulting in delayed IOC.
2.	IF the AF does not fund FY 2024-28 procurement disconnects in future budget, (or IF Congress continues to decrement the program's budget requests), THEN the program will be forced to "buy-to-budget" in those years, driving an overall program delay to Full Operational Capability (FOC) and cost increase.
3.	IF the electronic warfare kit supplier is unable to meet EPAWSS manufacturing expectations due to commitments across multiple defense programs, THEN the aircraft modification schedule and IOC may be delayed.
4.	IF F-15 Programmed Depot Maintenance at Robins AFB is unable to incorporate the EPAWSS modifications starting mid-way through low-rate initial production, THEN the program will experience significant cost growth (~$240M), negatively impact F-15 aircraft availability, and delay FOC.
5.	IF Boeing does not achieve key readiness milestones at the San Antonio Contractor Modification Facility (facility requirements, kit production, support equipment, tooling, plans/procedures, and staffing), THEN induction of the first operational aircraft for the EPAWSS modification may be delayed which may drive a delay to IOC.
6.	IF the electronic warfare kit supplier fails to deliver integrated software on-time with the full content and incorporate critical fixes to problem reports, THEN developmental test will be slowed and the program may be unable to complete the developmental test program on-time in Dec 2022 and start Initial Operational Test & Evaluation (IOT&E) on-time in April 2023, which may drive a delay to the Full Rate Production Decision Point and FOC.

Performance

Performance Characteristics					
SAR Baseline Development Estimate	**Current APB Production Objective/Threshold**		**Demonstrated Performance**	**Current Estimate**	**Deviation**
Sustainment (A_o and A_m)					
A_o = 99% A_m = 90%	A_o = 99% A_m = 90%	A_o = 97% A_m = 88%	A_o = 97% A_m = 90%	A_o = 99% A_m = 90%	

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

Requirements Source

Capabilities Development Document (September 2014)

Acquisition Budget Estimate

Total Acquisition Cost

		Development APB 11/02/2016	Production APB (Current) 02/23/2021		Budget Estimate PB 2023		
Category	**Base Year**	**Objective (BY16$)**	**Objective (BY16$)**	**Threshold (BY16$)**	**BY16$**	**TY$**	**Deviation**
RDT&E	2016	876.5	1,236.0	1,359.6	1,137.3	1,210.4	
Procurement	2016	3,375.0	3,314.1	3,645.5	2,814.5	3,505.3	
MILCON							
Acq. O&M							
Total		4,251.5	4,550.1	5,005.1	3,951.7	4,715.7	
PAUC	2016	10.294	12.535	13.382	13.217	15.771	
APUC	2016	8.172	9.180	10.120	9.476	11.802	

Budget Notes

- Development APB RDT&E includes development costs for the F-15 EPAWSS program of record and no fully-configured quantities.
- Development APB Procurement includes F-15 EPAWSS electronic warfare A-kits, B-kits, installation, and support equipment for 217 F-15E and 196 F-15C aircraft (413 total).
- Production APB RDT&E includes development costs for the F-15 EPAWSS program of record.
- Production APB Procurement includes F-15 EPAWSS electronic warfare A-kits, B-kits, installation, and support equipment for 217 F-15E aircraft and F-15 EPAWSS A-kits, B-kits, and AFCAA chosen factors for 144 F-15EX aircraft (361 total).
    - Note – 2ea F-15C models modified for developmental test (prior to AF force structure decision to remove F-15C models from the program baseline) will not be upgraded to the final F-15 EPAWSS production configuration.
- Budget Estimate PB 2023 RDT&E includes historical actuals, FY 2022 appropriated, FY 2023 approved budget, and FY 2024-FY 2027 forecasted development costs for the F-15 EPAWSS program of record (based on September 2021 F-15 EPAWSS Program Office Estimate (POE)).
- Budget Estimate PB 2023 Procurement includes historical actuals, FY 2022 appropriated, FY 2023 through FY 2027 approved budget, and FY 2028-complete forecasted procurement costs (based on September 2021 F-15 EPAWSS POE and April 2021 F-15EX POE).
- The Procurement values used in the PAUC and APUC calculation include F-15E EPAWSS Procurement, F-15EX EPAWSS A-kit costs, F-15EX EPAWSS B-kit costs and DP1 APB memo directed cost factors associated with the F-15E procurement quantity (217) and F-15EX EPAWSS procurement quantity (80).

Total End Item Quantity

Quantity Category	Development APB Quantities	Current APB Quantity	Current Estimate Quantity
Development	0	2	2
Procurement	413	361	297
Total	413	363	299

Quantity Notes

The current APB Procurement quantity of 361 includes 217 F-15E and 144 F-15EX aircraft. The two listed under Development are F-15C models that will not be upgraded to the final EPAWSS production configuration. Although the FY 2023 PB request reduces F-15EX procurement quantity from 144 to 80, the latest approved cost estimate includes the full quantity of 144. The Air Force Cost Assessment Agency (AFCAA) is in the process of building a Non-Advocate Cost Assessment (NACA) for the revised total program quantity accounting for the EX reduction from 144 to 80. The USAF Air Combat Command requirement is 144 F-15EXs.

Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Baseline Estimate (FY23 PB)	
1.	Per OSD guidance, this section identifies cost risk derived from the OSD (CAPE) ICE dated November 10, 2020. The ICE was developed to support MS-C and identified the following cost risks. Analysis of actual cost data for the EPAWSS EMD program indicates that, to date, the COVID-19 pandemic has had only minimal effects on the EPAWSS program's ability to execute development activities. However, as the program transitions to LRIP with increases in production quantities including F-15EX kits, and stands-up the modification line at the Boeing San Antonio facility, it is likely that the program will experience increases in costs and possible schedule delays associated with the ongoing pandemic and its effects on supply chains worldwide.
2.	BAE's ability to deliver B-kit hardware has been consistently behind schedule throughout the EMD contract. With the planned purchase of F-15EX EPAWSS systems, the need for initial spares, and the potential for retrofitting certain EPAWSS components, not all EPAWSS kits produced by BAE will be allocated to the EPAWSS program lot buys. If BAE is unable to increase its hardware production capacity to the level of demand required by the EPAWSS program and the F-15EX program, it is likely that EPAWSS installation throughput at San Antonio and Warner-Robins will be limited by availability of hardware, lengthening the time period in which those installations occur. This will cause the average cost per install to increase at each location.
3.	Detailed planning for the incorporation of the EPAWSS system installations into the existing F-15 PDM line at the government depot at Warner-Robins has begun. If EPAWSS incorporation into the F-15 periodic depot maintenance schedule is delayed or constrained relative to the EPAWSS program plan, more installs will be performed at the Boeing San Antonio facility, where the average cost per install is significantly higher.
Original Baseline Estimate (November 2016)	
1.	The EPAWSS Original Baseline was set by the MDA in a November 2, 2016 ADM approving Milestone B. The CAPE review of the cost estimates prepared for the F-15 EPAWSS Milestone B review dated September 26, 2016 noted the Air Force conducted an analysis of the program staffing levels over time compared to similar electronic warfare systems. CAPE concluded the staffing levels are reasonable and achievable. To assess the reasonableness of the SCP and the ICE, CAPE reviewed the technical and cost data collected from Boeing and BAE Systems in support of the Milestone B decision. F-15 Saudi Arabia DEWS, from which EPAWSS heavily leverages, shares 87% of the software, 76% of the firmware, and 81% of the hardware with EPAWSS. CAPE noted the DEWS leverage reduces the overall risk for development and procurement and provides a reasonable analogy for cost estimating.
Revised Original Estimate	
None	
Current Procurement Cost 2021	
There are no known risks with this program at this time.	

Unit Cost

Current Baseline Compared with Current Estimate

Category ($M)	Current APB BY16$ (February 23, 2021)	Current Estimate	% Change	NMC Breach
PAUC				
Cost	4450.1	3951.7		-
Quantity	363	299		-
Unit Cost	12.535	13.217	5.5%	
APUC				
Cost	3314.1	2814.5		-
Quantity	361	297	(17.8%)	-
Unit Cost	9.180	9.476	3.2%	

Unit Cost Notes

- Unit cost increases are driven by the F-15EX quantity reduction from 144 to 80 aircraft. The F-15 EPAWSS program is not experiencing cost growth. AFCAA is in the process of completing a non-advocate cost assessment which is planned to complete in Jun 2022.
- Current APB PAUC calculation = (F-15E & F-15C EPAWSS RDT&E + F-15E EPAWSS Procurement) + F-15EX A-Kit costs + F-15EX B-Kit costs + cost factors) / (F-15C quantity (2) + F-15E quantity (217) + F-15EX quantity (144) (363 total))
- Current APB APUC calculation = (F-15E EPAWSS procurement costs + F-15EX EPAWSS procurement costs + F-15EX A-Kit costs + F-15EX B-Kit costs + cost factors) / (F-15E procurement quantity (217) + F-15EX procurement quantity (144) (361 total))Current Estimate PAUC calculation = (F-15E & F-15C EPAWSS RDT&E + F-15E EPAWSS Procurement + F-15EX EPAWSS A-kit costs + F-15EX EPAWSS B-kit costs + cost factors) / (F-15C RDT&E quantity (2) + F-15E procurement quantity (217) + F-15EX EPAWSS procurement quantity (80) (299 total))
- Current Estimate APUC calculation = (F-15E EPAWSS procurement costs + F-15EX EPAWSS A-kit costs + F-15EX EPAWSS B-kit costs + cost factors) / (F-15E procurement quantity (217) + F-15EX EPAWSS procurement quantities (80) (297 total))

Original Baseline Compared with Current Estimate

Category ($M)	Original APB BY$16 (November 2, 2016)	Current Estimate	% Change	NMC Breach
PAUC				
Cost	4251.5	3951.7		-
Quantity	413	299		-
Unit Cost	10.294	13.217	28.4%	
APUC				
Cost	3375.0	2814.5		-
Quantity	413	297		-
Unit Cost	8.172	9.476	16.0%	

Unit Cost Notes

- Unit cost increases are driven by the F-15EX quantity reduction from 144 to 80 aircraft. The F-15 EPAWSS program is not experiencing cost growth. AFCAA is in the process of completing a non-advocate cost assessment which is planned to complete in Jun 2022.
- Original APB PAUC calculation = (F-15E & F-15C EPAWSS RDT&E + F-15E & F-15C EPAWSS Procurement) / (F-15C quantity (196) + F-15E quantity (217) (413 total))
- Original APB APUC calculation = (F-15E EPAWSS procurement costs + F-15C EPAWSS procurement costs) / (F-15C quantity (196) + F-15E quantity (217) (413 total))
- Current Estimate PAUC calculation = (F-15E & F-15C EPAWSS RDT&E + F-15E EPAWSS Procurement + F-15EX EPAWSS A-kit costs + F-15EX EPAWSS B-kit costs + cost factors) / (F-15C RDT&E quantity (2) + F-15E procurement quantity (217) + F-15EX EPAWSS procurement quantity (80) (299 total))
- Current Estimate APUC calculation = (F-15E EPAWSS procurement costs + F-15EX EPAWSS A-kit costs + F-15EX EPAWSS B-kit costs + cost factors) / (F-15E procurement quantity (217) + F-15EX EPAWSS procurement quantities (80) (297 total))

Actions Taken or Proposed to Control Future Cost Growth

As a result of cost overruns early in the development program, in FY 2020 the Air Force Service Acquisition Executive directed the program to restructure the development contract from cost-type to Firm Fixed Price (completed August 20, 2020).

Contracts

Contract Data ($TYM)		
Contract Number	FA8634-17-C-2650	
Contract Type	Firm Fixed Price (FFP)	
Effort Number	N/A	
Modification Number	P00067 (4/7/2022)	
Award Date	Initial Award was 11/3/2016	
Definitization Date	12/16/2016; converted to majority firm-fixed-price on 08/28/2020	
Order Number	N/A	
CAGE Code/CAGE Legal Name	76301/Boeing Company, The	
Contract Title	EPAWSS EMD	
Contract Address	AFLCMC Bldg 556, 2690 Loop Road West, WPAFB, OH 45433	
Contracts/Effort Price, Quantity, and Performance ($TYM)		
Initial Target Price	Current Target Price	
750.9	766.8	
Initial Ceiling Price	Current Ceiling Price	
N/A	N/A	
Contractor's EAC	PM's EAC	
750.9	766.8	
Initial Quantity:	Current Quantity	Delivered Quantity
8	8	8
BAC	BCWP	ACWP
N/A	N/A	N/A
BCWS	Cost Variance	Schedule Variance
N/A	N/A	N/A

Contract Notes

Initial Target Price reflects contract restructure P00043. EMD contract converted to mostly FFP on August 28, 2020. Cost and Schedule Variance reporting is not required for this FFP type contract.

Contract Data ($TYM)		
Contract Number	FA8634-21-C-2702	
Contract Type	Firm Fixed Price/Cost Plus Fixed Fee/Fixed Price Incentive Firm Target	
Effort Number	N/A	
Modification Number	P00016 (3/31/2022)	
Award Date	Initial award was 12/16/2020	
Definitization Date	09/28/2021	
Order Number	N/A	
CAGE Code/CAGE Legal Name	76301/Boeing Company, The	
Contract Title	EPAWSS LRIP	
Contract Address	AFLCMC Bldg 556, 2690 Loop Road West, WPAFB, OH 45433	
Contracts/Effort Price, Quantity, and Performance ($TYM)		
Initial Target Price	Current Target Price	
276.2	298.6	
Initial Ceiling Price	Current Ceiling Price	
276.2	298.6	
Contractor's EAC	PM's EAC	
164.1	164.1	
Initial Quantity	Current Quantity	Delivered Quantity
43	43	0
BAC	BCWP	ACWP
164.1	45.6	41.8
BCWS	Cost Variance	Schedule Variance
45.8	+3.8	-$0.2

Contract Notes

The LRIP contract is approximately 1/3 CPFF, 1/3 FFP, and 1/3 FPIF contract types. Note that Contractor and PM EAC do not include FFP CLINs since they are not reportable.

Cost Variance (based on EOM February 2022 data):

Boeing is required to provide only the Top 3 Cost and Schedule Variances.

LRIP Tooling Mod Line Standup Material (+$3,217K) Unfavorable – Current cost variance is driven by later than planned start of procurement of material required for tooling manufacturing. Impact – There is no impact anticipated due to the current period positive CV as the variance will normalize once the tooling fabrication/ procurement activity ramps up in later reporting periods. Corrective Action – none

LRIP BAE SEPM (+$2,729K) Unfavorable – BAE's cumulative positive cost variance is driven by underruns in level-of-effort activities due to position vacancies. Impact – There is no impact due to favorable variance to date. Corrective Action – none.

LRIP ICS BAE ICS (+920K) Unfavorable – BAE's cumulative positive cost variance is driven by underruns in level-of-effort activities. Impact – The significant underrun has resulted in a lower EAC for these purchase order line items. Corrective Action – Engineering Support to Operations and the Operations Support activities will ramp up in 2022 aligning with touch build timing.

Schedule Variance (based on EOM February 2022):

Boeing is only required to provide the Top 3 Cost and Schedule Variances.

LRIP Mod Line Standup Material (-$2,487K) Unfavorable – This control account has cumulative negative schedule variance due to the initial budget being spread based on a forecast prior to firm purchase contracts being established. The actual purchase contract part deliveries differed from this forecast creating a significant schedule variance. Impact – The support equipment procurement is driving a schedule risk to first aircraft induction. Corrective Action – Expediting orders with suppliers, borrowing from Boeing-internal sources, and temporarily leveraging USAF as-needed.

LRIP BAE DMSMS (-$1,037K) Unfavorable – BAE's cumulative negative schedule variance is primarily due to delayed delivery of parts and material from sub-tier suppliers. Impact – There is no impact as delayed material will not delay build timing to support contractual deliveries. Corrective Action – The procurement and engineering team is working closely with suppliers and actively driving to improve material lead-time dates. In parallel, engineering is examining alternate replacements with better lead-time to support BAE's internal needs.

LRIP BAE ICS (-$659K) Unfavorable – BAE's cumulative negative schedule variance is driven by delays in finalizing environmental stress screening test stations. Impact – Delayed completion puts initial kit production schedule at-risk. Corrective Action – The engineering team is investigating reuse opportunities within existing designs to streamline the remaining efforts.

Technologies and Systems Engineering

Significant Technical Risks

Significant Technical Risks	
Current Estimate (FY23 PB)	
1.	IF the electronic warfare kit supplier discovers significant hardware issues during remaining hardware qualification testing, THEN retrofits may be required in the production program, driving cost increases.

Deliveries and Expenditures

Deliveries

Deliveries				
Delivered to Date	**Planned to Date**	**Actual to Date**	**Total Quantity**	**Percent Delivered**
Development	2	2	2	100.0%
Production	0	0	297	0.00%
Total Program Quantity Delivered	2	2	299	0.55%

Expended and Appropriated (TY $M) (FY23 PB)

Total Acquisition Cost: 4361.18
Expended to Date: 953.60
Percent Expended: 21.87%
Total Funding Years: 22
Years Appropriated: 11
Percent Years Appropriated: 50%
Appropriated to Date: 1308.1
Percent Appropriated: 29.99%

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	11/2/2016	12/1/2020
Approved Quantity	78	43
Reference	Milestone B ADM	Milestone C ADM
Start Year	2019	2020
End Year	2023	2026

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 in order to meet IOC requirement of 24 aircraft while providing spares and continued production until the FRP Decision.

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)	1312.8	1444.1	1154.3	1940.1	

Current APB based on F-15E EPAWSS (Quantity 217) and F-15EX (Quantity 144). Current estimate based on F-15E EPAWSS (Quantity 217) and F-15 EX (Quantity 80) – Calculated by apportioning POE estimate for 144 on a per unit basis to 80 units (assumes lifecycle remains unchanged). Longer F-15EX lifecycle drives greater growth between BY and TY.

O&S Cost Breakdown

Category (BY$ Million)	F-15 EPAWSS
Unit-Level Manpower	0
Unit Operations	0
Maintenance	733.07
Sustaining Support	27.98
Continued System Improvements	58.54
Other (F-15EX)	334.72
Total O&S	1154.3