Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy											Date: February 2018	
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 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	147.204	42.206	75.186	62.448	-	62.448	62.325	53.713	43.967	46.956	Continuing	Continuing
0718: *MATCALS*	8.439	0.310	11.508	6.438	-	6.438	6.675	3.158	2.676	2.739	Continuing	Continuing
0993: *Carrier ATC*	110.493	27.071	32.799	33.679	-	33.679	32.863	28.420	23.772	25.439	Continuing	Continuing
1657: *ATC Improvement*	3.445	0.383	0.413	0.419	-	0.419	0.419	0.428	0.438	0.447	Continuing	Continuing
3372: *ATC Systems*	24.827	14.442	30.466	21.912	-	21.912	22.368	21.707	17.081	18.331	Continuing	Continuing

A. Mission Description and Budget Item Justification

The FY 2019 funding request was reduced by $2.133 million in ATC Systems to account for the availability of prior year execution balances.

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. Funded 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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	47.404	75.186	63.645	-	63.645
Current President's Budget	42.206	75.186	62.448	-	62.448
Total Adjustments	-5.198	0.000	-1.197	-	-1.197
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.761	0.000			
• SBIR/STTR Transfer	-0.891	0.000			
• Program Adjustments	0.000	0.000	-0.325	-	-0.325

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy				Date: February 2018	
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*			
• Rate/Misc Adjustments	0.000	0.000	-0.872	-	-0.872
• Congressional Directed Reductions	-2.546	-	-	-	-
Adjustments					

Change Summary Explanation

3372: Contract award (CA), Preliminary Design Review (PDR), Critical Design Review (CDR), and the beginning and time span of the AN/SPN-46 Blk V effort, were moved to reflect an updated development timeline. The new schedule takes into account changes identified by studies and analysis of the technical requirements, availability of resources, and refined cost estimates for the AN/SPN-46 Blk V upgrade. The FY 2019 funding request was reduced by $2.133 million to account for the availability of prior year execution balances.

0993: 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.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0718: *MATCALS*	8.439	0.310	11.508	6.438	-	6.438	6.675	3.158	2.676	2.739	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This 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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: ASPARCS Improvements	0.260	1.608	1.089	0.000	1.089
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 2018 Plans: *Note - The $1.334 million increase in Air Surveillance and Precision Approach Radar Control System (ASPARCS) Improvements is to initiate a Part I ECP for the AN/TSQ-263 Tactical Terminal Communications System (TTCS). This ECP will resolve known obsolescence issues and reduce deployment setup time. Commence the Part I ECP to develop and test a prototype which modernizes the AN/TSQ-263 TTCS. This ECP will reduce system hardware requirements, improve reliability, address obsolescence issues, and reduce					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
the deployment set-up time. FY18 efforts will include requirements generation, ECP development and initial systems development. ***FY 2019 Base 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 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $0.519M from FY 2018 to FY 2019 is due to higher priorities within the program.					
Title: Ground/Air Task Oriented Radar System (G/ATOR)	0.050	8.000	2.870	0.000	2.870
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 2018 Plans:*** Develop a Test and Evaluation Master Plan (TEMP) that supports the Mode 5/S integration into G/ATOR, includes a Joint Operational Test Approach (JOTA) event required by the Marine Corps and a plan for obtaining					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
DoD AIMS certification for the G/ATOR platform. Commence system testing of the G/ATOR Mode 5/S integration for FAA and DoD AIMS certification and use by all G/ATOR blocks. ***FY 2019 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. 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 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $5.130M from FY 2018 to FY 2019 is due to the ramp down of the G/ATOR development program.					
Title: Virtual Warfare Center Support	0.000	1.900	2.479	0.000	2.479
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 2018 Plans:*** *Note-FY18 $1.9 increase is for Virtual Warfare Center (VWC) Support - This project supports fully interactive operator in the loop simulations at 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. VWC support encompasses a set of integrated fire control (IFC) activities that also includes concept/CONOPS development, family of systems architecture development, and systems engineering/ integration efforts. Conduct Design of Experiment related to Marine Air Ground Task Force (MAGTF) IAMD capabilities. Provide event technical support for four analysis events. Conduct and document analysis results for USMC stakeholders. ***FY 2019 Base Plans:*** FY19 $0.579 million increase of Virtual Warfare Center funding is in support of integration and continued development of Designs of Experiment related to marine Air Ground Task Force IAMD capabilities.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Provide event technical support for additional analysis events. Conduct and document analysis results for USMC stakeholders. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $0.579M from FY 2018 to FY 2019 is due to the establishment and ramp up of the VWC program.					
Accomplishments/Planned Programs Subtotals	0.310	11.508	6.438	0.000	6.438

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• RDTEN/0204460M: *G/ATOR*	78.860	54.645	45.029	-	45.029	23.927	10.555	12.185	12.336	Continuing	Continuing
• OPN/2820: *Ashore ATC Equipment/MATCALS*	15.822	9.556	5.421	-	5.421	5.528	5.700	5.980	6.136	Continuing	Continuing

Remarks

Ashore ATC Equipment: FY2017-FY2023 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 2019 Navy			Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop - ASPARCS Mode 5/S	WR	NAWCAD : Patuxent River, MD	1.277	0.106	Dec 2016	0.673	Feb 2018	0.500	Dec 2018	-		0.500	0.000	2.556	-
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	3.570	0.106		0.673		0.500		-		0.500	0.000	4.849	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development - G/ ATOR	WR	NSWC : Dahlgren, VA	0.595	0.024	Jan 2017	2.837	Feb 2018	1.000	Feb 2019	-		1.000	Continuing	Continuing	Continuing
Software Development - ASPARCS	WR	NAWCAD : Patuxent River, MD	3.557	0.106	Dec 2016	0.825	Mar 2018	0.589	Mar 2019	-		0.589	Continuing	Continuing	Continuing
Software Development - Mode 5/S Dev - G/ATOR	SS/CPIF	Telephonics : Huntington Station, NY	0.000	0.024	Jan 2017	4.818	Mar 2018	1.670	Mar 2019	-		1.670	Continuing	Continuing	Continuing
Engineering Support - VWC	TBD	NSMA : TBD	0.000	0.000		1.320	Jan 2018	1.400	Jan 2019	-		1.400	0.000	2.720	-
Software Development - VWC	C/BA	TBD : TBD	0.000	0.000		0.580	Jan 2018	0.919	Jan 2019	-		0.919	0.000	1.499	1.499
		Subtotal	4.152	0.154		10.380		5.578		-		5.578	Continuing	Continuing	N/A

Remarks

FY19 $0.589 million increase of Virtual Warfare Center funding is in support of integration and continued development of Designs of Experiment related to marine Air Ground Task Force IAMD capabilities. The increase is due to the VWC development effort ramping up in order to meet key development milestones in future years.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.517	0.050	Dec 2016	0.155	Jan 2018	0.160	Jan 2019	-		0.160	Continuing	Continuing	Continuing
Program Managemnt Support	WR	G/ATOR : PEO Land Systems	0.200	0.000		0.300	Jan 2018	0.200	Jan 2019	-		0.200	0.000	0.700	-
		Subtotal	0.717	0.050		0.455		0.360		-		0.360	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	8.439	0.310		11.508		6.438		-		6.438	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

MATCALS

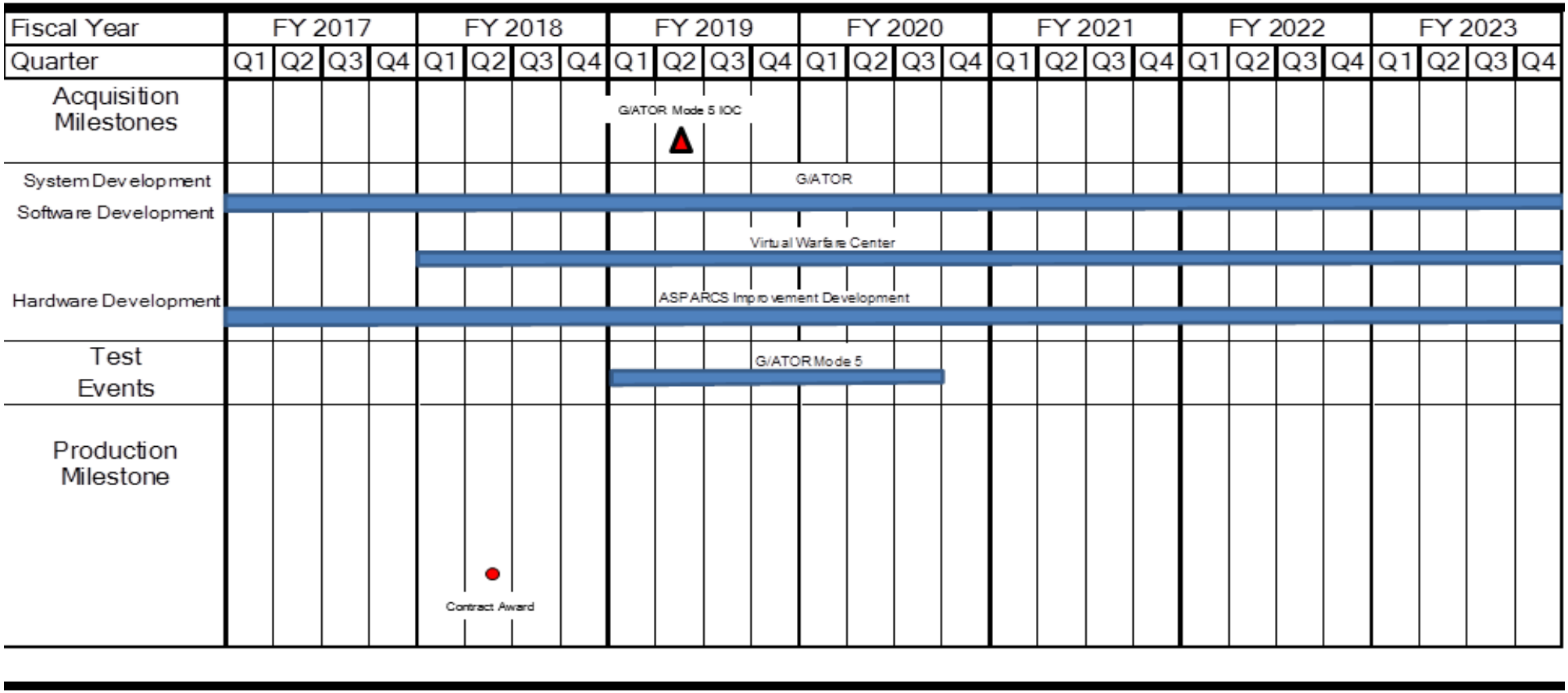


Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

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	2017	4	2023
System Development: Software Development: Virtual Warfare Center	1	2018	4	2023
System Development: Hardware Development: ASPARCS Improvements	1	2017	4	2023
Test Events: G/ATOR Mode 5	1	2019	3	2020
Production Milestones: G/ATOR Mode 5 Integration	2	2018	2	2018

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0993: *Carrier ATC*	110.493	27.071	32.799	33.679	-	33.679	32.863	28.420	23.772	25.439	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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: AN/SPN-50	22.423	22.759	26.428	0.000	26.428
Articles:	1	-	-	-	-
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. #3 CVN NARG, #1 ATC NARG priorities.					
FY 2018 Plans: Execute contract Modification for SPN-50 EMD Contract to add incremental funding. Conduct Critical Design Review (CDR). Conduct Test Readiness Review (TRR). EDM #2/3 delivered. Finalize Hardware and Software design of EDM #3 in Post-CDR Configuration. Develop Post-CDR Software Build. Continuation of Systems Integration Lab standup and commence sub-system testing. Development of OEM training for fleet and test operators.					
FY 2019 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
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. 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 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $3.669M from FY 2018 to FY 2019 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.					
Title: AN/SPN-43C	1.263	2.188	2.256	0.000	2.256
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 2018 Plans:*** Continue sustainment ECPs for AN/SPN-43C ***FY 2019 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Continued sustainment ECPs for AN/SPN-43C. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $0.068M from FY 2018 to FY 2019 is due to inflation and additional ECP support.					
Title: AN/TPX-42	3.385	7.852	4.995	0.000	4.995
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 2018 Plans:*** *Note- TPX-42 increase is due to 1) broadened CyberSecurity requirement to remain compliant with software CyberSecurity directives and Information Assurance; and 2) funding provided for TPX-42 hardware and software development so that TPX-42 will interface with EASR sensor. Complete CATCC/DAIR Embedded Trainer ECP to incorporate ATC final control functions; continue Multifunction Console (MFC) ECP. ***FY 2019 Base 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 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $2.857M from FY 2018 to FY 2019 is due to completion of the Embedded Trainer ECP in FY18.					
Accomplishments/Planned Programs Subtotals	27.071	32.799	33.679	0.000	33.679

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• OPN/2830: *Afloat ATC Equipment: SATC*	8.485	8.657	8.593	-	8.593	8.560	8.587	8.738	8.921	Continuing	Continuing

Remarks

Afloat ATC Equipment: FY2017-2023 reflects Ship Air Traffic Control (SATC) portion of the Afloat ATC Equipment budget.

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 2019 Navy		Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop-TPX-42	WR	NAWCAD : PAX River, MD	4.633	0.360	Dec 2016	0.973	Dec 2017	0.563	Dec 2018	-		0.563	Continuing	Continuing	Continuing
Primary HDW Develop - SPN-43	WR	NAWCAD : PAX River, MD	3.719	0.470	Dec 2016	0.485	Dec 2017	0.475	Dec 2018	-		0.475	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	0.000	12.782	May 2017	8.620	Dec 2017	0.000		-		0.000	8.620	30.022	30.022
Primary HDW EMD - SPN-50(V)1	C/CPIF	SAAB : Syracuse NY	0.000	0.000		5.000	Dec 2017	18.060	Jan 2019	-		18.060	2.000	25.060	25.060
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	44.205	13.612		15.078		19.098		-		19.098	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%.

The increase in FY19 for Primary HDW EMD is due to Non-recurring Engineering (NRE) increase in developing and testing the EDM as the effort moves to Engineering Manufacturing phase of EMD. Due to evolving Navy policy, Risk Management Framework (RMF) requirements were incorporated into the NRE.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development-TPX-42	WR	NAWCAD : PAX River, MD	17.755	1.700	Dec 2016	3.050	Dec 2017	2.300	Dec 2018	-		2.300	Continuing	Continuing	Continuing
Integrated Logistics Support- TPX-42	WR	NAWCAD : PAX River, MD	1.739	0.120	Dec 2016	0.220	Dec 2017	0.120	Dec 2018	-		0.120	Continuing	Continuing	Continuing
Integrated Logistics Support - SPN-43	WR	NAWCAD : PAX River, MD	0.931	0.200	Dec 2016	0.224	Dec 2017	0.245	Dec 2018	-		0.245	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support-SPN-50(V)1	WR	NAWCAD : PAX River, MD	1.505	0.510	Dec 2016	0.806	Dec 2017	0.850	Dec 2018	-		0.850	Continuing	Continuing	Continuing
Studies & Analysis-SPN-50(V)1	WR	NAWCAD : PAX River, MD	4.242	0.763	Dec 2016	0.800	Dec 2017	0.800	Dec 2018	-		0.800	Continuing	Continuing	Continuing
Software Development - SPN-50(V)1	WR	NAWCAD : PAX River, MD	7.012	3.797	Dec 2016	3.702	Dec 2017	2.182	Dec 2018	-		2.182	Continuing	Continuing	Continuing
Studies & Analysis-SPN-43	WR	NAWCAD : PAX River, MD	2.009	0.020	Dec 2016	0.020	Dec 2017	0.020	Dec 2018	-		0.020	Continuing	Continuing	Continuing
Studies & Analysis-TPX-42	WR	NAWCAD : PAX River, MD	0.821	0.100	Dec 2016	0.500	Dec 2017	0.100	Dec 2018	-		0.100	Continuing	Continuing	Continuing
Systems Engineering-SPN-50(V)1	WR	NAWCAD : PAX River, MD	5.211	2.964	Dec 2016	3.000	Dec 2017	2.822	Dec 2018	-		2.822	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	0.000	0.402	Jun 2017	0.000		0.000		-		0.000	0.000	0.402	-
		Subtotal	54.618	10.576		12.322		9.439		-		9.439	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation- TPX-42	WR	NAWCAD : PAX River, MD	2.745	0.400	Dec 2016	0.900	Dec 2017	0.712	Dec 2018	-		0.712	Continuing	Continuing	Continuing
Development Test & Evaluation - SPN-43	WR	NAWCAD : PAX River, MD	1.500	0.573	Dec 2016	1.459	Dec 2017	1.516	Dec 2018	-		1.516	Continuing	Continuing	Continuing
Operational Test & Evaluation-SPN-50(V)1	WR	OPTEVOR : Norfolk, VA	1.100	0.205	Dec 2016	1.840	Dec 2017	1.893	Dec 2018	-		1.893	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	0.000	1.000	Dec 2016	0.000		0.000		-		0.000	0.000	1.000	-
		Subtotal	7.052	2.178		4.199		4.121		-		4.121	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	American Electronics, Inc. : California, MD	2.795	0.300	Dec 2016	0.500	Dec 2017	0.309	Dec 2018	-		0.309	1.500	5.404	5.404
Program Management Support	WR	NAWCAD : PAX River, MD	1.528	0.350	Dec 2016	0.500	Dec 2017	0.509	Dec 2018	-		0.509	Continuing	Continuing	Continuing
Travel	WR	NAVAIRHQ : PAX River, MD	0.295	0.055	Oct 2016	0.200	Dec 2017	0.203	Dec 2018	-		0.203	Continuing	Continuing	Continuing
		Subtotal	4.618	0.705		1.200		1.021		-		1.021	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	110.493	27.071		32.799		33.679		-		33.679	Continuing	Continuing	N/A

Remarks

Increase in program management support and travel is directly related to the increased efforts in support of SPN-50.

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

AN/SPN-50 Schedule

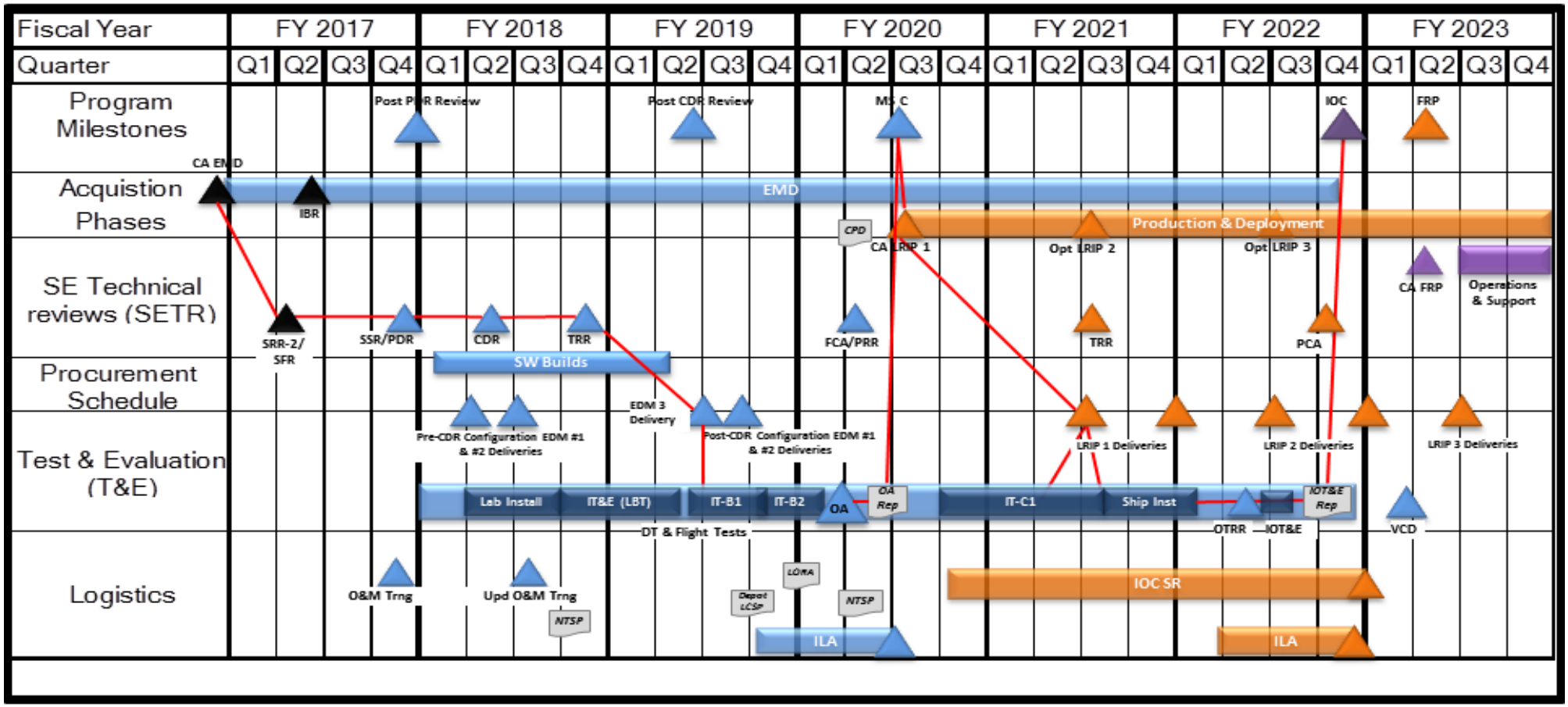


Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

AN/TPX 42/SPN43 SCHEDULE

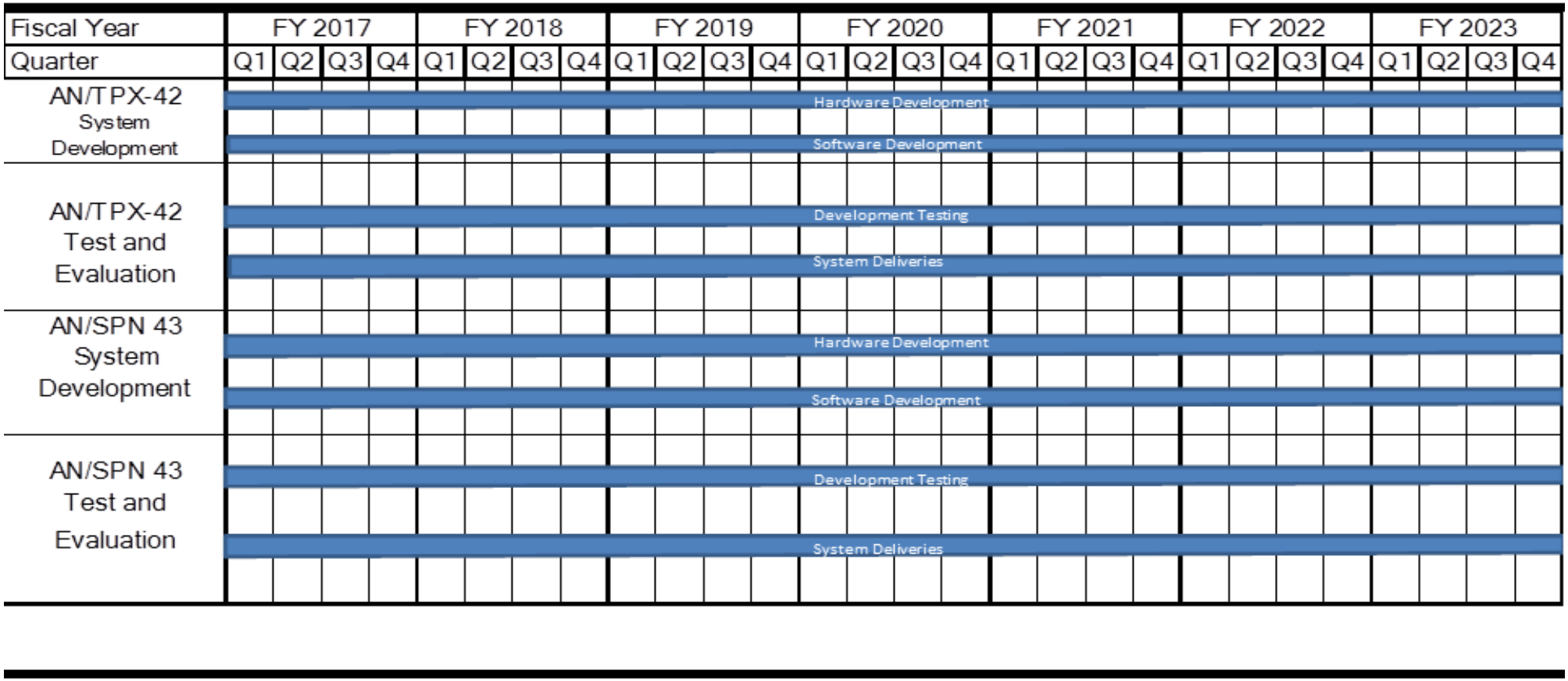


Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

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	2017	4	2023
System Development: Hardware Development: Quality Design and Build (AN/SPN43C)	4	2017	4	2023
System Development: Hardware Development: AN/TPX-42A(V)	1	2017	4	2023
System Development: Software Development: AN/TPX-42A(V)	1	2017	4	2023
System Development: Reviews: Critical Design Review (CDR) (AN/SPN-50(V)1)	2	2018	2	2018
Page/Group/Row				
Test and Evaluation: Developmental Testing/Operational Testing (AN/SPN-50(V)1)	4	2018	4	2019
Test and Evaluation: Developmental Testing (AN/TPX-42A(V))	1	2017	4	2023
Production Milestones: Developmental Testing (AN/SPN-43C)	1	2017	4	2023
Production Milestones: Contract Awards: (AN/SPN-50(V)1) Post-CDR EDM Contract Award	4	2017	4	2017
Deliveries: Pre-CDR Configuration Prototype Delivery (AN/SPN-50(V)1)	4	2017	4	2017
Deliveries: Post-CDR Configuration Prototype Delivery (AN/SPN-50(V)1)	4	2018	4	2018
Deliveries: System Deliveries (TPX-42A(V))	1	2017	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
1657: *ATC Improvement*	3.445	0.383	0.413	0.419	-	0.419	0.419	0.428	0.438	0.447	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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: NAS MOD VIDS	0.191	0.210	0.210	0.000	0.210
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 2018 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 2019 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 2019 OCO Plans: N/A					
Title: Fleet ATC Systems	0.192	0.203	0.209	0.000	0.209
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
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 2018 Plans:*** Continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system. for future processor/display, sensor and communication systems. ***FY 2019 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 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $0.006M from FY 2018 to FY 2019 is due to inflation.					
Accomplishments/Planned Programs Subtotals	0.383	0.413	0.419	0.000	0.419

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• OPN/2820: *Ashore ATC Equipment: NASMOD/Fleet ATC*	35.498	35.900	35.696	-	35.696	36.485	37.694	39.444	40.471	Continuing	Continuing

Remarks

Ashore ATC Equipment: FY2017-FY2023 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 2019 Navy		Date: February 2018
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 2019 Navy		Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop - VIDS	WR	SPAWAR Systems Command : Charleston, SC	1.765	0.191	Dec 2016	0.210	Dec 2017	0.210	Dec 2018	-		0.210	Continuing	Continuing	Continuing
Primary HDW Develop - Fleet ATC	WR	SPAWAR Systems Center : Charleston, SC	0.744	0.192	Dec 2016	0.203	Dec 2017	0.209	Dec 2018	-		0.209	Continuing	Continuing	Continuing
		Subtotal	2.509	0.383		0.413		0.419		-		0.419	Continuing	Continuing	N/A

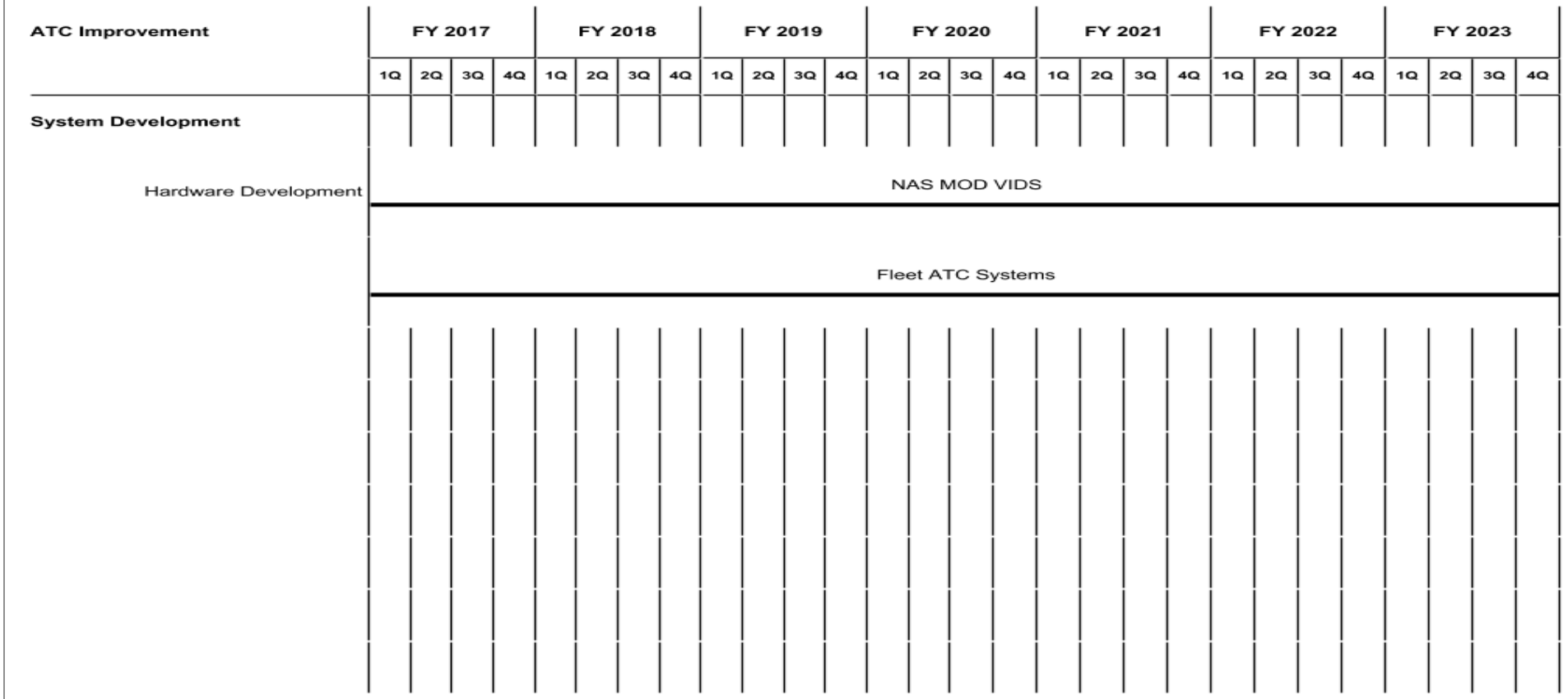
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.445	0.383		0.413		0.419		-		0.419	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*



2019DON - 0604504N - 1657

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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 Development: Hardware Development: NAS MOD VIDS	1	2017	4	2023
System Development: Hardware Development: Fleet ATC Systems	1	2017	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
3372: *ATC Systems*	24.827	14.442	30.466	21.912	-	21.912	22.368	21.707	17.081	18.331	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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: AN/SPN-46 Blk IV Upgrade	11.386	17.217	8.534	0.000	8.534
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 2018 Plans: Pedestal component of the block upgrade will be fabricated and integrated with the new transmitter and circuit cards, support is required for hardware/software integration and development, and test cost increases required for flight testing of the AN/SPN-46 Blk IV with the F/A-18. Complete development of the Blk IV upgrade. Perform flight testing of the antenna and pedestal.					
FY 2019 Base Plans: Install AN/SPN-46 Blk IV pedestal and transmitter on CVN to perform integration and qualification testing.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Decrease of $8.683M from FY 2018 to FY 2019 is due to the completion of the AN/SPN-46 Block IV upgrade.					
Title: AN/SPN-35 Blk I Upgrade	3.056	13.249	7.957	0.000	7.957
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. 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 2018 Plans: Award contracts for Blk I primary and auxiliary equipment development. Continue development of the Blk I upgrade to include ordering of long lead items for the Radar Processing Controller (RPC), the receiver, main I/O processor, and control indicator. Assess and address broadened CyberSecurity requirements to remain compliant with Information Assurance Mandates.					
FY 2019 Base Plans: Complete development of the AN/SPN-35 Blk I upgrade. Perform Test Readiness Review (TRR) and begin testing.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease of $5.292M from FY 2018 to FY 2019 is due to the ramping down of the AN/SPN-35 Block I Upgrade.					
Title: AN/SPN-46 Block V Upgrade	0.000	0.000	5.421	0.000	5.421
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, and optimizing and reconfiguring the radar's software					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
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 on outdated bus systems and IP based substructures as well 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 2018 Plans:*** N/A ***FY 2019 Base Plans:*** Complete Analysis of Alternatives (AoA) for the individual engineering changes, start engineering designs to support PDR level reviews for the radar CCAs, RTOS, software, RAM pole and the TS-3098 which together comprise the Blk V upgrade. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $5.421M from FY 2018 to FY 2019 is due to the start-up of the AN/SPN-46 Block 5 Upgrade program.					
Accomplishments/Planned Programs Subtotals	14.442	30.466	21.912	0.000	21.912

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• OPN/2830: *Afloat ATC Equipment/ACLS*	20.926	35.954	39.297	-	39.297	40.705	43.331	43.274	44.182	Continuing	Continuing

Remarks

Afloat ATC Equipment: FY2017-FY2023 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 Material Development Decisions (MDD) and Milestones.

E. Performance Metrics

Test Readiness Review (TRR) of the AN/SPN-46 Block IV and AN/SPN-35 Block I upgrade.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 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	9.622	4.903	Nov 2016	7.263	Nov 2017	4.057	Nov 2018	-		4.057	Continuing	Continuing	Continuing
Ancillary Hardware Development - AN/SPN-46 Blk IV Upgrade	C/CPFF	Sierra Nevada Corp (SNC) : Reno, NV	12.737	5.101	Dec 2016	7.120	Dec 2017	0.000		-		0.000	0.000	24.958	24.958
Primary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	2.026	Nov 2016	5.236	Nov 2017	3.455	Nov 2018	-		3.455	Continuing	Continuing	Continuing
Ancilliary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.272	Apr 2017	4.083	Nov 2017	2.532	Nov 2018	-		2.532	Continuing	Continuing	Continuing
Primary Hardware Development - AN/SPN - 46 Blk V Upgrade	C/CPFF	TBD : TBD	0.000	0.000		0.000		4.254	Nov 2018	-		4.254	0.000	4.254	4.254
		Subtotal	22.359	12.302		23.702		14.298		-		14.298	Continuing	Continuing	N/A

Remarks

New cost in FY19 ($4.254 million) is for AN/SPN-46 Block V Upgrade to complete Analysis of Alternatives (AoA) for individual engineering changes, start engineering designs to support PDR level reviews for the radar CCAs, RTOS, software, RAM pole and the TS-3098 which together comprise the Blk V upgrade.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support (ILS)	WR	NAWCAD : Patuxent River, MD	0.442	0.495	Nov 2016	1.275	Nov 2017	1.300	Nov 2018	-		1.300	Continuing	Continuing	Continuing
Systems Engineering Support	WR	NAWCAD : Patuxent River, MD	0.834	0.720	Nov 2016	2.050	Nov 2017	1.995	Nov 2018	-		1.995	Continuing	Continuing	Continuing
		Subtotal	1.276	1.215		3.325		3.295		-		3.295	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	0.187	0.305	Nov 2016	2.312	Nov 2017	2.402	Nov 2018	-		2.402	Continuing	Continuing	Continuing
AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.217	Nov 2018	-		0.217	Continuing	Continuing	Continuing
AN/SPN-46 Blk V Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.123	Nov 2018	-		0.123	Continuing	Continuing	Continuing
		Subtotal	0.187	0.305		2.312		2.742		-		2.742	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management (PM) Support	WR	NAWCAD : Patuxent River, MD	0.802	0.510	Nov 2016	0.777	Nov 2017	1.190	Nov 2018	-		1.190	Continuing	Continuing	Continuing
PM Suppt - MSS	C/CPAF	TBD : Patuxent River, MD	0.203	0.110	Nov 2016	0.350	Nov 2017	0.387	Nov 2018	-		0.387	Continuing	Continuing	Continuing
		Subtotal	1.005	0.620		1.127		1.577		-		1.577	Continuing	Continuing	N/A

Remarks

Increase in FY19 Management Services is due to AN/SPN-46 Blk V entering the first full year of development.

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	24.827	14.442		30.466		21.912		-		21.912	Continuing	Continuing	N/A

Remarks

Program decrease from FY18 to FY19 represents the progression of AN/SPN-46 Blk IV to completion.

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

ATC Systems

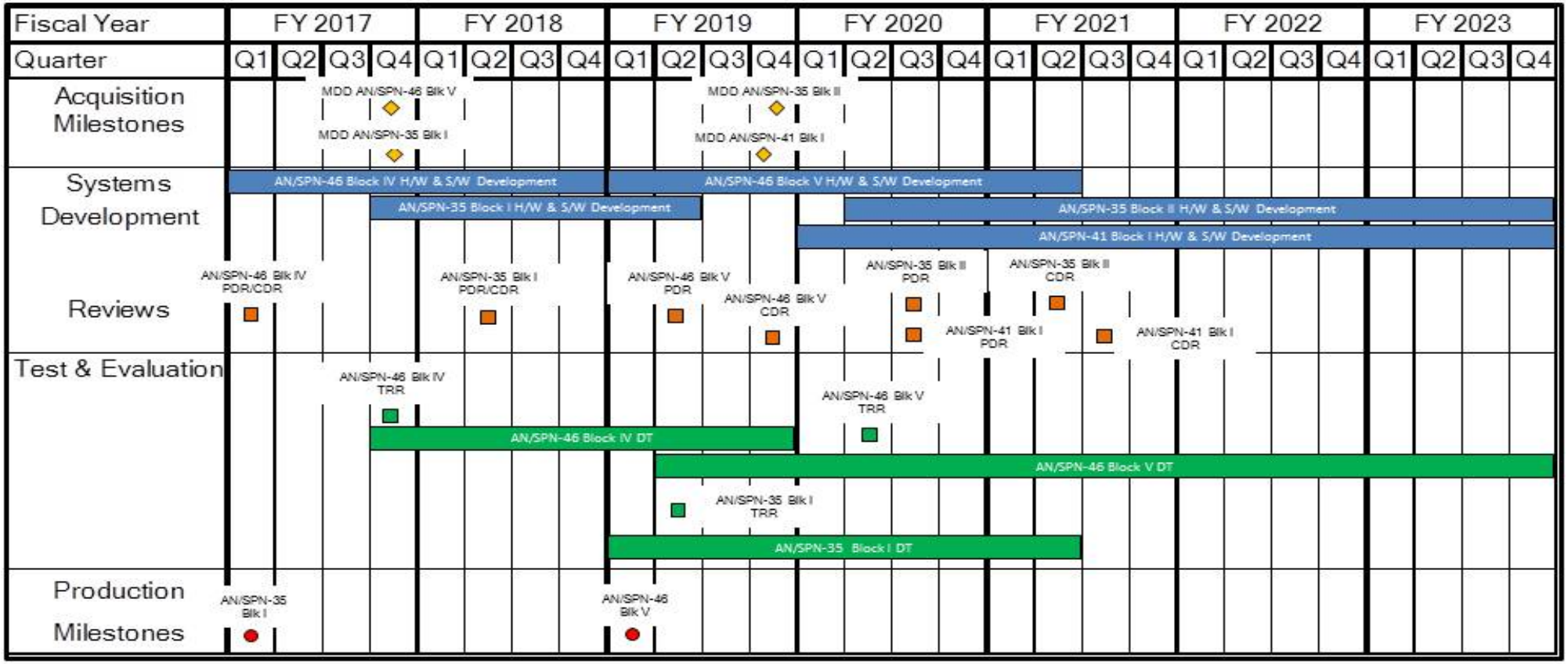


Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3372				
Acquisition Milestones: MDD AN/SPN-46 Blk V	4	2017	4	2017
Acquisition Milestones: MDD AN/SPN-35 Blk I	4	2017	4	2017
Acquisition Milestones: MDD AN/SPN-35 Blk II	4	2019	4	2019
Acquisition Milestones: MDD AN/SPN-41 Blk I	4	2019	4	2019
Production Milestones: Contract Award AN/SPN-46 BLK V	1	2019	1	2019
Production Milestones: Contract Award AN/SPN-35 Blk I	1	2017	1	2017