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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	300.313	50.195	38.863	27.499	-	27.499	-	-	-	-	-	-
0718: <i>MATCAL S</i>	20.920	6.394	3.222	3.136	-	3.136	-	-	-	-	-	-
0993: <i>Carrier ATC</i>	185.984	21.924	13.668	9.897	-	9.897	-	-	-	-	-	-
1657: <i>ATC Improvement</i>	4.656	0.400	0.424	0.358	-	0.358	-	-	-	-	-	-
3372: <i>ATC Systems</i>	88.753	21.477	21.549	14.108	-	14.108	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The FY 2022 funding request was reduced by \$2.957 million 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. 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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	44.923	38.863	30.058	-	30.058
Current President's Budget	50.195	38.863	27.499	-	27.499
Total Adjustments	5.272	0.000	-2.559	-	-2.559
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	7.000	0.000			
• SBIR/STTR Transfer	-1.728	0.000			
• Program Adjustments	0.000	0.000	-1.957	-	-1.957

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• Rate/Misc Adjustments	0.000	0.000	-0.602	-	-0.602
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Change Summary Explanation

Financial:

The FY 2020 increase of \$7.0 million is due to a Below Threshold Reprogramming for the AN/SPN-50(V)1 development cost increase due to unforeseen contract growth and rework driven by test deficiencies.

The FY 2022 change is due to the reduction from availability of prior year execution balances, rate adjustments, and increase to Common Aviation Command and Control System (CAC2S).

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
0718: MATCALs	20.920	6.394	3.222	3.136	-	3.136	-	-	-	-	-	-
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 Marine Resource Oversight Committee 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 preplanned program improvement (P3I) and evolutionary product improvements as required for Ground/Air Task Oriented Radar System (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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: ASPARCS Improvements	0.587	0.590	0.602	0.000	0.602
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 2021 Plans: Develop ECP's to minimize obsolescence issues within the Precision Approach Radar and develop capability to meet the multiple touchdown point capability requirement.					
FY 2022 Base Plans: Develop ECP's to minimize obsolescence issues within the Precision Approach Radar and develop capability to meet the multiple touchdown point capability requirement. Perform operational functionality study and analysis regarding Expeditionary Air Traffic Control tower capability improvements.					
FY 2022 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021			
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 0718 / MATCALs				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
		FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A						
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 to FY 2022 increase is due to inflation.						
Title: Ground/Air Task Oriented Radar System (G/ATOR)		3.279	0.000	0.000	0.000	0.000
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 2021 Plans: N/A						
FY 2022 Base Plans: N/A						
FY 2022 OCO Plans: N/A						
Title: Virtual Warfare Center Support		2.528	2.632	1.534	0.000	1.534
Articles:		-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy	Date: May 2021
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Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 0718 / <i>MATCAL</i> S
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>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.</p> <p>FY 2021 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.</p> <p>FY 2022 Base Plans: Continue to support integration and development of Designs of Experiment related to Marine Air Ground Task Force (MAGTF) IAMD capabilities. Provide event technical support for additional analysis events. Conduct and document analysis results for capabilities. Provide event technical support for additional analysis events. Conduct and document analysis results for USMC stakeholders.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: The decrease from FY 2021 to FY 2022 is due to a decreasing requirement and re-phasing of funds due to under-execution.</p>					
<p>Title: Common Aviation Command and Control System (CAC2S)</p> <p align="right">Articles:</p> <p>Description: Integrate ATNAVICS with the Common Aviation Command and Control System (CAC2S) to provide a coordinated and integrated modernization effort for the equipment of the Marine Air Command and Control System and provide enhanced Air Command and Control (AC2) capability for the Tactical Air Command Center, Tactical Air Operations Center, and Direct Air Support Center to support aviation employment in Joint, combined, and coalition operations.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Base Plans:</p>	0.000 -	0.000 -	1.000 1	0.000 -	1.000 1

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Integration of ATNAVICS and CAC2S, including the production of an MATC CAC2S prototype, developmental testing, field unit evaluation and certification.					
<i>FY 2022 OCO Plans:</i> N/A					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> The FY 2021 to FY 2022 increase is due to the additional CAC2S integration efforts in FY 2022.					
Accomplishments/Planned Programs Subtotals	6.394	3.222	3.136	0.000	3.136

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTEN/0204460M: G/ATOR	30.669	22.205	21.367	-	21.367	-	-	-	-	-	-
• OPN/2820: <i>Ashore ATC Equipment/MATCALs</i>	4.201	9.506	10.604	-	10.604	-	-	-	-	-	-

Remarks

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 requires modification to achieve FAA flight certification and 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-8 and a Decision Analysis Study was conducted by NAVAIR. Funding will address development of expeditionary ATC Tower capability improvements via the Engineering Change Proposal process.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Primary HDW Develop - ASPARCS Mode 5/S	WR	NAWCAD : Patuxent River, MD	2.089	0.587	Dec 2019	0.590	Dec 2020	0.000		-		0.000	-	-	-
Primary HDW Develop - ASPARCS	C/BA	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.134	Dec 2021	-		0.134	-	-	-
Primary HDW Develop - ASPARCS	WR	NIWC : San Diego, CA	0.510	0.000		0.000		0.200	Dec 2021	-		0.200	-	-	-
Primary HDW Develop - ASPARCS	C/CPFF	TRANDES : San Diego, CA	1.783	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			4.382	0.587		0.590		0.334		-		0.334	-	-	N/A

Remarks
SPAWARSYSCEN has changed its name and is now called Naval Information Warfare Center (NIWC).

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Development - G/ATOR	WR	NSWC : Dahlgren, VA	1.619	0.956	Mar 2020	0.000		0.000		-		0.000	-	-	-
Software Development - ASPARCS	WR	NAWCAD : Patuxent River, MD	4.572	0.000		0.000		0.200	Dec 2021	-		0.200	-	-	-
Software Development - Mode 5/S Dev - G/ATOR	SS/CPIF	Telephonics : Huntington Station, NY	5.854	2.123	Nov 2019	0.000		0.000		-		0.000	-	-	-
Engineering Support - VWC	TBD	NSMA : TBD	2.262	1.047	Jan 2020	1.157	Dec 2020	0.880	Dec 2021	-		0.880	-	-	-
Software Development - VWC	C/BA	TBD : TBD	0.999	1.321	Jan 2020	1.315	Dec 2020	0.584	Dec 2021	-		0.584	-	-	-
Software Development - CAC2S	TBD	TBD : TBD	0.000	0.000		0.000		0.975	Dec 2021	-		0.975	-	-	-
Subtotal			15.306	5.447		2.472		2.639		-		2.639	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date: May 2021**

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 0718 / <i>MATCALs</i>
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MATCALs	FY 2020				FY 2021				FY 2022				
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
Acquisition Milestones													
System Development													
Software Development	G/ATOR												
	Visual Warfare Center												
										CAC2S			
Hardware Development	ASPARCS Improvement Developments												
Test Events	G/ATOR Mode 5												
Production Milestones													

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 0718 / <i>MATCAL</i> S
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MATCAL S				
System Development: Software Development: G/ATOR	1	2020	4	2020
System Development: Software Development: Visual Warfare Center	1	2020	4	2022
System Development: Software Development: CAC2S	1	2022	4	2022
System Development: Hardware Development: ASPARCS improvements	1	2020	4	2022
System Development: Test Events: G/ATOR Mode 5	1	2020	3	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>				Project (Number/Name) 0993 / <i>Carrier ATC</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
0993: <i>Carrier ATC</i>	185.984	21.924	13.668	9.897	-	9.897	-	-	-	-	-	-
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 ATC System Shipboard, AN/SYY-1(V) interfaces to emerging sensors as well as those currently in service to improve reliability to the fleet. The embedded training capability of the AN/TPX-42A(V) will carry on to the AN/SYY-1(V). 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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: AN/SPN-50	15.924	6.911	4.484	0.000	4.484
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 2021 Plans: Follow-on testing to Support ITC1 and Operational Test Readiness Review (OTRR). Conduct M Demo and Logistics Demo.					
FY 2022 Base Plans: Testing continues with IT-C2 and OT-C1 (IOT&E). Updating ILA in support of Initial Operational Capability (IOC).					
FY 2022 OCO Plans:					

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
FY 2021 to FY 2022 Increase/Decrease Statement:					
The FY 2021 to FY 2022 decrease due to AN/SPN-50(V)1 development program ramping down.					
Title: AN/SPN-43C	2.301	2.347	2.394	0.000	2.394
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 2021 Plans: Continued sustainment ECPs for AN/SPN-43C.					
FY 2022 Base Plans: Continued sustainment ECPs for AN/SPN-43C.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 to FY 2022 increase is due to inflation.					
Title: AN/TPX-42	3.699	4.410	3.019	0.000	3.019
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 2021 Plans: Continue sustainment ECPs for AN/TPX-42. Continue developing shipboard enclave environment, reduce cyber vulnerabilities of aviation land and launch systems and improve the ability to continue manned and unmanned					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
aircraft flight operations in a cyber-contested battlespace. Continue land based testing for AN/TPX-42 interface with Enterprise Air Surveillance Radar (EASR and AN/SPN-50). FY 2022 Base Plans: Continue sustainment ECPs for AN/TPX-42. Continue developing shipboard enclave environment, reduce cyber vulnerabilities of aviation land and launch systems and improve the ability to continue manned and unmanned aircraft flight operations in a cyber-contested battlespace. Complete land based testing for AN/TPX-42 interface with Enterprise Air Surveillance Radar (EASR and AN/SPN-50). FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 to FY 2022 decrease is due to the completion of land based testing for the AN/TPX-42 interface with AN/SPN-50.					
Accomplishments/Planned Programs Subtotals	21.924	13.668	9.897	0.000	9.897

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN/2830: Afloat ATC	24.349	40.100	35.856	-	35.856	-	-	-	-	-	-
<i>Equipment: SATC / AN/SPN-50(V)1</i>											
Remarks											

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 in progress ECPs, with improvements being incorporated into the production of AN/SYY-1(V) 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.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy											Date: May 2021				
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)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Primary HDW Develop-TPX-42	WR	NAWCAD : PAX River, MD	6.529	0.574	Dec 2019	0.869	Dec 2020	0.833	Nov 2021	-		0.833	-	-	-
Primary HDW Develop - SPN-43	WR	NAWCAD : PAX River, MD	5.148	0.484	Dec 2019	0.526	Dec 2020	0.537	Nov 2021	-		0.537	-	-	-
Primary HDW Develop - SPN-50(V)1 Pre-CDR Configuration EDM	C/CPIF	SAAB : Syracuse NY	11.317	0.000		0.000		0.000		-		0.000	-	-	-
Primary HDW Develop - SPN-50(V)1 Post-CDR Configuration EDM	C/CPIF	SAAB : Syracuse NY	5.383	0.095	Dec 2019	0.203	Dec 2020	0.207	Oct 2021	-		0.207	-	-	-
Primary HDW EMD - SPN-50(V)1	C/CPIF	SAAB : Syracuse NY	39.377	9.148	Dec 2019	2.230	Dec 2020	2.219	Oct 2021	-		2.219	-	-	-
Prior year Prod Dev no longer funded in the FYDP	Various	Various : TBD	17.998	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			85.752	10.301		3.828		3.796		-		3.796	-	-	N/A

Remarks

FY 2020 and FY2021 increase for AN/SPN-50(V)1 is due to unforeseen contract growth and rework driven by test deficiencies.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Development-TPX-42	WR	NAWCAD : PAX River, MD	24.805	2.071	Dec 2019	2.100	Dec 2020	0.516	Nov 2021	-		0.516	-	-	-
Integrated Logistics Support- TPX-42	WR	NAWCAD : PAX River, MD	2.199	0.122	Dec 2019	0.406	Dec 2020	0.200	Nov 2021	-		0.200	-	-	-
Integrated Logistics Support-SPN-43	WR	NAWCAD : PAX River, MD	1.251	0.122	Dec 2019	0.123	Dec 2020	0.125	Nov 2021	-		0.125	-	-	-
Integrated Logistics Support-SPN-50(V)1	WR	NAWCAD : PAX River, MD	1.699	0.364	Dec 2019	0.193	Dec 2020	0.000		-		0.000	-	-	-
Studies & Analysis-SPN-50(V)1	WR	NAWCAD : PAX River, MD	4.441	0.065	Dec 2019	0.085	Dec 2020	0.000		-		0.000	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

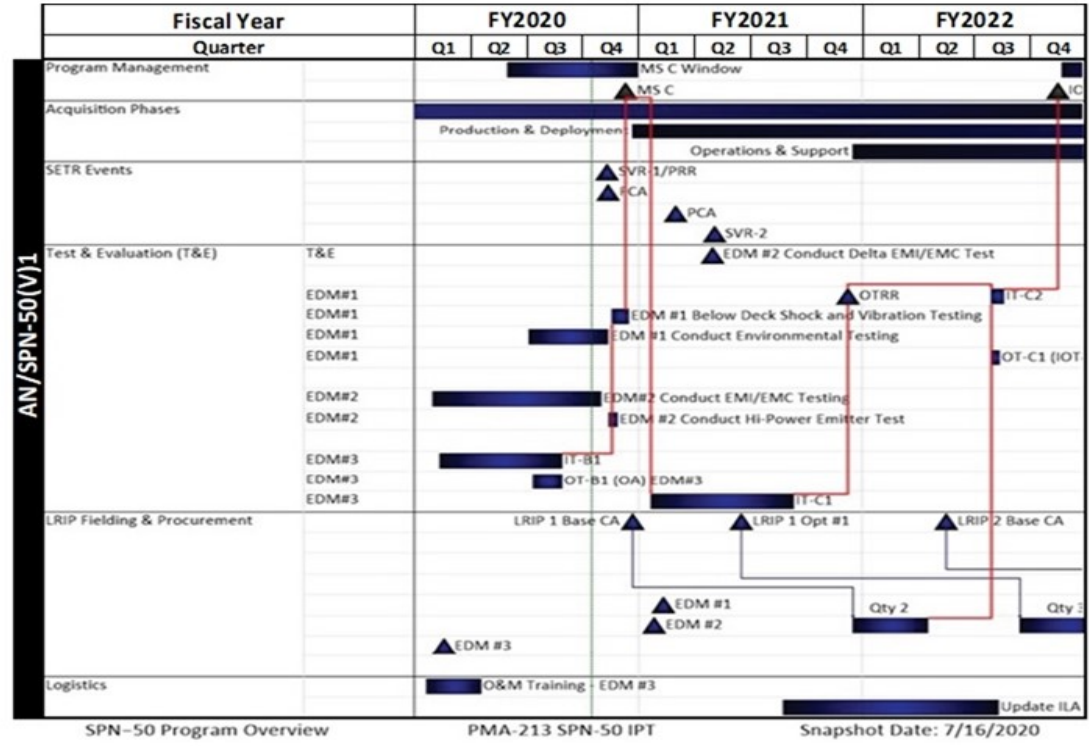
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / Air Control	Project (Number/Name) 0993 / Carrier ATC
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Development - SPN-50(V)1	WR	NAWCAD : PAX River, MD	11.235	0.080	Dec 2019	0.212	Dec 2020	0.071	Nov 2021	-		0.071	-	-	-
Studies & Analysis-SPN-43	WR	NAWCAD : PAX River, MD	2.069	0.021	Dec 2019	0.022	Dec 2020	0.023	Nov 2021	-		0.023	-	-	-
Studies & Analysis-TPX-42	WR	NAWCAD : PAX River, MD	1.521	0.102	Dec 2019	0.250	Dec 2020	0.000		-		0.000	-	-	-
Systems Engineering-SPN-50(V)1	WR	NAWCAD : PAX River, MD	14.947	2.340	Dec 2019	0.517	Dec 2020	0.000		-		0.000	-	-	-
Prior Year Support no longer funded in the FYDP	Various	Various : Various	13.393	0.000		0.000		0.000		-		0.000	-	-	-
Studies & Analysis SPN-50(V)1	WR	Variou : VA	0.402	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			77.962	5.287		3.908		0.935		-		0.935	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test & Evaluation- TPX-42	WR	NAWCAD : PAX River, MD	4.757	0.726	Dec 2019	0.785	Dec 2020	0.285	Nov 2021	-		0.285	-	-	-
Development Test & Evaluation - SPN-43	WR	NAWCAD : PAX River, MD	5.048	1.520	Dec 2019	1.550	Dec 2020	1.581	Nov 2021	-		1.581	-	-	-
Operational Test & Evaluation-SPN-50(V)1	WR	OPTEVOR : Norfolk, VA	0.677	0.296	Dec 2019	2.272	Dec 2020	1.974	Nov 2021	-		1.974	-	-	-
Prior year T&E no longer funded in the FYDP	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	-	-	-
Development Test & Evaluation SPN-50	WR	NAWCAD : PAX River	6.097	2.664	Dec 2019	0.000		0.000		-		0.000	-	-	-
Subtotal			16.579	5.206		4.607		3.840		-		3.840	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / Air Control	Project (Number/Name) 0993 / Carrier ATC



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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date: May 2021**

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 0993 / <i>Carrier ATC</i>
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AN/TPX-42 / AN/SPN-43 Schedule

Fiscal Year Quarter	FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
AN/TPX-42 System Development	Hardware Development											
	Software Development											
AN/TPX-42 Test and Evaluation	Development Testing											
	System Deliveries											
AN/SPN-43 System Development	Hardware Development											
	Software Development											
AN/SPN-43 Test and Evaluation	Development Testing											
	System Deliveries											

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Legend
 Development (RD TEN)

Revision Date: 29 Apr 2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 0993 / <i>Carrier ATC</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Carrier ATC				
Acquisition Milestones: Milestones: AN/SPN-50(V)1 Milestone C	4	2020	4	2020
System Development: Hardware Development: AN/SPN-43C	1	2020	4	2022
System Development: Hardware Development: AN/TPX-42A(V)	1	2020	4	2022
System Development: Software Development: AN/SPN-43C	1	2020	4	2022
System Development: Software Development: AN/TPX-42A(V)	1	2020	4	2022
System Development: Reviews: Functional Configuration Audit/Production Readiness Review (AN/SPN-50(V)1)	4	2020	4	2020
System Development: Reviews: Physical Configuration Audit (AN/SPN-50(V)1)	1	2021	1	2021
Test and Evaluation: Developmental Testing/Operational Testing (AN/SPN-50(V)1)	3	2020	1	2021
Test and Evaluation: Developmental Testing (AN/TPX-42A(V))	1	2020	4	2022
Test and Evaluation: Developmental Testing (AN/SPN-43C)	1	2020	4	2022
Deliveries: System Deliveries (TPX-42A(V))	1	2020	4	2022
Deliveries: System Deliveries (AN/SPN-43C)	1	2020	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>				Project (Number/Name) 1657 / <i>ATC Improvement</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
1657: <i>ATC Improvement</i>	4.656	0.400	0.424	0.358	-	0.358	-	-	-	-	-	-
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), Fleet ATC Systems, and remote tower improvements.. 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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: NAS MOD VIDS	0.207	0.211	0.181	0.000	0.181
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 2021 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. To include VIDS cyber integration efforts and continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system.					
FY 2022 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. To include VIDS cyber integration efforts and continue engineering efforts to maintain interoperability with the FAA's next generation air traffic control system.					
FY 2022 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 to FY 2022 decrease is due to funds being re-phased to the outyears due to under-execution.					
Title: Fleet ATC Systems	0.193	0.213	0.177	0.000	0.177
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 2021 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 2022 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 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 to FY 2022 decrease is due to funds being re-phased to the outyears due to under-execution.					
Accomplishments/Planned Programs Subtotals	0.400	0.424	0.358	0.000	0.358

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN/2820: Ashore ATC Equipment: NASMOD/Fleet ATC	36.385	37.072	39.485	-	39.485	-	-	-	-	-	-
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 1657 / <i>ATC Improvement</i>
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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.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 1657 / <i>ATC Improvement</i>
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	FY 2020				FY 2021				FY 2022			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
ATC Improvement												
System Development												
Hardware Development	NASMOD VIDS											
	Fleet ATC Systems											

2022PB - 0604504N - 1657

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 1657 / <i>ATC Improvement</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>ATC Improvement</i>				
System Development: Hardware Development: NASMOD VIDS	1	2020	4	2022
System Development: Hardware Development: Fleet ATC Systems	1	2020	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
3372: ATC Systems	88.753	21.477	21.549	14.108	-	14.108	-	-	-	-	-	-
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: AN/SPN-46 Blk IV Upgrade	9.340	6.190	0.114	0.000	0.114
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, replacement of obsolete circuit cards, addresses transmitter obsolescence issues, and Cybersecurity					
FY 2021 Plans: Continue qualification testing of the pedestal/transmitter configuration. Complete the principal unit (Pedestal EDMs) Electromagnetic Interference (EMI), environmental and shock testing. Installation of EDMs at the Landing Systems Test Facility (LSTF) to start the full system integration, in-system testing, and formal flight qualification testing.					
FY 2022 Base Plans: Complete flight testing. Complete development of the AN/SPN-46 Blk IV upgrade.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease from FY 2021 to FY 2022 is due to the pedestal/transmitter efforts concluding.					
Title: AN/SPN-35 Blk I Upgrade	7.360	4.100	0.689	0.000	0.689
Articles:	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: This program 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), and 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.</p> <p>FY 2021 Plans: Complete System Integration Tests for EDM 2 and Environmental Qualification for EDMs 2 - 5.</p> <p>FY 2022 Base Plans: Complete flight testing. Complete development of the AN/SPN-35 Blk I upgrade.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Decrease of \$3.4M from FY 2021 to FY 2022 is due to the completion of the AN/SPN-35 Blk I upgrade.</p>					
<p>Title: AN/SPN-46 Blk V Upgrade (CCAs, RTOS, software, RAM pole, TS-3098)</p> <p align="right">Articles:</p> <p>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 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</p>	4.777 -	7.262 -	4.594 -	0.000 -	4.594 -

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / Air Control	Project (Number/Name) 3372 / ATC Systems
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

designs. Hardware changes will include reducing reliability issues caused by outdated bus systems and IP based substructures and provide an 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 2021 Plans:

Continue engineering design reviews and documentation updates for all updated components to support two additional TIM's.

FY 2022 Base Plans:

Complete the development of SW re-architecture efforts, Real Time Operating System (RTOS) updates and Radar Processor Single Board Computer upgrades. Integrate and begin qualification testing of upgrades with maintenance Local Area Network (LAN).

FY 2022 OCO Plans:

N/A

FY 2021 to FY 2022 Increase/Decrease Statement:

Decrease of \$2.668M from FY 2021 to FY 2022 is due to engineering efforts ramping down for software development.

Title: AN/SPN-35 Blk II Upgrade

Articles:

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
	0.000	3.997	8.711	0.000	8.711
	-	-	-	-	-

Description: This program provides for the development, upgrade, redesign, integration, and testing of the AN/SPN-35C Block II 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 II upgrade will include engineering efforts to develop an Active Electronically Steered Array (AESA) to replace the existing receiver-transmitter, pedestal, antenna group and incorporate digital stabilization.

FY 2021 Plans:

Continue development of two-panel subarray. This involves System Requirements Review (SRR), software development, design of the Radome, and design of the core elements critical to proving the array will work in the frequency band and track targets.

FY 2022 Base Plans:

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Continue development of AESA to include completion of initial evaluation of subarray. Follow-on fabrication of a full array. Increased development efforts contain significant engineering events such as system Preliminary Design Review (PDR) in 1st quarter, and Critical Design Review (CDR) in 4th quarter. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Increase of \$4.714M from FY 2021 to FY 2022 is due to the increased engineering efforts for the AESA.					
Accomplishments/Planned Programs Subtotals	21.477	21.549	14.108	0.000	14.108

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/2830: <i>Afloat ATC Equipment/ACLS</i>	38.930	17.528	31.199	-	31.199	-	-	-	-	-	-

Remarks

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. 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. The current SPN systems will need to be sustained through 2040.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / Air Control	Project (Number/Name) 3372 / ATC Systems
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Primary Hardware Development - AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	22.428	5.159	Nov 2019	2.436	Nov 2020	0.000		-		0.000	-	-	-
Ancillary Hardware Development - AN/SPN-46 Blk IV Upgrade	C/CPFF	Sierra Nevada Corp (SNC) : Reno, NV	25.857	2.550	Nov 2019	2.257	Nov 2020	0.000		-		0.000	-	-	-
Primary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	10.717	2.515	Nov 2019	1.796	Nov 2020	0.328	Nov 2021	-		0.328	-	-	-
Ancillary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	9.151	4.043	Nov 2019	1.539	Nov 2020	0.000		-		0.000	-	-	-
Primary Hardware Development - AN/SPN - 46 Blk V Upgrade	C/CPFF	Sierra Nevada Corp (SNC) : Reno, NV	2.628	1.583	Nov 2019	3.499	Nov 2020	2.232	Nov 2021	-		2.232	-	-	-
Ancillary Hardware Development - AN/SPN-46 Blk V Upgrade	WR	NAWCAD : Patuxent River, MD	1.249	2.276	Nov 2019	2.584	Nov 2020	1.166	Nov 2021	-		1.166	-	-	-
Primary Hardware Development - AN/SPN-35 Blk II Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		1.000	Nov 2020	2.500	Nov 2021	-		2.500	-	-	-
Ancillary Hardware Development - AN/SPN-35 Blk II Upgrade	C/CPFF	GTRI : Atlanta, GA	0.000	0.000	Aug 2020	2.997	Nov 2020	5.296	Nov 2021	-		5.296	-	-	-
Subtotal			72.030	18.126		18.108		11.522		-		11.522	-	-	N/A

Remarks
FY 2022 increase in AN/SPN-35 Blk II due to significant engineering events such as PDR and CDR.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / Air Control	Project (Number/Name) 3372 / ATC Systems
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Logistics Support (ILS)	WR	NAWCAD : Patuxent River, MD	3.512	0.992	Nov 2019	1.012	Nov 2020	0.474	Nov 2021	-		0.474	-	-	-
Systems Engineering Support	WR	NAWCAD : Patuxent River, MD	5.599	0.758	Nov 2019	0.770	Nov 2020	0.535	Nov 2021	-		0.535	-	-	-
Subtotal			9.111	1.750		1.782		1.009		-		1.009	-	-	N/A

Remarks
Decrease from FY 2021 to FY 2022 is due to engineering and logistics efforts ramping down for the AN/SPN-46 Blk IV.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	2.792	0.141	Nov 2019	0.162	Nov 2020	0.055	Nov 2021	-		0.055	-	-	-
AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.217	0.465	Nov 2019	0.572	Nov 2020	0.147	Nov 2021	-		0.147	-	-	-
AN/SPN-46 Blk V Upgrade	WR	NAWCAD : Patuxent River, MD	0.123	0.189	Nov 2019	0.192	Nov 2020	0.497	Nov 2021	-		0.497	-	-	-
AN/SPN-35 Blk II Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.131	Nov 2021	-		0.131	-	-	-
Subtotal			3.132	0.795		0.926		0.830		-		0.830	-	-	N/A

Remarks
Decrease from FY 2021 to FY 2022 is due to the completion AN/SPN-46 Blk IV and AN/SPN-35 Blk I testing efforts.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management (PM) Support	WR	NAWCAD : Patuxent River, MD	3.279	0.537	Nov 2019	0.477	Nov 2020	0.487	Nov 2021	-		0.487	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy

Date: May 2021

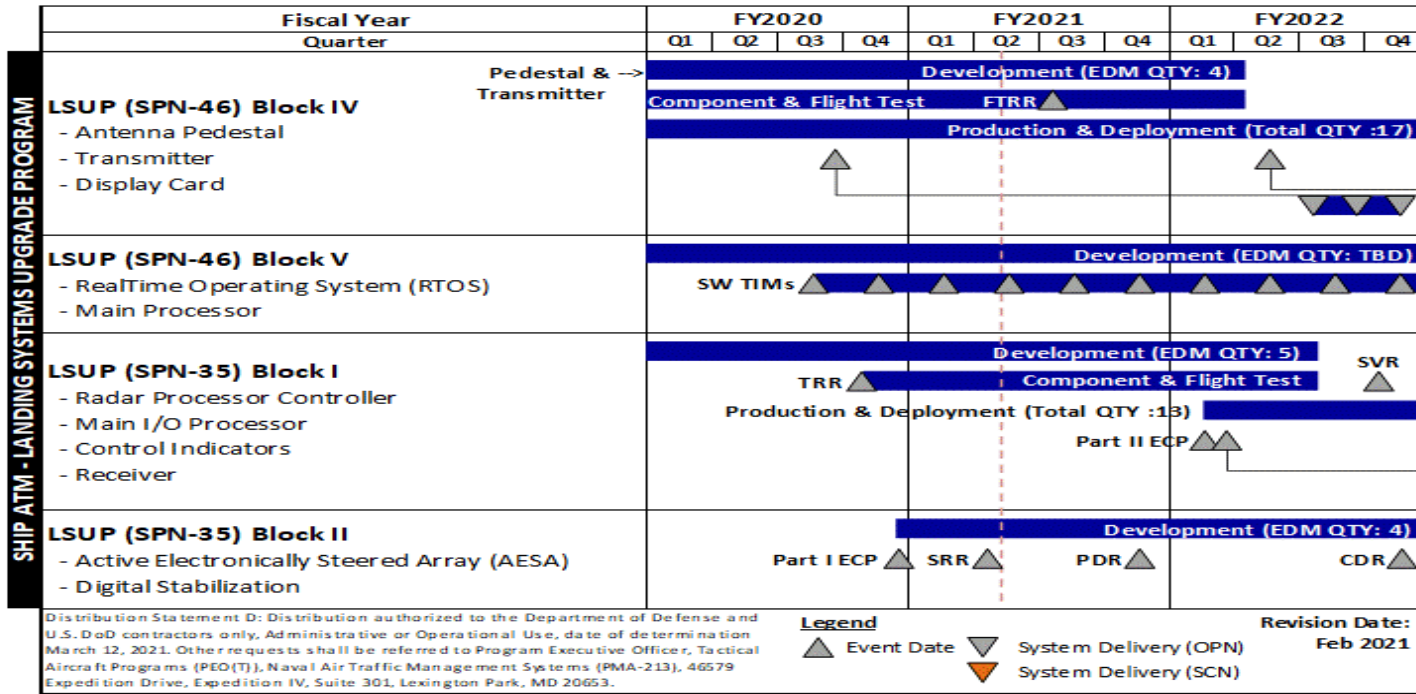
Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604504N / Air Control

Project (Number/Name)
3372 / ATC Systems



LSUP (Landing System Upgrade Program) Roadmap



SHIP ATM - LANDING SYSTEMS UPGRADE PROGRAM

POC: Jordan Yingling
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Bring 'em Back Alive

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / <i>Air Control</i>	Project (Number/Name) 3372 / <i>ATC Systems</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Proj 3372</i>				
Reviews: AN/SPN-46 Blk V Technical Interchange Meeting (TIM) Quarterly	3	2020	4	2022
Reviews: AN/SPN-35 Blk I System Verification Review (SVR)	4	2022	4	2022
Reviews: AN/SPN-35 Blk II System Requirements Review (SRR)	2	2021	2	2021
Reviews: AN/SPN-35 Blk II Preliminary Design Review (PDR)	4	2021	4	2021
Reviews: AN/SPN-35 Blk II Critical Design Review (CDR)	4	2022	4	2022
Test and Evaluation: AN/SPN-46 Blk IV Test Readiness Review (TRR) Display Card/ Power Supply	2	2020	2	2020
Test and Evaluation: AN/SPN-46 Blk IV (TRR) Pedestal/Transmitter	3	2020	3	2020
Test and Evaluation: AN/SPN-35 Blk I (TRR)	4	2020	4	2020