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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy **Date:** March 2019

Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	460.370	0.000	46.363	27.441	-	27.441	23.646	16.772	17.050	17.384	Continuing	Continuing
0652: AV-8B	460.370	0.000	46.363	27.441	-	27.441	23.646	16.772	17.050	17.384	Continuing	Continuing

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, studies and analyses of future capability expansion and unique flight testing, and the Obsolescence Replacement (OR)/Readiness Management Plan (RMP) including structural, hydraulic, electrical, environmental, and mechanical systems. OR/RMP represents all 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: H6.2 and follow-on block upgrades, to include a H7.0 block upgrade that will be required to implement full Link 16 capability, provide weapon improvements and integrate AIM-9X and Joint Standoff Weapon (JSOW). An H6.2 update, included the Common Avionics Program, provided AV-8B a self-contained Global Positioning System navigation capability that is required to access preferred airspaces, and included a Litening OFP V3, and initial Link 16 Precise Participant Location and Identification capability, which provided interoperability, digital combat identification and increased situational awareness on the battlefield. Link 16 is a Top 10 item in the Operational Advisory and Systems Safety Groups. The H7.0 OFP will fully implement the Harrier Link 16 integration, which will provide information sharing capabilities and integration of an increased number of Link 16 J-series messages and the ability to act on shared target track information. Connection to the Link 16 network is vital to the AV-8B's ability to operate within some Command and Control situations and Operational Plans, as designed today, as well as provide a tactical capability for the more effective and safe prosecution of both airborne and ground targets. 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 are required to support current and future mission threads. 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. H7.0 will also include the integration and test of weapons and sensors such as, but not limited to, AIM-9X, JSOW and Litening OFP V4, and will integrate required Display Computer processing improvements to enable H7.0 functionality. Integration of these weapons is vital to the Harrier's continued combat relevance to the Marine Expeditionary Unit and Global Response Force Combatant Commanders particularly as obsolete AIM-9M inventory dwindles.

Additionally, software integration and stores expansion testing will be required for systems to include a Helmet Mounted Cueing System (HMCS), Unique Weapons, survivability and Countermeasures, Advanced Precision Kill Weapons System (APKWS), AIM-9X, ALE-43, survivability upgrades, standoff weapons such as JSOW, Joint Air-to-Ground Missile (JAGM) and AIM-120 unique platform flight test which will be required to utilize updated AIM-120C variants on the AV-8B as well as test of emergent tactical requirements. AV-8B funding also supports peculiar flight test requirements to include weapons integration/carriage and avionics and software/firmware upgrades. Studies and analyses will be conducted on systems such as survivability systems, HMCS and Beyond Line of Sight (BLOS) to assess feasibility of integrating on the AV-8B. The ELMP is a comprehensive plan to increase and maintain safety of flight and operational readiness of the AV-8B F402-RR-408 Engine

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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 / <i>AV-8B Aircraft - Engine Dev</i>
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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. The OR/RMP is required to ensure the AV-8B air vehicle's sustained mission availability, and safe and reliable operational readiness until end of service. Air vehicle sustainment 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.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	46.363	38.735	-	38.735
Current President's Budget	0.000	46.363	27.441	-	27.441
Total Adjustments	0.000	0.000	-11.294	-	-11.294
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-11.305	-	-11.305
• Rate/Misc Adjustments	0.000	0.000	0.011	-	0.011

Change Summary Explanation

Funds were realigned in FY 2019 from PE 0604214N to PE 0604214M.

The FY 2020 funding request was reduced by \$4.110 million to account for the availability of prior year execution balances.

FY 2020 funding decrease due to evolution of H7.0 OFP into the test phase and preparing for FY 2021 fielding. AIM-9X test asset procurement is complete and Original Equipment Manufacturer (OEM) involvement decreases as peculiar test flights are completed. Studies and analyses decrease as future efforts studies complete and inform future integration plans and decisions to ensure future capabilities such as HMCS, BLOS and survivability upgrades are feasible and integration approach is analyzed. Decrease in FY 2020 due to completion of the planning phase of the Fatigue Destructive Teardown Assessment.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0652: AV-8B	460.370	0.000	46.363	27.441	-	27.441	23.646	16.772	17.050	17.384	Continuing	Continuing
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, and Readiness Management Plan (RMP). 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. H6.2 provided Global Positioning System navigation capabilities, a Litening common OFP update and initial Link 16 capability to include use of the APX-123, initial Mode 5 capability, as well as software updates and cryptographic modernization. H7.0 OFP will integrate full Harrier Link 16 capability, provide software updates, integrate AIM-9X, a Litening Common OFP update, provide Advanced Precision Kill Weapons System (APKWS) integration improvements, Joint Standoff Weapon (JSOW) integration, and common avionics ADS-B (out), Mode 5, and Mode S Identification Friend or Foe capabilities as well as integrate required Radar Display Computer processing improvements to enable H7.0 functionality. Other efforts include peculiar integration and flight test requirements such as AIM-120C flight test, as AIM-120A/B will become obsolete, unique weapons, sensors, and countermeasures integration and stores expansion to include APKWS, Helmet Mounted Cueing System (HMCS), Beyond-Line-of-Sight (BLOS) communications, AIM-9X, ALE-43, standoff weapons such as JSOW, and unique flight test and study efforts of other avionics, sensors, or weapons systems, or emergent tactical requirements, as they arise. The program is working closely with the Common Avionics Program and the Allies (Spain and Italy) on all efforts. RMP represents all 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Development of RMP Engineering Change Proposals	0.000	8.043	4.693	0.000	4.693
Articles:	-	-	-	-	-
Description: Develop obsolescence solutions to improve safety, structural integrity, and systems reliability of the AV-8B aircraft.					
FY 2019 Plans: Extension of AV-8B End of Service date to 2028 requires continued obsolescence mitigation efforts to maintain aircraft readiness. The program will continue to address known, predicted, and emergent obsolescence equipment issues, continuing efforts from prior years. Continue fatigue life tracking analyses and algorithm update development. Continue Fuselage Fatigue Life Assessment and planning for a Fatigue Destructive Teardown Assessment to assure continued safe operation of the aircraft through the end of service date.					

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Appropriation/Budget Activity 1319 / 5		R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev		Project (Number/Name) 0652 / AV-8B		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Systems engineering will support ongoing and emergent analysis and design/ development/test efforts required to identify Engineering Change Proposal (ECP) requirements to correct systems safety, structural integrity, compatibility, and readiness issues including efforts required to respond to evolving and emergent threats, mission systems, communications systems, navigation equipment, weapons carriage and countermeasures, structural, hydraulic, electrical, environmental, and mechanical systems.						
FY 2020 Base Plans: Extension of AV-8B End of Service date to 2028 requires continued obsolescence mitigation efforts to maintain aircraft readiness. The program will continue to address known, predicted, and emergent obsolescence equipment issues, continuing efforts from prior years. Continue fatigue life tracking analyses and algorithm update development. Continue Fuselage Fatigue Life Assessment to assure continued safe operation of the aircraft through the end of service date. Systems engineering will support ongoing and emergent analysis and design/ development/test efforts required to identify ECP requirements to correct systems safety, structural integrity, compatibility, and readiness issues including efforts required to respond to evolving and emergent threats, mission systems, communications systems, navigation equipment, weapons carriage and countermeasures, structural, hydraulic, electrical, environmental, and mechanical systems.						
FY 2020 OCO Plans: N/A						
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to completion of the planning for Fatigue Destructive Teardown Assessment.						
Title: Operational Flight Program (OFP) and Avionics Weapons Systems Development and Integration		0.000	32.388	17.362	0.000	17.362
Articles:		-	-	-	-	-
Description: Develop, integrate, and test aircraft 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, HMCS, APKWS, BLOS Communications, Crypto Modernization activities, survivability upgrades, ALE-43, standoff weapons such as JSOW and other weapons/avionics and sensor systems and emergent tactical requirements as they arise, perform stores expansion testing, and conduct Digital Interoperability (to include Link 16) development, integration, and test efforts. Evaluate future capability expansions via studies and analyses.						
FY 2019 Plans: Funds provide for future capability expansion studies and analyses, efforts required to respond to evolving and emerging threats, peculiar flight test requirements to include various required weapons/sensors/						

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Appropriation/Budget Activity 1319 / 5		R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev		Project (Number/Name) 0652 / AV-8B		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
countermeasures/stores expansion integration and testing such as AIM-120, AIM-9X, ALE-43, JSOW, and other weapons/avionics systems as they arise. Funds will continue H7.0 OFP/Link 16/ AIM-9X/JSOW software development and integration and begin test efforts.						
FY 2020 Base Plans: Funds will provide for future capability expansion studies and analyses efforts to include HMCS, BLOS and survivability upgrades, future OFPs such as H8.0, efforts required to respond to evolving and emerging threats, peculiar flight test requirements to include various required weapons/sensors/countermeasures/crypto modernization/stores expansion integration and testing such as AIM-9X, ALE-43, JSOW, and other weapons/ avionics systems as they arise. Funds will also provide for continuation of H7.0 OFP/Link 16/ AIM-9X software integration and test efforts preparing for FY 2021 release.						
FY 2020 OCO Plans: N/A						
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease from FY 2019 to FY 2020 is due to evolution of H7.0 OFP software into the test phase, preparing for FY 2021 fielding. AIM-9X test asset procurement is complete and OEM involvement decreases as peculiar test flights are completed. Studies and analyses decrease as future efforts studies complete and inform future integration plans and decisions to ensure future capabilities such as HMCS, BLOS and survivability upgrades are feasible and integration approach is analyzed.						
Title: F402-RR-408 Engine Safety and Reliability Enhancements		0.000	5.932	5.386	0.000	5.386
Articles:		-	-	-	-	-
Description: Improve Safety and Reliability of the F402-RR-408 Engine and accessories for the AV-8B Harrier.						
FY 2019 Plans: The engineering CIP will conduct engineering investigations to develop ECPs for improvements and design solutions to correct deficiencies resulting from safety, obsolescence, FOD detection and prevention and structural fatigue for the engine and engine accessories, to maintain readiness and to meet mission requirements.						
FY 2020 Base Plans: The engineering CIP will conduct engineering investigations to develop ECPs for improvements and design solutions to correct deficiencies resulting from safety, obsolescence, FOD detection and prevention						

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and structural fatigue for the engine and engine accessories, to maintain readiness and to meet mission requirements. FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease from FY 2019 to FY 2020 is due to completion of redesign of the gas turbine starter bearings, an eighteen month effort beginning in FY 2018 and completing in FY 2020.												
Accomplishments/Planned Programs Subtotals								0.000	46.363	27.441	0.000	27.441
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• APN/0514: AV-8 Series	41.762	58.577	39.472	-	39.472	33.774	32.273	38.445	39.208	125.055	1,783.276	
Remarks												
D. Acquisition Strategy												
<p>The Obsolescence Replacement (OR)/RMP ensures the maximum readiness levels for the AV-8B Type/Model/Series by maintaining post production engineering and logistic support with the Original Equipment Manufacturers (OEMs). RMP tracks readiness degraders, identifies and addresses obsolescence for non-avionics systems, 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 and safety. The RMP additionally 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 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. The H6.2 upgrade, accomplished in conjunction with the Common Avionics Program, provided a Global Positioning System Navigation capability for AV-8B, LITENING operational flight program update, initial Link 16 capability to include the use of APX-123 and initial Mode 5 functionality. The H7.0 OFP will provide the AV-8B integration of additional required Link 16 J-series messages, integration of AIM-9X and JSOW weapons, and APKWS integration updates. H7.0 will also be accomplished in conjunction with the Common Avionics Program and will integrate ADS-B (out), Mode 5, and Mode S capabilities. Peculiar flight test efforts to include weapons, avionics, survivability, and sensor integration such as AIM-120, AIM-9X, APKWS, ALE-43, ALR-67, HMCS, standoff weapons such as JSOW, other avionics/</p>												

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<p>weapons and sensor systems and emergent tactical requirements as they arise. Studies and analyses will be accomplished to assess future capability expansion feasibility and integration concepts to include weapons expansion, BLOS communications, survivability upgrades, and other potential avionics, weapons, or software capabilities as they arise.</p> <p>E. Performance Metrics</p> <p>Achieve Engine Life Management Program Rolls-Royce Component Improvement Program cost plus fixed fee, follow-on, contract award 1st Quarter FY 2020.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev				Project (Number/Name) 0652 / AV-8B					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development - ELMP	C/CPFF	Rolls-Royce PLC : Bristol, GB	36.187	0.000		1.963	Dec 2018	1.976	Dec 2019	-		1.976	6.018	46.144	46.144
Primary Hardware Development - ELMP	C/FFP	ONTIC (Goodrich) PS : Pitstone, GB	6.881	0.000		1.445	Mar 2019	0.820	Mar 2020	-		0.820	1.380	10.526	10.526
Primary Hardware Development - OFP	WR	NAWCWD : China Lake, CA	71.061	0.000		12.492	Dec 2018	8.367	Nov 2019	-		8.367	Continuing	Continuing	Continuing
Primary Hardware Development - OFP	C/FFP	Boeing : St. Louis, MO	10.777	0.000		3.100	Dec 2018	1.691	Dec 2019	-		1.691	3.319	18.887	18.887
Primary Hardware Development - OFP	C/CPFF	Raytheon : Waltham, MA	4.450	0.000		2.802	Dec 2018	0.000		-		0.000	4.596	11.848	11.848
Systems Engineering - RMP	C/FFP	Boeing : St. Louis, MO	36.570	0.000		1.466	Jan 2019	1.038	Jan 2020	-		1.038	14.326	53.400	53.400
Systems Engineering - RMP	WR	NAWCWD : China Lake, CA	3.755	0.000		0.096	Nov 2018	0.098	Nov 2019	-		0.098	Continuing	Continuing	Continuing
Systems Engineering - RMP	WR	NAWCAD : Patuxent River, MD	9.238	0.000		1.503	Nov 2018	1.472	Nov 2019	-		1.472	Continuing	Continuing	Continuing
Systems Engineering - OFP	WR	NAWCWD : China Lake, CA	0.837	0.000		0.502	Nov 2018	0.500	Nov 2019	-		0.500	Continuing	Continuing	Continuing
Systems Engineering - OFP	TBD	TBD : TBD	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior year cost no longer funded in the FYDP	Various	Various : Various	44.016	0.000		0.000		0.000		-		0.000	0.000	44.016	-
Subtotal			223.772	0.000		25.369		15.962		-		15.962	Continuing	Continuing	N/A
Remarks															
Line 2: Decrease from FY19 to FY20 due to ONTIC completion of redesign of the gas turbine starter bearings.															
Line 4: Decrease from FY19 to FY20 due to less OEM involvement as development completes and AIM-9X moves into developmental test.															
Line 5: Decrease from FY19 to FY20 due to integration analysis effort now expected to complete in FY19 as AIM-9X planning has matured.															
Line 6: Decrease from FY19 to FY20 due to decreased requirement for airframe structural and subcomponent improvement studies; safety and obsolescence studies will continue.															

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev				Project (Number/Name) 0652 / AV-8B					
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support - OFP	WR	FST Cherry Pt : Cherry Point, NC	0.080	0.000		0.100	Nov 2018	0.000		-		0.000	Continuing	Continuing	Continuing
Software Development - RMP	C/CPFF	Boeing : St. Louis, MO	2.255	0.000		0.616	Jun 2019	0.628	Jun 2020	-		0.628	2.146	5.645	5.645
Studies and Analysis - OFP	WR	NAWCWD : China Lake, CA	0.881	0.000		0.234	Nov 2018	0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing
Studies and Analysis - RMP	C/FFP	Boeing : St. Louis, MO	4.962	0.000		3.605	Jul 2019	0.500	Jul 2020	-		0.500	3.090	12.157	12.157
Studies and Analysis - OFP	C/FFP	Boeing : St. Louis, MO	4.519	0.000		2.147	Jan 2019	0.239	Jan 2020	-		0.239	0.000	6.905	6.905
Prior year cost no longer funded in the FYDP	Various	Various : Various	55.372	0.000		0.000		0.000		-		0.000	0.000	55.372	-
Subtotal			68.069	0.000		6.702		1.567		-		1.567	Continuing	Continuing	N/A
Remarks															
Line 1: Decrease from FY19 to FY20 at FST Cherry Point because AIM-9X ILS effort will complete in FY19.															
Line 4: Decrease from FY19 to FY20 due to completion in FY19 of the planning phase the Fatigue Destructive Teardown Assessment.															
Line 5: Decrease from FY19 to FY20 due to decreased requirement for future capability studies.															
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation - RMP	WR	NAWCWD : China Lake, CA	40.834	0.000		0.259	Jan 2019	0.301	Jan 2020	-		0.301	Continuing	Continuing	Continuing
Developmental Test & Evaluation - OFP	WR	NAWCWD : China Lake, CA	26.444	0.000		6.841	Jan 2019	3.957	Jan 2020	-		3.957	Continuing	Continuing	Continuing
Developmental Test & Evaluation - OFP	C/CPFF	Raytheon : Waltham, MA	1.971	0.000		1.537	Apr 2019	0.000		-		0.000	0.000	3.508	3.508
Developmental Test & Evaluation - RMP	WR	FRC-E : Cherry Point, NC	0.293	0.000		0.100	Dec 2018	0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing
Developmental Test & Evaluation - RMP/OFP	Various	Various : Various	0.100	0.000		0.179	Jan 2019	0.183	Jan 2020	-		0.183	Continuing	Continuing	Continuing

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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational Test & Evaluation - OFP	WR	COMOPTEVFOR : Norfolk, VA	25.013	0.000		0.707	Jan 2019	0.721	Jan 2020	-		0.721	Continuing	Continuing	Continuing
Operational Test & Evaluation - OFP	WR	NAWCAD : Patuxent River, MD	0.130	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior year cost no longer funded in the FYDP	Various	Various : Various	12.727	0.000		0.000		0.000		-		0.000	0.000	12.727	-
Subtotal			107.512	0.000		9.623		5.362		-		5.362	Continuing	Continuing	N/A
Remarks															
Line 2: Decrease from FY19 to FY20 due to reduced scope of AIM-9X separation and captive integration testing as the effort progresses.															
Line 3: Decrease from FY19 to FY20 due to test assets being procured from Raytheon in FY19 for software integration efforts.															
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering & Tec SRVC (Non-FFRDC) - RMP	C/CPFF	Amelex : California, MD	1.301	0.000		0.275	Dec 2018	0.280	Nov 2019	-		0.280	0.867	2.723	2.723
Engineering & Tec SRVC (Non-FFRDC) - ELMP	C/CPFF	LTM, Inc : Havelock, NC	5.231	0.000		1.331	Jun 2019	1.379	Jun 2020	-		1.379	8.845	16.786	16.786
Engineering & Tec SRVC (Non-FFRDC)	C/CPFF	Various : Various	10.729	0.000		0.208	Dec 2018	0.000		-		0.000	0.000	10.937	10.937
Government Engineering Support - ELMP	WR	NAWCAD : Patuxent River, MD	10.055	0.000		1.062	Nov 2018	1.079	Nov 2019	-		1.079	Continuing	Continuing	Continuing
Government Engineering Support - OFP	WR	NAWCAD : Patuxent River, MD	4.104	0.000		1.394	Nov 2018	1.420	Nov 2019	-		1.420	Continuing	Continuing	Continuing
Government Engineering Support - ELMP	WR	NAWCWD : China Lake, CA	1.376	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Government Engineering Support - OFP	Various	Various : Various	0.404	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MGT & PROF SUPPT SRVC (NON-FFRDC)	C/CPFF	Various : Various	9.248	0.000		0.214	Dec 2018	0.206	Jan 2020	-		0.206	12.064	21.732	21.732
Travel	WR	Various : Various	1.800	0.000		0.185	Oct 2018	0.186	Oct 2019	-		0.186	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev				Project (Number/Name) 0652 / AV-8B					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior year cost no longer funded in the FYDP	Various	Various : Various	16.769	0.000		0.000		0.000		-		0.000	0.000	16.769	-
Subtotal			61.017	0.000		4.669		4.550		-		4.550	Continuing	Continuing	N/A
Remarks															
Line 3: Decrease from FY19 to FY20 due to completion of Link 16 integration.															
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			460.370	0.000		46.363		27.441		-		27.441	Continuing	Continuing	N/A
Remarks															

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PE 0604214M: *AV-8B Aircraft - Engine Dev*
Navy

R-1 Line #98

R-1 Program Element (Number/Name)	Program Element Description	Program Element Type	Program Element Status	Program Element Location	Program Element Contact	Program Element Date	Program Element Comments

Project (Number/Name)	Start Date	End Date	Duration (Days)	Actual Cost	Budgeted Cost	Variance	Cost Index	Performance Index	Cost Variance	Cost Performance
1	1/1/2020	1/31/2020	31	10000	10000	0	1.0	1.0	0	1.0
2	2/1/2020	2/28/2020	28	15000	15000	0	1.0	1.0	0	1.0
3	3/1/2020	3/31/2020	31	20000	20000	0	1.0	1.0	0	1.0
4	4/1/2020	4/30/2020	30	25000	25000	0	1.0	1.0	0	1.0
5	5/1/2020	5/31/2020	31	30000	30000	0	1.0	1.0	0	1.0
6	6/1/2020	6/30/2020	30	35000	35000	0	1.0	1.0	0	1.0
7	7/1/2020	7/31/2020	31	40000	40000	0	1.0	1.0	0	1.0
8	8/1/2020	8/31/2020	31	45000	45000	0	1.0	1.0	0	1.0
9	9/1/2020	9/30/2020	30	50000	50000	0	1.0	1.0	0	1.0
10	10/1/2020	10/31/2020	31	55000	55000	0	1.0	1.0	0	1.0
11	11/1/2020	11/30/2020	30	60000	60000	0	1.0	1.0	0	1.0
12	12/1/2020	12/31/2020	31	65000	65000	0	1.0	1.0	0	1.0
13	1/1/2021	1/31/2021	31	70000	70000	0	1.0	1.0	0	1.0
14	2/1/2021	2/28/2021	28	75000	75000	0	1.0	1.0	0	1.0
15	3/1/2021	3/31/2021	31	80000	80000	0	1.0	1.0	0	1.0
16	4/1/2021	4/30/2021	30	85000	85000	0	1.0	1.0	0	1.0
17	5/1/2021	5/31/2021	31	90000	90000	0	1.0	1.0	0	1.0
18	6/1/2021	6/30/2021	30	95000	95000	0	1.0	1.0	0	1.0
19	7/1/2021	7/31/2021	31	100000	100000	0	1.0	1.0	0	1.0
20	8/1/2021	8/31/2021	31	105000	105000	0	1.0	1.0	0	1.0
21	9/1/2021	9/30/2021	30	110000	110000	0	1.0	1.0	0	1.0
22	10/1/2021	10/31/2021	31	115000	115000	0	1.0	1.0	0	1.0
23	11/1/2021	11/30/2021	30	120000	120000	0	1.0	1.0	0	1.0
24	12/1/2021	12/31/2021	31	125000	125000	0	1.0	1.0	0	1.0
25	1/1/2022	1/31/2022	31	130000	130000	0	1.0	1.0	0	1.0
26	2/1/2022	2/28/2022	28	135000	135000	0	1.0	1.0	0	1.0
27	3/1/2022	3/31/2022	31	140000	140000	0	1.0	1.0	0	1.0
28	4/1/2022	4/30/2022	30	145000	145000	0	1.0	1.0	0	1.0
29	5/1/2022	5/31/2022	31	150000	150000	0	1.0	1.0	0	1.0
30	6/1/2022	6/30/2022	30	155000	155000	0	1.0	1.0	0	1.0
31	7/1/2022	7/31/2022	31	160000	160000	0	1.0	1.0	0	1.0
32	8/1/2022	8/31/2022	31	165000	165000	0	1.0	1.0	0	1.0
33	9/1/2022	9/30/2022	30	170000	170000	0	1.0	1.0	0	1.0
34	10/1/2022	10/31/2022	31	175000	175000	0	1.0	1.0	0	1.0
35	11/1/2022	11/30								

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604214M / AV-8B Aircraft - Engine Dev	Project (Number/Name) 0652 / AV-8B	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AV-8B AIRCRAFT - ENGINE DEV				
Acquisition Milestones: H7.0 IOC	4	2021	4	2021
Systems Development: Hardware Development: AIM-9X Integration Development	1	2019	4	2020
Systems Development: Hardware Development: RMP Obsolescence Development	1	2019	4	2024
Systems Development: Software Development: H7.0 Development	1	2019	4	2020
Systems Development: Software Development: RMP Fatigue Life Expended Development	1	2019	4	2024
Test & Evaluation: Technical Evaluation: H7.0 Link 16 DT/OT (IT)	1	2019	3	2021
Production Milestones: Contract Awards: Engine Life Management Program (ELMP): ELMP Contract Award FY19	1	2019	1	2019
Production Milestones: Contract Awards: Engine Life Management Program (ELMP): ELMP Contract Award FY20	1	2020	1	2020
Production Milestones: Contract Awards: Engine Life Management Program (ELMP): ELMP Contract Award FY21	1	2021	1	2021
Production Milestones: Contract Awards: Engine Life Management Program (ELMP): ELMP Contract Award FY22	1	2022	1	2022
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: H7.0 S/W Delivery	3	2021	3	2021