Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604504N *I Air Control*							
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	189.158	68.012	61.498	44.923	-	44.923	36.844	30.084	29.309	29.890	Continuing	Continuing
0718: *MATCALS*	8.749	5.100	5.488	6.648	-	6.648	3.111	2.642	2.683	2.736	Continuing	Continuing
0993: *Carrier ATC*	137.564	34.301	33.679	15.522	-	15.522	11.735	10.033	7.992	8.151	Continuing	Continuing
1657: *ATC Improvement*	3.828	0.411	0.419	0.416	-	0.416	0.424	0.435	0.443	0.451	Continuing	Continuing
3372: *ATC Systems*	39.017	28.200	21.912	22.337	-	22.337	21.574	16.974	18.191	18.552	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element provides for the development, integration, and testing of Automated Air Traffic Control (ATC) hardware and software required to provide improved flight safety and more reliable all-weather ATC and landing system capabilities at Naval Air Stations (NASs) and Marine Corps Air Stations (MCASs) and Fleet Area Control and Surveillance Facilities (FACSFAC) worldwide. Programs are required to upgrade or replace aging ATC and landing system equipment on aircraft, aircraft carriers, amphibious ships, NASs, MCASs and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites. These upgrades include addressing broadened CyberSecurity requirements to remain compliant with software CyberSecurity directives and Information Assurance mandates. Virtual Warfare Center (VWC) supports the Marine Air Ground Task Force (MAGTF) Integrated Air and Missile Defense (IAMD) development.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	75.186	62.448	62.325	-	62.325
Current President's Budget	68.012	61.498	44.923	-	44.923
Total Adjustments	-7.174	-0.950	-17.402	-	-17.402
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-0.950			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-4.000	0.000			
• SBIR/STTR Transfer	-1.390	0.000			
• Program Adjustments	0.000	0.000	-17.390	-	-17.390
• Rate/Misc Adjustments	-0.001	0.000	-0.012	-	-0.012

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*			R-1 Program Element (Number/Name) PE 0604504N *I Air Control*		
• Congressional Directed Reductions	-1.783	-	-	-	-
Adjustments					

Change Summary Explanation

Schedule:
Due to the complexity of the Pedestal components, the schedule has been updated to reflect the continuation of the Blk IV program into FY 2020 (Proj 3372).

Financial:
The FY 2020 funding request was reduced by $17.150 million to align the Shipboard Air Traffic Radar SATR (SPN 50) to the Service Cost Position in support of MS-C (Proj 0993).

The FY 2018 funding was reduced by a $1.783 million Congressional adjustment for AN/SPN-35 Block I Upgrade Delayed New Start (Proj 3372).

The FY 2018 funding was reduced by $4.000 million for a below threshold reprogramming for higher priority needs.

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 0604504N / *Air Control*	Project (Number/Name) 0718 / *MATCALS*	

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
0718: *MATCALS*	8.749	5.100	5.488	6.648	-	6.648	3.111	2.642	2.683	2.736	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Marine Air Traffic Control and Landing Systems (MATCALS) program provides for continued development, integration, and testing of hardware and software to meet requirements for all-weather operations and improved flight safety of Air Traffic Control (ATC) and Landing Systems at Marine Corps expeditionary airfields. An Acquisition Decision Memorandum from Jan 2005 approved the use of the U.S. Army AN/TPN-31 Air Traffic Navigation, Integration, and Coordination System (ATNAVICS) to fulfill the Air Surveillance and Precision Approach Radar and Control System (ASPARCS) requirement for Jul 2006. The ATNAVICS will replace the legacy ATC Precision Approach Radar (PAR), Airport Surveillance Radar (ASR), and Command and Control Subsystem with a High Mobility Multipurpose Wheeled Vehicle based PAR, ASR and Command and Control Subsystem. The MROC Decision Memorandum 11-2005 of Dec 2004 outlines the evolutionary improvements required by Headquarters Marine Corps. This program works with the Marine ATC Working Group identifying the requirements to implement the P3I and evolutionary product improvements as required for G/ATOR, ATNAVICS, Expeditionary ATC Towers, and Navigational Aids that support Marine Air Traffic Control Detachments.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: ASPARCS Improvements	0.640	1.089	0.587	0.000	0.587
Articles:	-	-	-	-	-
Description: Investigate and resolve obsolescence issues. Perform studies and analyses to implement P3I and other evolutionary improvements. Develop criteria for existing ASPARCS software to achieve Defense Information Infrastructure-Common Operating Environment Level 5 compliance, Information Assurance, Radar Range Extension and Mapping functionality, and enhanced simulation and training into the existing ASPARCS software. Perform Mode 5/S integration, operational functionality study and analyses with AN/TPN-31(V)7 ATNAVICS System.					
FY 2019 Plans: Commence a Part I ECP to develop and test a prototype which upgrades/replaces the current precision approach capability. This ECP will reduce system hardware footprint, improve reliability and meet the requirement for multiple touchdown points.					
FY 2020 Base Plans: Continue ATNAVICS ECP's that will reduce system hardware footprint, improve reliability and meet the requirement for multiple touchdown points.					
FY 2020 OCO Plans:					

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 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease of $0.502M between FY 2019 and FY 2020 is due to the funding required for the G/ATOR and VWC development efforts this same year.					
Title: Ground/Air Task Oriented Radar System (G/ATOR)	2.560	2.870	3.533	0.000	3.533
Articles:	-	-	-	-	-
Description: G/ATOR is multi-role, ground-based, expeditionary radar that replaces five legacy radar systems for the Marine Air Ground Task Force. It satisfies the Marine Air Command and Control System and the Ground Counter Fire/ Counter Battery capabilities. The G/ATOR replaces the AN/TPS-63 and complements the AN/TPS-59 long range radar and will provide mobile, multi-functional, three-dimensional surveillance of air breathing targets, detection of cruise missiles and Unmanned Aerial Systems, and the cueing of air defense weapons. The G/ATOR contributes to the extension of Sea Shield/Sea Strike by surveillance and detection of enemy air threats not seen by Navy sensors in the littorals by participating in a cooperative engagement network of sensors and shooters; G/ATOR enables Integrated Fire Control (IFC) and provides engage/fire on remote capability. G/ATOR surveillance coverage with IFC will provide unprecedented reach, volume and precision in the execution of Operational Maneuver From The Sea allowing Naval forces to project and sustain power deep inland. G/ATOR will add Mode 5/S capability, Federal Aviation Administration flight certification requirements, and the ability to integrate with AN/TPN-31(V) ATNAVICS for Precision Approach Radar. This increment of G/ATOR replaces the Marine Corps' AN/TPS-73 radar and the Airport Surveillance Radar portion of the ATNAVICS also known as Air Surveillance and Precision Approach Radar Control System. ***FY 2019 Plans:*** Continue developing the TEMP that supports the Mode 5/S integration into G/ATOR, includes the JOTA event required by the Marine Corps and a plan for obtaining DoD AIMS certification for the G/ATOR platform. Continue system testing of the G/ATOR Mode 5/S integration for FAA and DoD AIMS certification and use by all G/ATOR blocks. ***FY 2020 Base Plans:*** Continue developing the TEMP that supports the Mode 5/S integration into G/ATOR, includes the JOTA event required by the Marine Corps and a plan for obtaining DoD AIMS certification for the G/ATOR platform.					

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 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue system testing of the G/ATOR Mode 5/S integration for FAA and DoD AIMS certification and use by all G/ATOR blocks. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $0.663M from FY 2019 to FY 2020 is due to the additional testing required leading up to system certification.					
Title: Virtual Warfare Center Support	1.900	1.529	2.528	0.000	2.528
Articles:	-	-	-	-	-
Description: Virtual Warfare Center (VWC) Support - This project supports fully interactive operator in the loop simulations in support of the Virtual Warfare Center (VWC) in order to quantify USMC Integrated Air and Missile Defense (IAMD) family of systems performance and how it impacts effectiveness in the IAMD mission area. ***FY 2019 Plans:*** Support integration and continued development of Designs of Experiment related to marine Air Ground Task Force IAMD capabilities. Provide event technical support for additional analysis events. Conduct and document analysis results for USMC stakeholders. ***FY 2020 Base Plans:*** Continue to support integration and development of Designs of Experiment related to marine Air Ground Task Force IAMD capabilities. Provide event technical support for additional analysis events. Conduct and document analysis results for USMC stakeholders. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $0.999M from FY 2019 to FY 2020 is due to FY19 being reduced for the "virtual warfare center support delayed new start" reduction. Fifty percent of the FY18 funding will be expended in FY19 due to the "six month delayed start" in FY18, therefore the actual increase between what will be executed in FY19 and FY20 is minimal.					
Accomplishments/Planned Programs Subtotals	5.100	5.488	6.648	0.000	6.648

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 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

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
• RDTEN/0204460M: *G/ATOR*	53.605	44.579	23.891	-	23.891	10.524	12.176	12.302	12.547	Continuing	Continuing
• OPN/2820: *Ashore ATC Equipment/MATCALS*	10.547	5.421	5.570	-	5.570	5.687	5.990	6.123	6.245	Continuing	Continuing

Remarks

Ashore ATC Equipment: FY2018-FY2024 reflects MATCALS portion of Ashore ATC Equipment budget.

D. Acquisition Strategy

An Acquisition Decision Memorandum was signed in Jan 2005 approving the procurement of the Army AN/TPN-31 ATNAVICS to fulfill the Air Surveillance and Precision Approach Radar and Control System requirement for July 2006. The MROC Decision Memorandum 11-2005 of December 2004 outlined the evolutionary improvements required by Headquarters Marine Corps. This program has joined with the Army to implement Pre-Planned Product Improvements and evolutionary product improvements.

G/ATOR will add Mode 5/S capability, FAA flight certification requirements, and the ability to integrate with AN/TPN-31 ATNAVICS for Precision Approach Radar.

The Marine Air Traffic Control (ATC) Working Group identified requirements to address obsolescence issues with ATC Expeditionary Towers. These requirements were validated by APX-25 and a Decision Analysis Study was conducted by NAVAIR 4.10. Funding will address development of expeditionary ATC Tower capability improvements via the Engineering Change Proposal process.

E. Performance Metrics

The MATCALS RDTEN funding will be used to continue development of evolutionary improvements envisioned by Headquarters Marine Corps for the MATCALS Family of Systems.

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 0604504N / *Air Control*	Project (Number/Name) 0718 / *MATCALS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop - ASPARCS Mode 5/S	WR	NAWCAD : Patuxent River, MD	1.383	0.215	Feb 2018	0.500	Dec 2018	0.410	Dec 2019	-		0.410	0.000	2.508	-
Primary HDW Develop - ASPARCS	WR	SPAWARSYSCEN : San Diego, CA	0.510	0.000		0.000		0.000		-		0.000	0.000	0.510	-
Primary HDW Develop - ASPARCS	C/CPFF	TRANDES : San Diego, CA	1.783	0.000		0.000		0.000		-		0.000	0.000	1.783	1.783
		Subtotal	3.676	0.215		0.500		0.410		-		0.410	0.000	4.801	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development - G/ ATOR	WR	NSWC : Dahlgren, VA	0.619	0.000	Feb 2018	1.000	Feb 2019	0.956	Mar 2020	-		0.956	Continuing	Continuing	Continuing
Software Development - ASPARCS	WR	NAWCAD : Patuxent River, MD	3.663	0.320	Mar 2018	0.589	Mar 2019	0.716	Mar 2020	-		0.716	Continuing	Continuing	Continuing
Software Development - Mode 5/S Dev - G/ATOR	SS/CPIF	Telephonics : Huntington Station, NY	0.024	2.560	Mar 2018	1.670	Oct 2018	1.700	Nov 2019	-		1.700	Continuing	Continuing	Continuing
Engineering Support - VWC	TBD	NSMA : TBD	0.000	1.320	Jan 2018	0.950	Oct 2018	1.506	Jan 2020	-		1.506	Continuing	Continuing	Continuing
Software Development - VWC	C/BA	TBD : TBD	0.000	0.580	Jan 2018	0.419	Jan 2019	1.000	Jan 2020	-		1.000	Continuing	Continuing	Continuing
		Subtotal	4.306	4.780		4.628		5.878		-		5.878	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.567	0.055	Jan 2018	0.160	Jan 2019	0.160	Jan 2020	-		0.160	Continuing	Continuing	Continuing

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 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	G/ATOR : PEO Land Systems	0.200	0.050	Jan 2018	0.200	Jan 2019	0.200	Jan 2020	-		0.200	0.000	0.650	-
		Subtotal	0.767	0.105		0.360		0.360		-		0.360	Continuing	Continuing	N/A

	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	8.749	5.100		5.488		6.648		-		6.648	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

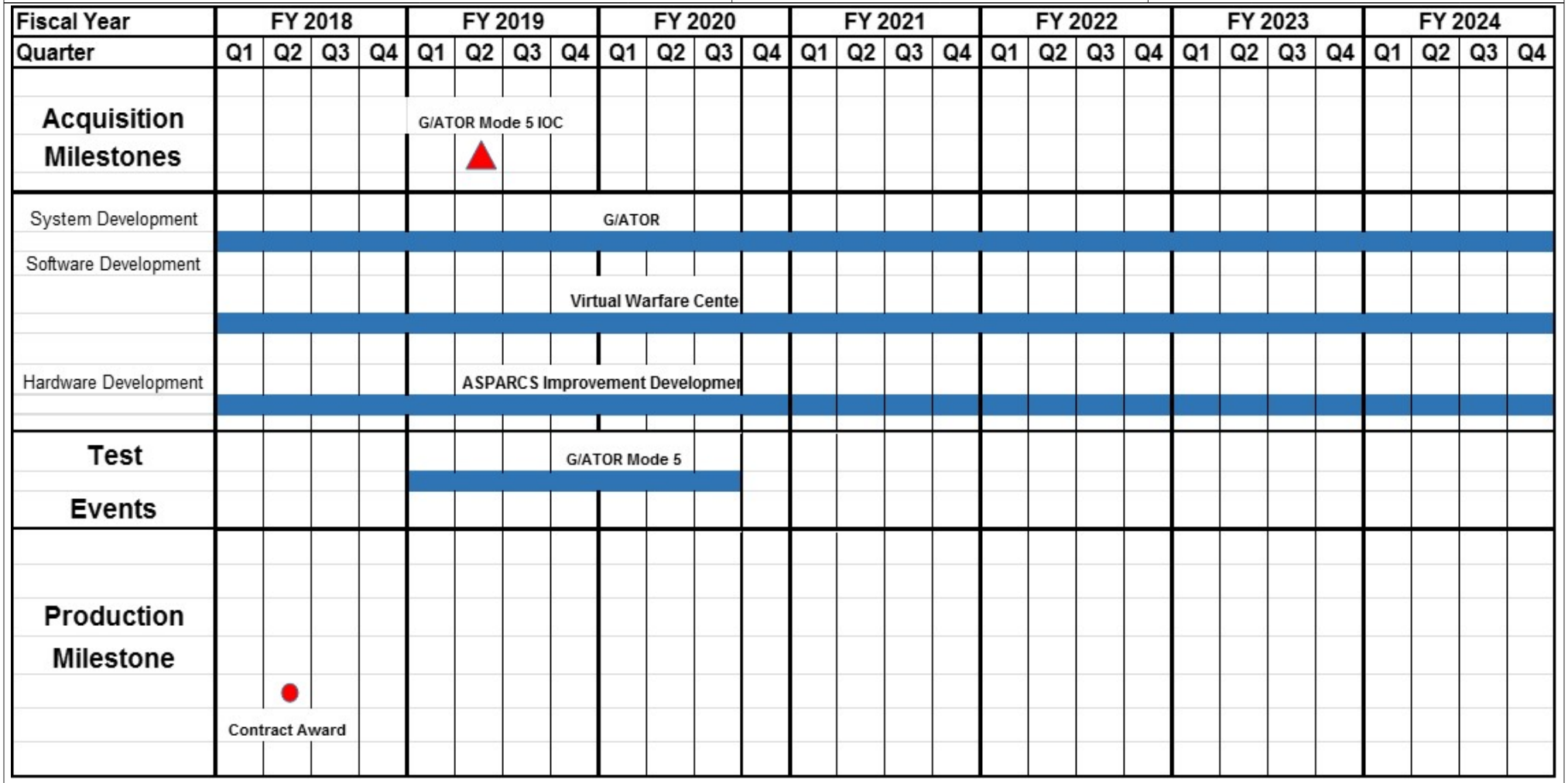


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MATCALS				
Acquisition Milestones: G/ATOR Mode 5 IOC	2	2019	2	2019
System Development: Software Development: G/ATOR	1	2018	4	2024
System Development: Software Development: Visual Warfare Center	1	2018	4	2024
System Development: Hardware Development: ASPARCS improvements	1	2018	4	2024
System Development: Test Events: G/ATOR Mode 5	1	2019	3	2020
System Development: Production Milestones: G/ATOR Mode 5 integration	2	2018	2	2018

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 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

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
0993: *Carrier ATC*	137.564	34.301	33.679	15.522	-	15.522	11.735	10.033	7.992	8.151	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Shipboard Air Traffic Control systems, interfacing with versions of the AN/TPX-42A(V) Direct Altitude and Identity Readout (DAIR), allow shipboard Air Traffic Controllers to identify, marshal, and direct aircraft within a 50 Nautical Mile (NM) radius of the ship. In recent years, the top 25 percent of the AN/SPN-43C frequency band has been reallocated to the Fixed Wireless Access Community prohibiting Air Traffic Control (ATC) Air Search Radar (ASR) operation within 50NM of the coast. Because the Navy requires an air traffic control surveillance radar, this project unit will include engineering efforts to identify requirements and develop the AN/SPN-50(V)1 as an AN/SPN-43C replacement system. In addition, bridging Engineering Change Proposals (ECP) will be required to sustain the AN/SPN-43C capability until the AN/SPN-50(V)1 is completely fielded. Finally, the AN/TPX-42A(V) DAIR continues to undergo several phased upgrades that have resulted in a number of field changes/technology refresh/insertion efforts. System improvements include replacing militarized front-end equipment in the track processor with open architecture Commercial Off the Shelf technology, converting the operational program software to more commonly used and flexible "C" language, providing the "hooks" for potential interface with Mode 5 Identification Friend or Foe, and integrating a flat panel monitor into the controller work station. The development of an ATC common console will reduce operational costs, improve reliability, and provide compatible interfaces and commonality for all ATC workstations. The addition of an embedded trainer within AN/TPX-42A(V) will improve controller training and increase flight safety. This effort includes addressing broadened CyberSecurity requirements to remain compliant with software CyberSecurity directives and Information Assurance mandates.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AN/SPN-50	24.262	26.428	9.561	0.000	9.561
Articles:	-	-	-	-	-
Description: This project funds the development of the AN/SPN-43C replacement program (AN/SPN-50), which was previously funded under AN/SPN-43C and is being broken out for administrative reasons. This system enables Air Traffic Controllers to assure the safe and expeditious movement of air traffic. This capability is an enabler in maintaining launch/recovery cycle times/sortie rates.					
FY 2019 Plans: Execute contract mod(s) for SPN-50 to add incremental funding. Delivery of EDM #3 and modification of EDM #1 and #2 to post-CDR Configuration. Complete the second and final phase of OEM training for fleet and test operators. Conduct development and operational land-based testing (IT-B1) and environmental analysis/testing (IT-B2). Maintenance Demonstrations (M-demos), Built in Test demonstrations (BIT-demos), and Logistics Demonstrations (LOG-demos) will be conducted during the IT-B1 test periods.					

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 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY18-19 increase is due to increase in material cost for Solid State Transmitter (SSTx), Unplanned emerging Risk Management Framework and Component Level Environmental Stress Screening (ESS) testing. The AN/SPN-50 development schedule was updated to reflect the result of a 9 month, December 2015 to September 2016, delay to the award of the AN/SPN-50 development contract. SSR/PDR, CDR, Post PDR Review, Pre-CDR configurations, EDM deliveries, and O&M Training, were moved by two quarters. Updated O&M was moved three quarters. AN/SPN - 43 Test and Evaluation schedule for "System Deliveries" was added because of AN/SPN-43 ECP delivered to ships that require testing and evaluation to support the Fleet until SPN-50 is delivered. ***FY 2020 Base Plans:*** Land-based testing will continue. Manufacturing maturity will be evaluated and a Production Readiness Review will be conducted. Documentation will continue to be updated leading up to the execution of a Milestone C in FY 2020. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease from FY 2019 to FY 2020 of $16.867M is due to the AN/SPN-50 development program ramping down in preparation for Milestone C and a production contract in FY 2020.					
Title: AN/SPN-43C	2.187	2.256	2.301	0.000	2.301
Articles:	-	-	-	-	-
Description: Funds development of sustainment Engineering Change Proposals (ECP) for the AN/SPN-43C. The sustainment effort will ensure the capabilities provided by the AN/SPN-43C remain available to CVN, LHA and LHD type ships until the replacement system is fielded. ***FY 2019 Plans:*** Continued sustainment ECPs for AN/SPN-43C. ***FY 2020 Base Plans:*** Continued sustainment ECPs for AN/SPN-43C. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase from FY 2019 to FY 2020 is due to inflation.					
Title: AN/TPX-42	7.852	4.995	3.660	0.000	3.660
Articles:	-	-	-	-	-
Description: This project funds the ongoing modernization of the AN/TPX-42 system through engineering changes and technology refresh, to include CyberSecurity requirements and compliance. Specific engineering changes are: Development of an Air Traffic Control (ATC) Multi-Function Console (MFC) which will reduce operational costs, improve reliability, and provide common hardware for all ATC workstations. Additionally, MFC will provide interfaces for emerging/planned sensors. ***FY 2019 Plans:*** Continue Multifunction Console (MFC) ECP inclusive of interface development for AN/SPN-50(V)1 and EASR. Begin sustainment ECPs for AN/TPX-42. ***FY 2020 Base Plans:*** Continue Multifunction Console (MFC)/AN/SYY-1 ECP inclusive of interface development for AN/SPN-50(V) and EASR. Begin Sustainment of ECPS for AN/TPX-42. Note: AN/SYY-1 will be the Tech Solution for Multifunction Console ECP. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease from FY 2019 to FY 2020 of $1.335M is due to the ramping down of the MFC ECP.					
Accomplishments/Planned Programs Subtotals	34.301	33.679	15.522	0.000	15.522

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
• OPN/2830: *Afloat ATC Equipment: SATC*	8.657	8.593	26.849	-	26.849	40.128	44.093	63.005	64.268	Continuing	Continuing

Remarks

Afloat ATC Equipment: FY2018-2024 reflects Ship Air Traffic Control (SATC) portion of the Afloat ATC Equipment budget.

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 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

D. Acquisition Strategy

AN/TPX-42 Voice/Video recorder replacement, Joint Precision Approach and Landing System Interface, Shipboard trainer, and Air Traffic Control (ATC) Console are all anticipated ECPs, with improvements being incorporated into the production of AN/TPX-42 upgrade kits.

AN/SPN-50 replacement program is an ACAT IVT program. All other projects are non-ACAT upgrades to existing systems. An evolutionary acquisition approach is being used to introduce these technology advancements that either satisfy user requirements, such as all weather operation, or address supportability and cost of ownership problems.

E. Performance Metrics

AN/SPN-50(V)1 incremental funding procured long lead items to support post-CDR EDM 2QFY18. Attain Milestone C 3QFY20.

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 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop-TPX-42	WR	NAWCAD : PAX River, MD	4.993	0.973	Dec 2017	0.563	Dec 2018	0.574	Dec 2019	-		0.574	Continuing	Continuing	Continuing
Primary HDW Develop - SPN-43	WR	NAWCAD : PAX River, MD	4.189	0.484	Dec 2017	0.475	Dec 2018	0.484	Dec 2019	-		0.484	Continuing	Continuing	Continuing
Primary HDW Develop - SPN-50(V)1 Pre-CDR Configuration EDM	C/CPIF	SAAB : Syracuse NY	17.951	0.000		0.000		0.000		-		0.000	0.000	17.951	17.951
Primary HDW Develop - SPN-50(V)1 Post-CDR Configuration EDM	C/CPIF	SAAB : Syracuse NY	12.782	8.620	Dec 2017	0.000		0.000		-		0.000	8.620	30.022	30.022
Primary HDW EMD - SPN-50(V)1	C/CPIF	SAAB : Syracuse NY	0.000	6.503	Dec 2017	18.060	Jan 2019	4.109	Dec 2019	-		4.109	2.000	30.672	30.672
Prior year Prod Dev no longer funded in the FYDP	Various	Various : TBD	17.902	0.000		0.000		0.000		-		0.000	0.000	17.902	-
		Subtotal	57.817	16.580		19.098		5.167		-		5.167	Continuing	Continuing	N/A

Remarks

SPN-50 HDW Development contract award will include the modifications to meet SPN-50 requirements, to include hardware redesign, development, and integration & test of above and below deck hardware to increase redundancy to expand operational availability from 94% to 98%.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development-TPX-42	WR	NAWCAD : PAX River, MD	19.455	3.050	Dec 2017	2.300	Dec 2018	2.307	Dec 2019	-		2.307	Continuing	Continuing	Continuing
Integrated Logistics Support- TPX-42	WR	NAWCAD : PAX River, MD	1.859	0.220	Dec 2017	0.120	Dec 2018	0.122	Dec 2019	-		0.122	Continuing	Continuing	Continuing
Integrated Logistics Support-SPN-43	WR	NAWCAD : PAX River, MD	1.131	0.224	Dec 2017	0.245	Dec 2018	0.249	Dec 2019	-		0.249	Continuing	Continuing	Continuing
Integrated Logistics Support-SPN-50(V)1	WR	NAWCAD : PAX River, MD	2.015	0.806	Dec 2017	0.850	Dec 2018	0.445	Dec 2019	-		0.445	Continuing	Continuing	Continuing
Studies & Analysis-SPN-50(V)1	WR	NAWCAD : PAX River, MD	5.005	0.800	Dec 2017	0.800	Dec 2018	0.200	Dec 2019	-		0.200	Continuing	Continuing	Continuing

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 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development - SPN-50(V)1	WR	NAWCAD : PAX River, MD	10.809	3.702	Dec 2017	2.182	Dec 2018	0.245	Dec 2019	-		0.245	Continuing	Continuing	Continuing
Studies & Analysis- SPN-43	WR	NAWCAD : PAX River, MD	2.029	0.020	Dec 2017	0.020	Dec 2018	0.021	Dec 2019	-		0.021	Continuing	Continuing	Continuing
Studies & Analysis- TPX-42	WR	NAWCAD : PAX River, MD	0.921	0.500	Dec 2017	0.100	Dec 2018	0.102	Dec 2019	-		0.102	Continuing	Continuing	Continuing
Systems Engineering- SPN-50(V)1	WR	NAWCAD : PAX River, MD	8.175	3.000	Dec 2017	2.822	Dec 2018	2.726	Dec 2019	-		2.726	Continuing	Continuing	Continuing
Prior Year Support no longer funded in the FYDP	Various	Various : Various	13.393	0.000		0.000		0.000		-		0.000	0.000	13.393	-
Studies & Analysis SPN-50(V)1	WR	Variou : VA	0.402	0.000		0.000		0.000		-		0.000	0.000	0.402	-
		Subtotal	65.194	12.322		9.439		6.417		-		6.417	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation- TPX-42	WR	NAWCAD : PAX River, MD	3.145	0.900	Dec 2017	0.712	Dec 2018	0.726	Dec 2019	-		0.726	Continuing	Continuing	Continuing
Development Test & Evaluation - SPN-43	WR	NAWCAD : PAX River, MD	2.073	1.459	Dec 2017	1.516	Dec 2018	1.520	Dec 2019	-		1.520	Continuing	Continuing	Continuing
Operational Test & Evaluation-SPN-50(V)1	WR	OPTEVOR : Norfolk, VA	1.305	1.840	Dec 2017	1.893	Dec 2018	0.611	Dec 2019	-		0.611	Continuing	Continuing	Continuing
Prior year T&E no longer funded in the FYDP	Various	Various : Various	1.707	0.000		0.000		0.000		-		0.000	0.000	1.707	-
Development Test & Evaluation SPN-50	WR	NAWCAD : PAX River	1.000	0.000		0.000		0.061	Dec 2019	-		0.061	0.000	1.061	-
		Subtotal	9.230	4.199		4.121		2.918		-		2.918	Continuing	Continuing	N/A

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 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	American Electronics, Inc. : California, MD	3.095	0.500	Dec 2017	0.309	Dec 2018	0.315	Dec 2019	-		0.315	Continuing	Continuing	Continuing
Program Management Support	WR	NAWCAD : PAX River, MD	1.878	0.500	Dec 2017	0.509	Dec 2018	0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
Travel	WR	NAVAIRHQ : PAX River, MD	0.350	0.200	Dec 2017	0.203	Dec 2018	0.205	Dec 2019	-		0.205	Continuing	Continuing	Continuing
		Subtotal	5.323	1.200		1.021		1.020		-		1.020	Continuing	Continuing	N/A

	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	137.564	34.301		33.679		15.522		-		15.522	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

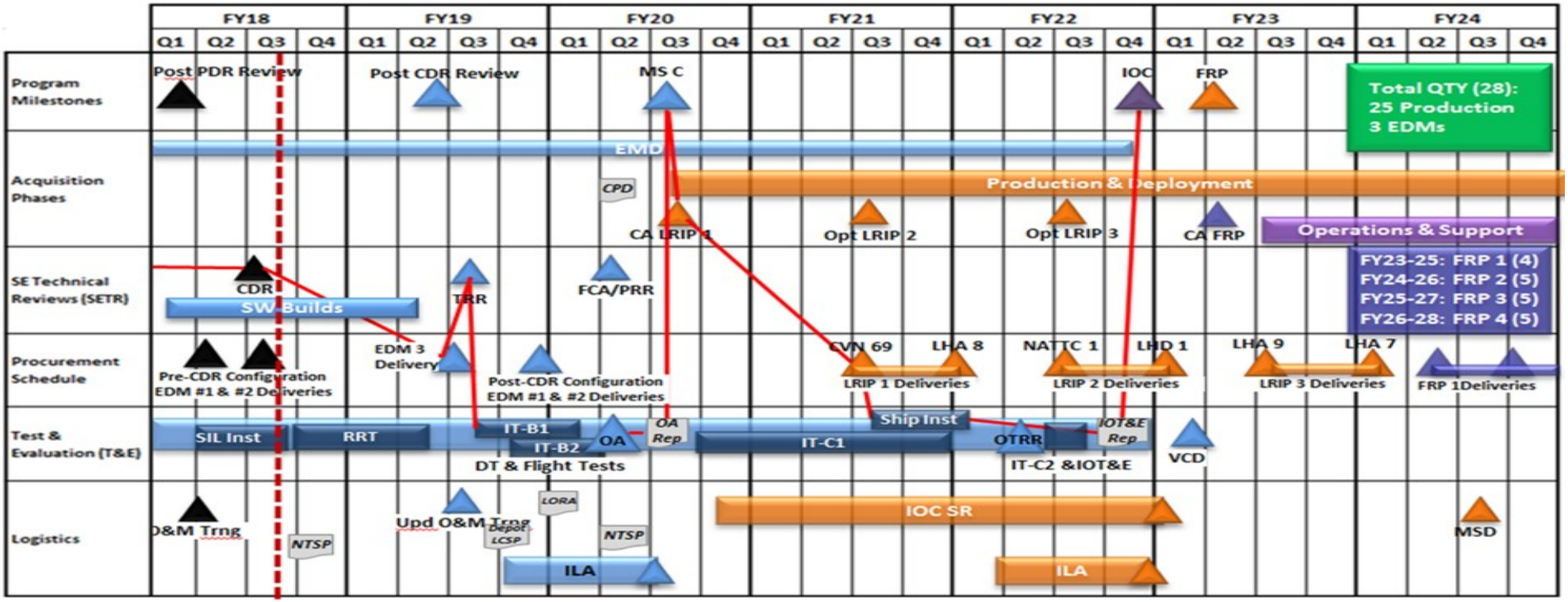


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

AN/TPX-42 / AN/SPN-43 Schedule

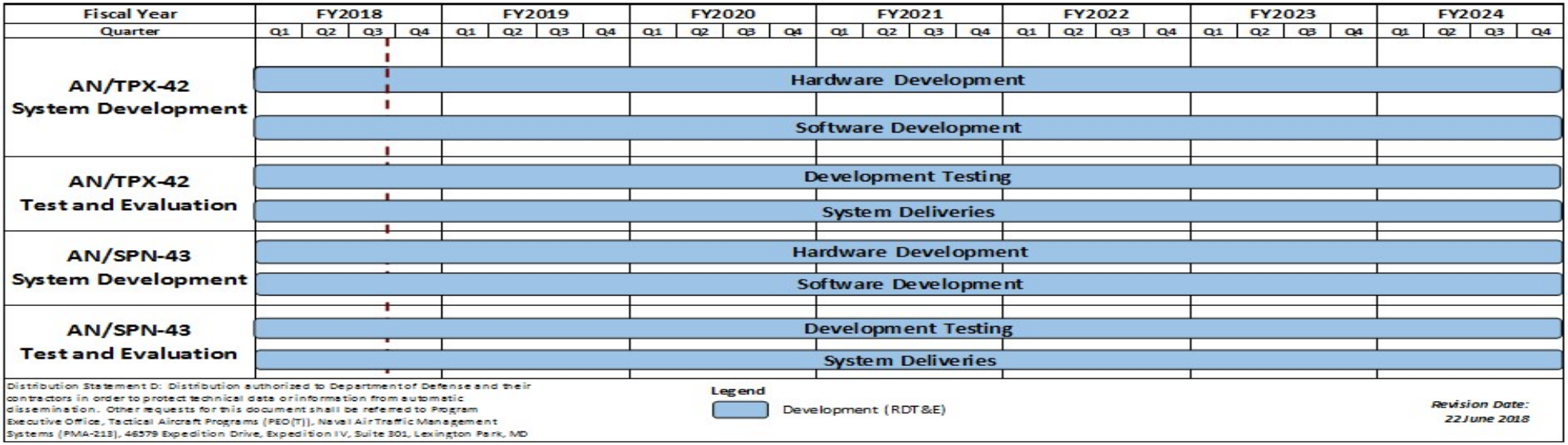


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Carrier ATC				
Acquisition Milestones: Milestones: AN/SPN-50(V)1 Post CDR Review	2	2019	2	2019
Acquisition Milestones: Milestones: AN/SPN-50(V)1 Milestone C	3	2020	3	2020
System Development: Hardware Development: AN/SPN-43C	1	2018	4	2024
System Development: Hardware Development: AN/TPX-42A(V)	1	2018	4	2024
System Development: Software Development: AN/SPN-43C	1	2018	4	2024
System Development: Software Development: AN/TPX-42A(V)	1	2018	4	2024
System Development: Reviews: Critical Design Review (CDR) (AN/SPN-50(V)1)	3	2018	3	2018
Test and Evaluation: Developmental Testing/Operational Testing (AN/SPN-50(V)1)	3	2019	2	2020
Test and Evaluation: Developmental Testing (AN/TPX-42A(V))	1	2018	4	2024
Test and Evaluation: Developmental Testing (AN/SPN-43C)	1	2018	4	2024
Deliveries: Pre-CDR Configuration Prototype Delivery (AN/SPN-50(V)1)	2	2018	2	2018
Deliveries: Post-CDR Configuration Prototype Delivery (AN/SPN-50(V)1)	3	2019	3	2019
Deliveries: System Deliveries (TPX-42A(V))	1	2018	4	2024
Deliveries: System Deliveries (AN/SPN-43C)	1	2018	4	2024

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 0604504N / *Air Control*	Project (Number/Name) 1657 / *ATC Improvement*	

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
1657: *ATC Improvement*	3.828	0.411	0.419	0.416	-	0.416	0.424	0.435	0.443	0.451	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program provides for engineering development, integration, adaptation, and testing of new and/or modernized Air Traffic Control (ATC) systems, air navigational aids, landing systems, and ATC communication systems for Naval and Marine Corps Air Stations (NAS/MCAS) and Fleet ATC Systems. These systems are critical to Naval Aviation and provide for safe, efficient air operations. Additionally, the Federal Aviation Administration (FAA) is affecting major modernization of the National Airspace System (NAS). The Navy must maintain compatibility with FAA-developed ATC systems in order to ensure seamless interoperability within the NAS. NAS modernization initiatives in Project 1657 include the Visual Information Display System (VIDS) and follow-on Pre-Planned Product Improvements, with additional RDT&E efforts required for modified commercial-off-the-shelf ATC systems and equipment for modernization and recapitalization of these systems at our NAS, MCAS & Fleet Area Control & Surveillance Facilities (FACSFACs) worldwide.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: NAS MOD VIDS	0.209	0.210	0.207	0.000	0.207
Articles:	-	-	-	-	-
Description: Continue engineering development of pre-planned product improvements for the VIDS and initiate efforts to incorporate VIDS into the FACSFACs. Research display alternatives for Navy ATC systems, and evaluate alternatives for future communication and radar systems.					
FY 2019 Plans: Continue engineering development of Pre-Planned Product Improvement for VIDS to incorporate multiple weather source inputs. Continue STARS and VIDS engineering development for technology insertion. Continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system.					
FY 2020 Base Plans: Continue engineering development of Pre-Planned Product Improvement for VIDS to incorporate multiple weather source inputs. Continue STARS and VIDS engineering development for technology insertion. Continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The decrease of $0.003M from FY 2019 to FY 2020 is due to Working Capital Fund inflation rates.					
Title: Fleet ATC Systems	0.202	0.209	0.209	0.000	0.209
Articles:	-	-	-	-	-
Description: Research efforts to determine the best technical approach to integrate various data link and communication system upgrades into Navy/Marine Corps ATC Systems including, but not limited to, the Digital Airport Surveillance Radar (DASR) and the DoD Advanced Automation Systems (DAAS) into the Fleet Area Control and Surveillance Facilities. Evaluate alternative for future processor/display, sensor and communication systems. ***FY 2019 Plans:*** Continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system. Continue evaluation of future processor/display, sensor and communication systems. ***FY 2020 Base Plans:*** Continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system. Continue evaluation of future processor/display, sensor and communication systems. ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.411	0.419	0.416	0.000	0.416

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
• OPN/2820: *Ashore ATC Equipment: NASMOD/Fleet ATC*	35.900	35.696	36.385	-	36.385	37.545	39.299	40.322	41.127	Continuing	Continuing

Remarks

Ashore ATC Equipment: FY2018-FY2024 reflects NASMOD and Fleet ATC portions of Ashore ATC budget.

D. Acquisition Strategy

All projects are non-ACAT upgrades to existing systems. An evolutionary acquisition approach is being used to introduce technology advancements that either satisfy emergent requirements or address supportability and cost of ownership problems.

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 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*

E. Performance Metrics

The Air Traffic Control (ATC) Improvement continues to research, evaluate and develop displays and other alternatives for Navy ATC, communication and radar systems. Maintain compatibility with the FAAs next generation Air Traffic Control System.

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 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop - VIDS	WR	SPAWAR Systems Command : Charleston, SC	1.956	0.209	Dec 2017	0.210	Dec 2018	0.207	Dec 2019	-		0.207	Continuing	Continuing	Continuing
Primary HDW Develop - Fleet ATC	WR	SPAWAR Systems Center : Charleston, SC	0.936	0.202	Dec 2017	0.209	Dec 2018	0.209	Dec 2019	-		0.209	Continuing	Continuing	Continuing
		Subtotal	2.892	0.411		0.419		0.416		-		0.416	Continuing	Continuing	N/A

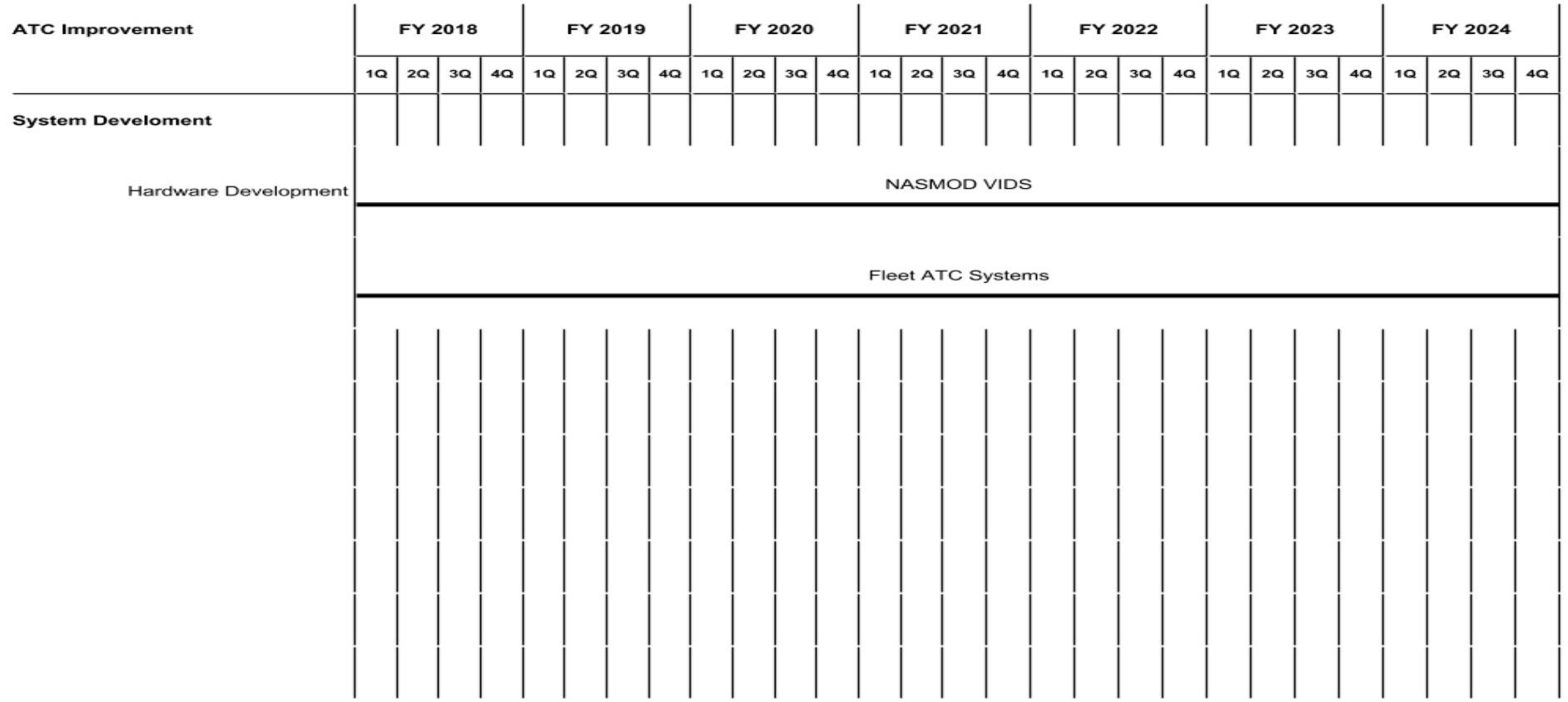
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	SPAWAR Systems Center : Charleston, SC	0.936	0.000		0.000		0.000		-		0.000	0.000	0.936	-
		Subtotal	0.936	0.000		0.000		0.000		-		0.000	0.000	0.936	N/A

	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	3.828	0.411		0.419		0.416		-		0.416	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*



2020PB - 0604504N - 1657

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 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ATC Improvement				
System Develoment: Hardware Development: NASMOD VIDS	1	2018	4	2024
System Develoment: Hardware Development: Fleet ATC Systems	1	2018	4	2024

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 0604504N / *Air Control*	Project (Number/Name) 3372 / *ATC Systems*	

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
3372: *ATC Systems*	39.017	28.200	21.912	22.337	-	22.337	21.574	16.974	18.191	18.552	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Landing System Upgrade Program (LSUP) is essential to maintain the United States Navy's capability to perform safe and expeditious aircraft landings aboard CVN and LHA/D vessels. The Navy's Precision Approach and Landing Capability requirements have necessitated Life Cycle Extension upgrades to legacy landing systems, AN/SPN-35, AN/SPN-41 and AN/SPN-46. The LSUP program will modernize technology that was developed and fielded over 30 years ago. It is estimated that without these upgrades, the Navy will lose its Automatic Carrier Landing System capability within 5 years. Cyber Security requirements have driven increased efforts to remain compliant with software CyberSecurity directives and Information Assurance mandates. Maintaining compliance is critical to retaining authorization to operate within the Fleet.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AN/SPN-46 Blk IV Upgrade	14.951	8.534	4.458	0.000	4.458
Articles:	-	-	-	-	-
Description: The AN/SPN-46 Blk IV program targets aging and obsolete components within the carrier landing systems and replaces them with modernized and sustainable components. Blk IV consists of antenna pedestal upgrades, addresses transmitter obsolescence issues, and replacement of obsolete circuit cards, and Cybersecurity.					
FY 2019 Plans: Pedestal components of the Pedestal/Transmitter configuration will continue to be fabricated and integrated with the new transmitter and circuit cards. Support required for hardware/software integration. Perform EMI qualification testing for the pedestal components of the pedestal/transmitter configuration.					
FY 2020 Base Plans: Complete qualification testing of the Pedestal configuration. Complete flight testing of the AN/SPN-46 Blk IV pedestal/transmitter configuration with the Baron commercial aircraft and F/A-18. Complete development of Block IV upgrade.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease of $4.076M from FY 2019 to FY 2020 is due to the AN/SPN-46 Blk IV completion.					
Title: AN/SPN-35 Blk I Upgrade	13.249	7.957	6.246	0.000	6.246
Articles:	-	-	-	-	-
Description: This accomplishment provides for the development, upgrade, redesign, integration, and testing of the AN/SPN-35C Block I upgrade. AN/SPN-35C is the Precision Approach Radar aboard LHA/LHD class ships and is used for Mode III aircraft recovery which ensures the safe approach and landing of all LH-class embarked aircraft during adverse weather & night conditions. The AN/SPN-35C Block I upgrade will include engineering efforts to upgrade, redesign, replace, and support common failure items (Receiver, Radar Processing Controller (RPC), Main Input/output Processor (MIOP), Control-Indicators). Included in these efforts are changes to obsolete components and analog systems, ensuring the radar capability is available to the fleet and extending the service life of the AN/SPN-35C to 2040. ***FY 2019 Plans:*** Perform Test Readiness Review (TRR) and begin qualification and flight testing. ***FY 2020 Base Plans:*** Complete flight testing. Complete development of the AN/SPN-35 Blk I upgrade. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.711M from FY 2019 to FY 2020 is due to the AN/SPN-35 Blk I upgrade completion.					
Title: AN/SPN-46 Blk V Upgrade (CCAs, RTOS, software, RAM pole, TS-3098)	0.000	5.421	11.633	0.000	11.633
Articles:	-	-	-	-	-
Description: The AN/SPN-46 Block V upgrade targets aging and obsolete hardware and software components within the carrier landing system and replaces them with modernized and supportable components. Blk V consists of a major AN/ SPN-46 operational software upgrade along with a refresh of numerous Commercial Off The Shelf (COTS) equipment subassemblies. Planned upgrades are updates to the radar's obsolete radar processor circuit card assemblies (CCAs) with new generation CCAs, upgrading the radar's Real Time Operating System (RTOS) with a current and supportable RTOS,					

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 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and optimizing and reconfiguring the radar's software into a logical, modular format. The radar's top two degraders, the Radar Alignment Mast (RAM) pole and the TS-3098 test set, will be modified with less complex, higher reliability designs.Hardware changes will include reducing reliability issues caused by outdated bus systems and IP based substructures and provide as overall system hardening to mitigate external interference issues. The software architecture redesign and optimization will increase modularity and operational efficiency as well as implement M-Code and resolve cyber security related issues inherent with the current system. ***FY 2019 Plans:*** Complete Analysis of Alternatives (AoA) for the individual engineering changes, start engineering designs to support Preliminary Design Review (PDR) level reviews for the radar CCAs, RTOS, software, RAM pole and the TS-3098 which together comprise the Blk V upgrade. Incorporate Risk Management Framework (RMF) Step III controls requirements into the LSUP Block V efforts. ***FY 2020 Base Plans:*** Complete engineering design reviews and documentation updates for all updated components through Critical Design Review (CDR). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $6.212M from FY 2019 to FY 2020 is due to the ramping up of the AN/SPN-46 Blk V Upgrade program. Cost Increases capture the effort required to update the AN/SPN-46 Real Time Operating System (RTOS) and associated processors. This includes standing up a new software (SW) RTOS development environment (Tornado to Workbench) as the current development environment is obsolete and unsupportable.					
Accomplishments/Planned Programs Subtotals	28.200	21.912	22.337	0.000	22.337

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 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

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
• OPN/2830: *Afloat ATC Equipment/ACLS*	28.621	39.297	40.561	-	40.561	43.017	43.035	43.929	45.807	Continuing	Continuing

Remarks

Afloat ATC Equipment: FY 2018-FY 2024 reflects ACLS portion of Afloat ATC Equipment budget.

D. Acquisition Strategy

Landing System Upgrade Program consists of lifecycle extension upgrades to the AN/SPN-35C Precision Approach Radar, AN/SPN-41B Instrument Control Landing Systems and AN/SPN-46 Automatic Carrier Landing Systems which support Air Traffic Control (ATC) operations on board CVN, LHA, and/or LHD-class ships. This effort includes numerous commercial off-the-shelf (COTS) component refresh updates which are urgently needed to sustain the operational viability of these Naval ATC systems supporting fleet air operations for at least the next 15 years until the next generation ATC system is fully implemented. This COTS refresh will include analysis and upgrade of key system components that are critical to overall system operation but have become increasingly difficult to maintain over the past few years. Recent adjustments in the direction and scope of Naval ATC systems have necessitated a re-evaluation of the long-term viability and sustainability of the current Fleet ATC equipment.

The Resources and Requirements Review Board approved the DON Precision Approach and Landing Capability (PALC) Roadmap per Decision Memorandum (DM) Ser: N8B/13U141053 dtd 03 July 2013. This PALC Roadmap re-scoped Joint Precision Approach and Landing System (JPALS) into a single increment and deferred JPALS capability from legacy fleet aircraft. As a result, a requirement to sustain current SPNs through 2030 has emerged. Per Enclosure 1 of the above DM, the Landing Systems Upgrade Program will be comprised of upgrades to the AN/SPN-46, AN/SPN-35C, and AN/SPN-41B. It is anticipated that each SPN upgrade will go through separate Systems Engineering Technical Review (SETR) processes.

E. Performance Metrics

Test Readiness Review (TRR) scheduled for 4th quarter FY 2019 of the AN/SPN-46 Block IV and AN/SPN-35 Block I upgrade. Critical Design Review (CDR) scheduled for 3rd quarter FY 2020, and TRR scheduled for 4th quarter FY 2021 for AN/SPN-46 Block V upgrade.

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 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development - AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	14.525	6.780	Nov 2017	1.123	Nov 2018	1.258	Nov 2019	-		1.258	Continuing	Continuing	Continuing
Ancillary Hardware Development - AN/SPN-46 Blk IV Upgrade	C/CPFF	Sierra Nevada Corp (SNC) : Reno, NV	17.586	5.337	Dec 2017	2.934	Nov 2018	1.175	Nov 2019	-		1.175	0.000	27.032	27.032
Primary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	2.026	5.236	Nov 2017	3.455	Nov 2018	1.761	Nov 2019	-		1.761	Continuing	Continuing	Continuing
Ancilliary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.272	4.083	Nov 2017	2.532	Nov 2018	2.857	Nov 2019	-		2.857	Continuing	Continuing	Continuing
Primary Hardware Development - AN/SPN - 46 Blk V Upgrade	C/CPFF	Sierra Nevada Corp (SNC) : Reno, NV	0.000	0.000		3.005	Nov 2018	4.710	Nov 2019	-		4.710	5.453	13.168	13.168
Ancilliary Hardware Development - AN/SPN-46 Blk V Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		1.249	Nov 2018	4.578	Nov 2019	-		4.578	0.000	5.827	-
		Subtotal	34.409	21.436		14.298		16.339		-		16.339	Continuing	Continuing	N/A

Remarks

Increase from FY 2019 to FY 2020 for AN/SPN-46 Block V is due to engineering efforts required for CDR in 3rd quarter FY 2020.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support (ILS)	WR	NAWCAD : Patuxent River, MD	0.937	1.275	Nov 2017	1.300	Nov 2018	1.229	Nov 2019	-		1.229	Continuing	Continuing	Continuing
Systems Engineering Support	WR	NAWCAD : Patuxent River, MD	1.554	2.050	Nov 2017	1.995	Nov 2018	1.880	Nov 2019	-		1.880	Continuing	Continuing	Continuing
		Subtotal	2.491	3.325		3.295		3.109		-		3.109	Continuing	Continuing	N/A

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 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	0.492	2.312	Nov 2017	2.402	Nov 2018	0.892	Nov 2019	-		0.892	Continuing	Continuing	Continuing
AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.217	Nov 2018	0.498	Nov 2019	-		0.498	Continuing	Continuing	Continuing
AN/SPN-46 Blk V Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.123	Nov 2018	0.252	Nov 2019	-		0.252	Continuing	Continuing	Continuing
		Subtotal	0.492	2.312		2.742		1.642		-		1.642	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management (PM) Support	WR	NAWCAD : Patuxent River, MD	1.312	0.777	Nov 2017	1.190	Nov 2018	1.004	Nov 2019	-		1.004	Continuing	Continuing	Continuing
PM Suppt - MSS	C/CPAF	TBD : Patuxent River, MD	0.313	0.350	Nov 2017	0.387	Nov 2018	0.243	Nov 2019	-		0.243	Continuing	Continuing	Continuing
		Subtotal	1.625	1.127		1.577		1.247		-		1.247	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	39.017	28.200		21.912		22.337		-		22.337	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

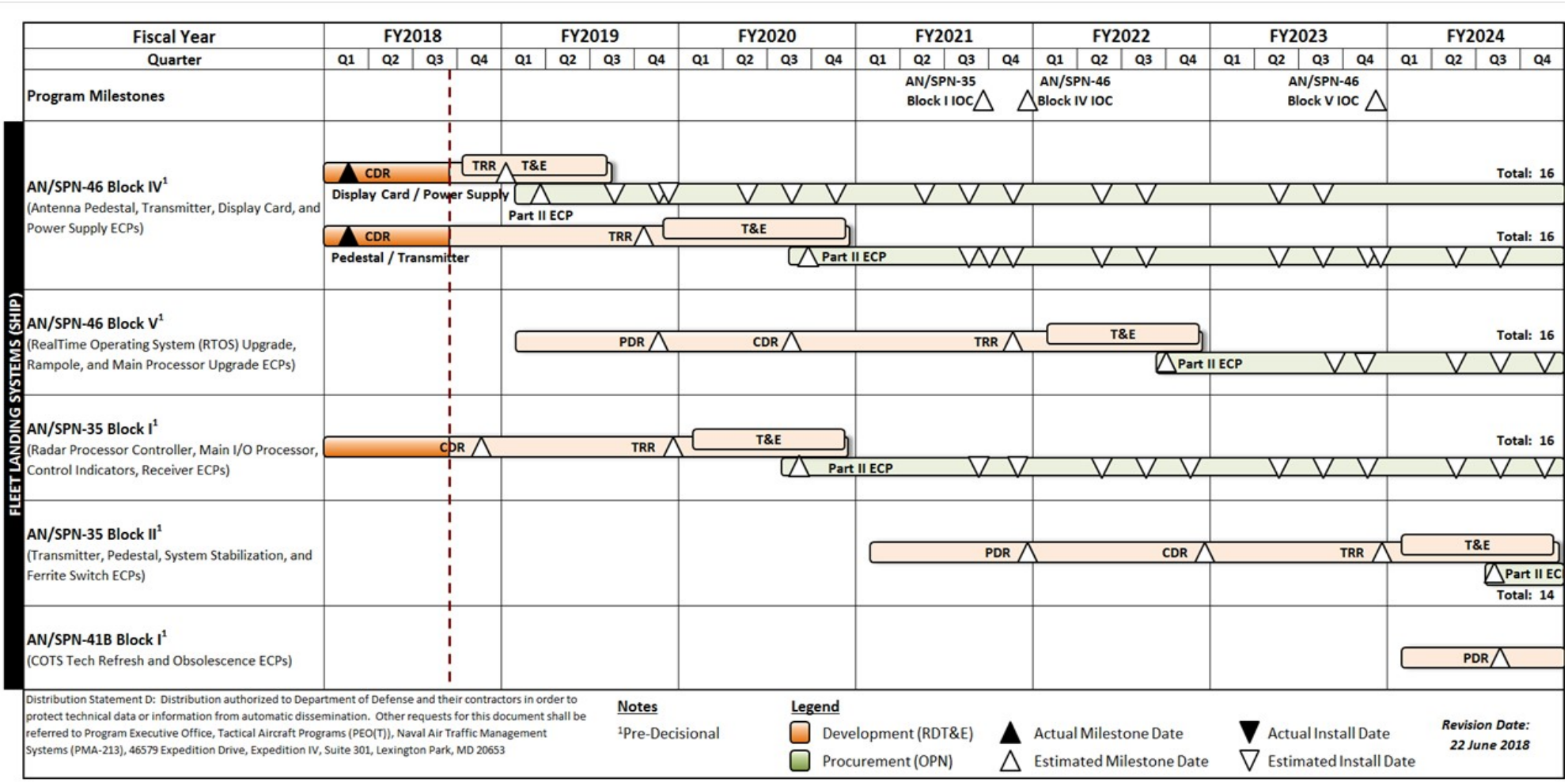


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3372				
Reviews: AN/SPN-35 Blk I Critical Design Review (CDR)	4	2018	4	2018
Reviews: AN/SPN-46 Blk V Preliminary Design Review (PDR)	4	2019	4	2019
Reviews: AN/SPN-46 Blk V Critical Design Review (CDR)	3	2020	3	2020
Test and Evaluation: AN/SPN-46 Blk IV Test Readiness Review (TRR) Display Card/ Power Supply	1	2019	1	2019
Test and Evaluation: AN/SPN-46 Blk IV (TRR) Pedestal/Transmitter	4	2019	4	2019
Test and Evaluation: AN/SPN-35 Blk I (TRR)	4	2019	4	2019
Test and Evaluation: AN/SPN-46 Blk V (TRR)	4	2021	4	2021