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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	112,535.231	9.132	8.263	5.320	-	5.320	0.000	0.000	0.000	0.000	0.000	112,557.946
0652: AV-8B	112,535.231	9.132	8.263	5.320	-	5.320	0.000	0.000	0.000	0.000	0.000	112,557.946

A. Mission Description and Budget Item Justification

The program provides for AV-8B Design, Development, Integration, and Test of various platform improvements such as: Engine Life Management Program (ELMP), Escape Systems, Joint Mission Planning System (JMPS), and Block upgrades to various mission systems and software Operational Flight Programs (OFPs) to include JMPS integration, avionics and communications systems, navigation equipment, weapons carriage and countermeasures, and studies and analyses of future capability expansion and unique flight testing. The program also provides for addressing obsolescence and readiness of avionics structural, hydraulic, electrical, environmental and mechanical systems to include engineering activities for development and design to support aircraft safety flight clearances, concept explorations, responses to evolving threats and developments to support Program Objective Memorandum.

The program's Evolutionary Acquisition Strategy includes Design, Development, Integration, and Test activities under the consolidated effort of Block Developments. Continued AV-8B combat relevance and ability to respond to evolving and emergent threats through end of service is critical to the Marine Air-Ground Task Force's ability to generate aviation combat power throughout the transition to F-35B. J-series, K-series, Tactical Targeting Network Technology, and other emerging datalink technology messages, as well as compliance with crypto modernization requirements and ability to use GPS-modernized weapons, are required to support current and future mission threats. Linked performance on par with current tactical platforms as well as design to communicate with F-35 is required for the AV-8B to remain tactically relevant to transition. H7.2, H7.3 and H7.4 will continue to build upon the evolutionary acquisition strategy for OFPs and will improve pilot situational awareness, make pilot interface and weapon selection, and Link16 functionality improvements via OFP and Mission Planning updates, and will integrate required Display Computer processing improvements to enable these functionalities. OFP and integration improvements, to include continued use of current weapons as they are upgraded to modernized GPS capability, is vital to the Harrier's continued combat relevance to the Marine Expeditionary Unit and Global Response Force Combatant Commanders.

AV-8B funding also supports peculiar flight test requirements to include weapons integration/carriage and avionics, software/firmware upgrades, and avionics hardware component redesign activity. The program also provides for the AV-8B air vehicle's sustained mission availability, and safe and reliable operational readiness until end of service. Sustainment of the aircraft structure, subsystems and software requires component and system analyses, technical planning, identification, prioritization and diagnosis of emergent problems and the allocation of resources for the development, testing, and flight clearance of engineering solutions in the areas of flight, crew safety and escape systems and structural integrity, obsolescence, systems reliability and maintainability, inventory preservation, alternative mission development or other emergent material or equipment conditions affecting AV-8B systems readiness. Activities include research/analysis for system safety deficiency corrections, fuel system safety improvements, structural analyses, monitoring and integrity analysis, component compatibility, component and materials obsolescence analyses and mitigation development, explorations for aging equipment, reliability improvement analyses and design developments. The ELMP is a comprehensive plan to increase and maintain safety of flight and operational readiness of the AV-8B F402-RR-408 Engine and accessories. The program will accomplish this mission by conducting Engineering Project Description investigations to develop engineering solutions that address emergent safety, obsolescence, foreign object debris detection and prevention, fatigue life and maintenance issues.

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B. Program Change Summary (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	9.205	8.263	8.789	-	8.789
Current President's Budget	9.132	8.263	5.320	-	5.320
Total Adjustments	-0.073	0.000	-3.469	-	-3.469
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.073	0.000			
• Program Adjustments	0.000	0.000	-3.467	-	-3.467
• Rate/Misc Adjustments	0.000	0.000	-0.002	-	-0.002

Change Summary Explanation

The decrease in FY2025 funding reflects reduction in RDT&E requirements for completion and fielding of the final OFP.

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy										Date: March 2024		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev				Project (Number/Name) 0652 / AV-8B			
COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
0652: AV-8B	112,535.231	9.132	8.263	5.320	-	5.320	0.000	0.000	0.000	0.000	0.000	112,557.946
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program provides for AV-8B Design, Development, Integration and Test of the following improvements: Engine Life Management Program (ELMP), Operational Flight Programs (OFPs) and Avionics/Weapons Integration, Escape System, readiness and obsolescence management. The ELMP is a comprehensive plan to increase safety of flight and operational readiness of the AV-8B F402-RR-408 Engine and Gas Turbine Starter (GTS), as well as other critical engine components. The Program Office will accomplish this mission through the Component Improvement Program (CIP), which entails Engineering Project Description investigations to derive safety and reliability improvements to the engine and engine components. H7.2, H7.3, and H7.4 will continue to build upon the evolutionary acquisition strategy for OFPs and will improve pilot situational awareness, make pilot interface and weapon selection, and Link16 functionality improvements via OFP and Mission Planning updates, and will integrate required Display Computer processing improvements to enable these functionalities. OFP and integration improvements, to include continued use of current weapons as they are upgraded to modernized GPS capability, and use of components with modern crypto is vital to the Harrier's continued combat relevance to the Marine Expeditionary Unit and Global Response Force Combatant Commanders. Other efforts include compliance with crypto modernization requirements, testing compatibility with GPS-modernized weapons, peculiar integration and flight test requirements such as weapons and countermeasures OFP updates, weapons integration and testing, sensors, and countermeasures integration and stores expansion to include APKWS, radio/communication systems upgrades, AIM-9X, ALE-43, standoff weapons such as JSOW, and unique flight test, study and component redesign efforts of other avionics, sensors, structural components, aircraft subsystems, weapons systems, or emergent tactical requirements as they arise. Efforts also include engineering activities for development, design and test to support aircraft safety, flight clearance and concept exploration for resolution of emergent safety, service life, escape systems, compatibility, obsolescence, and readiness issues as well as response to fleet urgent operational requirements.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Title: Operational Flight Program (OFP) and Aircraft/Avionics/Subsystem/Weapons Systems Development and Integration	7.469	7.463	5.320	0.000	5.320
Articles:	-	-	-	-	-
Description: Develop, integrate, and test aircraft OFP updates, weapons and countermeasures systems OFP updates, mission planning updates, Litening Pod software updates/capability expansions, support aircraft avionics development efforts, integrate and test unique weapons systems, sensors, and countermeasures such as AIM-120C, AIM-9X variants, APKWS, Crypto Modernization activities, radio/communication systems upgrades, survivability upgrades, ALE-43, standoff weapons such as JSOW and other weapons/avionics and sensor systems, avionics component redesign efforts and emergent tactical requirements as they arise. Perform stores expansion testing, crypto modernization compatibility testing/integration, GPS-modernization compatibility testing/integration and conduct Digital Interoperability (to include Link 16) integration, and test efforts. Develop					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>solutions to obsolescence concerns to improve safety, readiness, structural integrity and systems reliability of the AV-8B aircraft.</p> <p>FY 2024 Plans: Extension of AV-8B end of service date to 2028 requires continued testing and integration efforts, as well as studies for airframe, avionics, and subsystem engineering efforts to improve safety and reliability, and mitigate obsolescence issues. Funds will provide for efforts on the follow-on OFP software upgrade (H7.3 and beyond), efforts required to respond to evolving and emerging threats, peculiar flight test requirements to include various required weapons/sensors/countermeasures/crypto modernization/GPS modernization compatibility testing/stores expansion integration and testing such weapons/stores updates, ALE-43, associated radio and communication system upgrades and other weapons/avionics systems as they arise. Additionally, funds will provide for continued research and innovation studies for airframe and subsystem safety and reliability improvements and Engineering Change Proposals (ECPs). The program will continue to address known, predicted, and emergent obsolescence issues. Systems engineering efforts will support ongoing and emergent analysis and design/development/test efforts required to address systems safety, structural integrity, obsolescence, performance and readiness issues, including efforts required to respond to evolving and emergent threats, mission systems, communication systems, navigation equipment, weapons carriage and countermeasures, structural, hydraulic, electrical, environmental, and mechanical systems.</p> <p>FY 2025 Base Plans: Extension of AV-8B end of service date to 2028 requires continued testing and integration efforts, as well as studies for airframe, avionics, and subsystem engineering efforts to improve safety and reliability, and mitigate obsolescence issues. Funds will provide for efforts on the follow-on OFP software upgrade (H7.3/H7.4), efforts required to respond to evolving and emerging threats, peculiar flight test requirements to include various required weapons/ sensors/countermeasures/crypto modernization/GPS modernization compatibility testing/ stores expansion integration and testing such weapons/stores updates, associated radio and communication system upgrades and other weapons/avionics systems as they arise. The program will continue to address known, predicted, and emergent obsolescence issues. Systems engineering efforts will support ongoing and emergent analysis and design/development/test efforts required to address systems safety, structural integrity, obsolescence, performance and readiness issues, including efforts required to respond to evolving and emergent threats, mission systems, communication systems, navigation equipment, weapons carriage and countermeasures,</p>					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
structural, hydraulic, electrical, environmental, and mechanical systems. FY 2025 OCO Plans: N/A FY 2024 to FY 2025 Increase/Decrease Statement: Decrease from FY24 to FY25 reflects reduced effort as OFP upgrade begins fielding.					
Title: F402-RR-408 Engine Safety and Reliability Enhancements Articles: Description: Improve Safety and Reliability of the F402-RR-408 Engine and accessories for the AV-8B Harrier. FY 2024 Plans: The engineering CIP will conduct engineering investigations to develop ECPs for improvements and design solutions to correct deficiencies resulting from safety, obsolescence and structural fatigue for the engine and engine accessories, to maintain readiness and to meet mission requirements. Conduct research and innovation studies for FOD mitigation and other operational environment changes to improve engine safety and reliability. FY 2025 Base Plans: No remaining engine modernization effort in FY25. FY 2025 OCO Plans: N/A FY 2024 to FY 2025 Increase/Decrease Statement: Decrease from FY24 to FY25 reflects transition of CIP efforts to OMN funding.	1.663 -	0.800 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	9.132	8.263	5.320	0.000	5.320

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
• APN/0514: AV-8 Series	26.532	22.829	3.584	-	3.584	2.394	2.183	0.489	0.000	0.000	1,578.630

Remarks

D. Acquisition Strategy
Engineering efforts focused on obsolescence mitigation and readiness improvements ensure the maximum reliability and readiness levels for the AV-8B Type/ Model/Series by maintaining post production engineering and logistic support with the Original Equipment Manufacturers (OEMs). The program tracks readiness

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<p>degraders, identifies and addresses obsolescence for all aircraft and avionics systems and subsystems, and identifies and addresses emerging in-service material developments related to ease of maintenance, safety, airframe life management and improved performance. The multi-disciplined team of program management, engineering, logistics, and financial personnel develop Engineering Change Proposals (ECPs), Rapid Action Minor Engineering Changes, Interim Rapid Action Changes to publications, trainer and support equipment modifications necessary to maintain aircraft reliability, readiness, and safety. The program also supports the constant improvement and analysis of fleet Fatigue Life Expended data to maximize aircraft structural life and to support the NAVAIR annual Structural Appraisal of Fatigue Effects report required by the Office of the Chief of Naval Operations (OPNAV), and structural fatigue life assessments to assure continued safe operation of the aircraft through the end of service date. Funding for the ELMP will be placed on a cost-type contract to Rolls-Royce to address safety of flight issues, top readiness degraders, engine removal and mission failure drivers in order to improve Fleet readiness and reduce cost of ownership of the F402-RR-408 and accessories. It is also developed to assess life management program issues and design fixes for any service revealed deficiencies. The program's Evolutionary Acquisition Strategy includes Design, Development, Integration, and Test activity under the consolidated effort of Block Developments: H2.0, H4.0, H5.0, H6.0, H6.1., H6.2, H7.0, and following OFPs (H7.3/ H7.4 and beyond). Follow on OFPs will address software improvements to improve usability of the aircraft software. Peculiar flight test efforts to include testing updates to weapons, subsystems, avionics, survivability and sensor integration such as AIM-120, AIM-9X, APKWS, ALE-43, ALR-67, standoff weapons such as JSOW, crypto modernization compliance integration/testing, GPS modernization compatibility, radio/communication systems upgrades and other avionics/weapons and sensor systems and emergent tactical requirements and avionics component redesign actions as they arise.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev	Project (Number/Name) 0652 / AV-8B
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Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Primary Hardware Development - ELMP	C/CPFF	Rolls-Royce PLC : Bristol, GB	41.552	1.113	Dec 2022	0.800	Dec 2023	0.000		-		0.000	0.000	43.465	43.465
Systems Engineering - OFP	WR	NAWCWD : China Lake, CA	4.280	0.750	Nov 2022	0.789	Nov 2023	0.500	Nov 2024	-		0.500	0.000	6.319	6.319
Systems Engineering - OFP	WR	NAWCAD : Patuxent River, MD	13.705	0.112	Nov 2022	0.000		0.000		-		0.000	0.000	13.817	13.817
Systems Engineering - OFP	WR	NAWCWD : Point Mugu	0.053	0.053	Nov 2022	0.054	Nov 2023	0.000		-		0.000	0.000	0.160	0.160
Systems Engineering - OFP	C/CPFF	Boeing : St. Louis, MO	0.000	0.100	Apr 2023	0.100	Apr 2024	0.000		-		0.000	0.000	0.200	0.200
Prior year cost no longer funded in the FYDP	Various	Various : Various	112,174.000	0.000		0.000		0.000		-		0.000	0.000	112,174.000	-
Subtotal			112,233.590	2.128		1.743		0.500		-		0.500	0.000	112,237.961	N/A

Remarks

Line 1: Decrease from FY24 to FY25 due to transition of the Component Improvement Program (CIP) effort to OMN.
 Line 2: Decrease from FY24 to FY25 due to decrease in development of software updates.
 Line 4: Decrease from FY24 to FY25 due to completion of JMPS updates.
 Line 5: Decrease from FY24 to FY25 due to completion of avionics component redesign efforts.

Support (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Studies & Analysis - OFP	C/CPFF	Boeing : St Louis, MO	8.857	0.102	Mar 2023	0.104	Mar 2024	0.000		-		0.000	0.000	9.063	9.063
Prior year cost no longer funded in the FYDP	Various	Various : Various	76.050	0.000		0.000		0.000		-		0.000	0.000	76.050	-
Subtotal			84.907	0.102		0.104		0.000		-		0.000	0.000	85.113	N/A

Remarks

Line 1: Decrease from FY24 to FY25 due to completion of studies and analysis efforts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

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Test and Evaluation (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test & Evaluation (DT&E)	WR	NAWCWD : China Lake, CA	43.782	4.626	Dec 2022	4.668	Dec 2023	4.521	Dec 2024	-		4.521	0.000	57.597	57.597
Operational Test & Evaluation (OT&E)	WR	COMOPTEVFOR : Norfolk, VA	26.379	0.287	Jan 2023	0.293	Jan 2024	0.299	Jan 2025	-		0.299	0.000	27.258	27.258
Operational Test & Evaluation (OT&E)	C/CPFF	Delex Systems : Herndon, VA	0.000	0.063	Jan 2023	0.052	Jan 2024	0.000		-		0.000	0.000	0.115	0.115
Prior Year Developmental Test & Evaluation Not Funded FYDP (PYDT&E)	Various	Various : Various	69.796	0.000		0.000		0.000		-		0.000	0.000	69.796	-
Subtotal			139.957	4.976		5.013		4.820		-		4.820	0.000	154.766	N/A

Remarks
 Line 1: Decrease from FY24 to FY25 due to reduced cost of test flights.
 Line 3: Decrease from FY24 to FY25 due to reduced requirement for contract support of test flights.

Management Services (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Engineering Support - OFP	WR	NAWCAD : Patuxent River, MD	11.394	1.876	Nov 2022	1.353	Nov 2023	0.000		-		0.000	0.000	14.623	14.623
Travel	WR	Various : Various	2.309	0.050	Oct 2022	0.050	Oct 2023	0.000		-		0.000	0.000	2.409	2.409
Prior year cost no longer funded in the FYDP	Various	Various : Various	63.074	0.000		0.000		0.000		-		0.000	0.000	63.074	-
Subtotal			76.777	1.926		1.403		0.000		-		0.000	0.000	80.106	N/A

Remarks
 Line 1: Decrease from FY24 to FY25 due to completion and fielding of H7.2 OFP upgrade.
 Line 2: Decrease from FY24 to FY25 due to transition of travel to OMN funding.

	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		112,535.231	9.132	8.263	5.320	-	5.320	0.000	112,557.946	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev	Project (Number/Name) 0652 / AV-8B
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AV-8B AIRCRAFT - ENGINE DEV	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Acquisition Milestones				H7.2 IOC ▲				H7.3 IOC ▲				H7.4 IOC ▲																
Systems Development																												
Hardware Development	Obsolescence Mitigation																											
Hardware Development																												
Software Development	Fatigue Life Expended																											
Software Development																												
Software Development																												
Software Development	H7.3 Dev																											
Software Development	H7.4 Development																											
Test & Evaluation																												
Technical Evaluation	H7.2 IT																											
	H7.3 DT/OT (IT)																											
	H7.4 DT/OT (IT)																											
Production Milestones																												
Contract Awards: Engine Life Management Program (ELMP)	■				■																							
Deliveries																												
	H7.2 SW Del ▼				H7.3 SW Del ▼				H7.4 SW Del ▼																			

- ▲ Major Milestones
- Award
- ▼ One-time Event

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy		Date: March 2024
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AV-8B AIRCRAFT - ENGINE DEV				
Acquisition Milestones: H7.2 IOC	4	2023	4	2023
Acquisition Milestones: H7.3 IOC	4	2024	4	2024
Acquisition Milestones: H7.4 IOC	4	2025	4	2025
Systems Development: Hardware Development: Obsolescence Mitigation Development	1	2023	4	2025
Systems Development: Software Development: H7.3 Development	1	2023	1	2024
Systems Development: Software Development: H7.4 Development	4	2023	1	2025
Systems Development: Software Development: Fatigue Life Expended Development	1	2023	4	2025
Test & Evaluation: Technical Evaluation: H7.2 DT/OT (IT)	1	2023	3	2023
Test & Evaluation: Technical Evaluation: H7.3 DT/OT (IT)	2	2023	4	2024
Test & Evaluation: Technical Evaluation: H7.4 DT/OT (IT)	2	2024	4	2025
Production Milestones: Contract Awards: Engine Life Management Program (ELMP): ELMP Contract Award FY23	1	2023	1	2023
Production Milestones: Contract Awards: Engine Life Management Program (ELMP): ELMP Contract Award FY24	1	2024	1	2024
Deliveries: H7.2 S/W Delivery	4	2023	4	2023
Deliveries: H7.3 S/W Delivery	4	2024	4	2024
Deliveries: H7.4 S/W Delivery	4	2025	4	2025