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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	233.127	64.544	62.028	81.254	-	81.254	101.618	82.468	64.240	57.112	Continuing	Continuing
3232: <i>Multi-Mission Signal Processor</i>	168.193	2.761	2.967	2.626	-	2.626	3.211	3.104	3.018	3.043	Continuing	Continuing
3243: <i>Shipboard Passive Electro-Optical Infrared Development</i>	0.000	42.922	48.203	69.082	-	69.082	83.913	66.373	49.428	42.100	Continuing	Continuing
3301: <i>Improved Capabilities SPY-1 Radar</i>	52.323	11.068	9.896	9.546	-	9.546	14.494	12.991	11.794	11.969	Continuing	Continuing
3408: <i>AN/SPS-49 Technical Refresh</i>	12.611	7.793	0.962	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.366

Note

The FY 2023 funding request was reduced by \$14.673 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

Multi-Mission Signal Processor (MMSP): The development of MMSP provides simultaneous Anti-Air Warfare (AAW)/Ballistic Missile Defense (BMD) multi-mission capability for DDG 51 class ships as part of the Aegis Modernization Program. This capability is utilized for DDG 113 and follow new construction and Aegis Ashore. Modifies SPY-1D transmitters

to enable dual beam for reduced frame times and better reaction time, provides stability for all D(V) waveforms, and avoids operational degradation. The SPY-1 radar system detects, tracks, and supports engagements of a broader range of threats. MMSP improves performance in littoral, ducted clutter, electronic attack (EA), and chaff environments and provides greater commonality in computer programs and equipment. This effort also provides for the development of MMSP on Destroyers Commercial Off The Shelf (COTS) refresh and MMSP technology refresh. MMSP/AEGIS Linear Processing System (ALPS) integration provides adjunct processing for data collection. The FY23 funding request supports development of MMSP including the commencement of technology refresh to support Aegis Modernization due to Diminishing Manufacturing Sources and Material Shortages (DMSMS) and obsolescence issues. MMSP-Restoration (MMSP-R) includes software updates required on new computer platforms. Engineering efforts will be required to assess alternate technologies and determine optimal MMSP architectural solutions, which will include system security requirements. Additionally, funding is required for technology development to support integration of ALPS into MMSP-R, continuation of MMSP-R development to support AEGIS modernization and ACB16 MMSP improvements, and MMSP-R Engineering Change Proposal (ECP)/Software updates.

Shipboard Passive Electro-Optical Infrared (SPEIR) Block I will be an open architecture system that addresses near-term capability requirements and associated gaps identified in the 2019 SPEIR Capability Development Document (CDD). This program answers an urgent counter unmanned aircraft system operational need for the Fleet to provide an initial capability by FY26. The SPEIR acquisition leverages technology developed under the Office of Naval Research's (ONR's) Combined EO/IR Surveillance and Response System (CESARS) Science and Technology (S&T) effort, specifically related to the Shipboard Panoramic EO/IR Cueing and Surveillance

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>
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System (SPECSS). SPEIR Block I will provide a common 360-degree EO/IR Electronic Support (ES) capability to surface ships that will passively find, fix, track, and target current / emerging threats in support of the following warfare missions: Anti-Ship Cruise Missile (ASCM) Defense, Counter-Unmanned Aircraft Systems (UAS), Counter-Fast Attack Craft / Fast In-shore Attack Craft (FAC/FIAC), and Mobility. SPEIR Block I will consist of a passive Wide Field of View (WFOV) capability with a 360-degree field-of-view optical sensors for autonomous detection and tracking for 24/7 day/night shipboard situational awareness. SPEIR Block I will also include an enhanced, high resolution Narrow-Medium Field of View (NFOV) and laser range-finding capability that will provide 3D target tracking, identification, and threat assessment. SPEIR Block I will have limited integration with shipboard combat systems to exchange target track data and disseminate motion imagery. This program includes risk reduction initiatives for modeling and simulation, sensor protection counter-countermeasures, Sensor Fusion Algorithms and combat system track publishing to enable limited Combat System Integration (CSI). SPEIR Block II will be a future program that will build on the modular open system architecture of Block I to address longer-term capability requirements to include an expanded spatial coverage envelope, Periscope Detection and Discrimination (PDD) and Mine Like Object (MLO) avoidance. SPEIR Block II will also provide full combat system integration and will include a government software development and integration effort for Soft-Kill Coordination System (SKCS) to manage ES engagements. The FY23 funding request supports detailed hardware and software design of the SPEIR Block I system, completion of initial software builds and associated integration effort, and limited procurement of material for Engineering Development Models (EDMs). Scope includes execution of Preliminary Design Review (PDR), continued test planning, training curriculum development and Modeling and Simulation (M&S) development and maturation. Increases from FY21 through FY24 are consistent with expected ramp up of developmental activities of a new Acquisition Category II program during the Engineering and Manufacturing Development (E&MD) phase. FY21 included partial year funding to initiate program execution and to award the E&MD contract, FY22 includes funding to execute system design and development activities, and FY23 includes funding focusing on E&MD contract execution, including one major System Engineering Technical Review (SETR) event (PDR) that will baseline system design to support same year (FY23) procurement of limited EDM materials. Additionally, FY23 will include planning, processes and procedures for system integration and development test. RDT&E costs are anticipated to ramp down starting in FY25 as Integration & Test planning is complete, EDM material procurements are completed, and all three (3) EDMs are assembled and integrated to support the execution of developmental test events prior to program transition to the Production phase.

Improved Capabilities for SPY-1 Radar: These Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions are intended to reduce cascading failures, mitigate obsolescence issues, and improve reliability in support of Anti-Air Warfare (AAW) and Ballistic Missile Defense (BMD) missions while still providing AN/

SPY-1 Radar Total Ownership Cost Reductions. Improvements, such as Solid State Insertion to address Diminishing Manufacturing Sources and Material Shortages (DMSMS), will yield reductions in annual fleet maintenance costs and is a top fleet requirement as part of the AEGIS Wholeness initiative. In addition to RM&A improvements, warfighting improvements funded in this line include: Transmitter Noise Cancellation (TNC) development will include hardware/software to counter low radar cross section, low altitude threats. Side Lobe Blanking (SLB) addresses shortfalls in mixed electronic attack environment while in an Integrated Air and Missile Defense (IAMD) mode. The Ship-Based Non-Cooperative Target Recognition (SBNCTR) program Phases 2, 2A and 3 will develop algorithms to provide classification for targets. Transition of Advanced Calibration Experiment (ACE) Phases 1 and 2 from Baseline 7 into Baseline 9. Incorporate Elevated Radar Advanced Calibration Experiment (ERACE) Phases 1/2 and 3 into Baseline 9. Electronic Attack (EA) and Rapid Radar Capability Improvement Program (R2CIP) develop solutions for evolving EA threats. The FY23 funding request supports the start of SLB Technology Development, continues the development efforts of SBNCTR Phase 2A, TNC phase 1 & 2, EA improvements, and dLNA Requirements and Specification Analysis, and completes SLB Requirements Analysis and Specification and Elevated Radar Advanced Calibration Experiment (ERACE) Phase 1/2.

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>
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AN/SPS-49 Technology Refresh: AN/SPS-49 is the only Air Surveillance Radar on the LSD 41/49 class ships. Continued degradation and increasingly low radar availability of the AN/SPS-49 Radar is greatly impacting deployed missions, impacting safety of flight and affecting LSD Air Warfare capability and operations and as a result, AN/SPS-49 Technology Refresh is required. This AN/SPS-49 Technology Refresh will include Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions which will reduce cascading failures and mitigate obsolescence issues. In addition, this effort replaces key components to include: transmitter, receiver, exciter, antenna elevation servo control, radar system control, display and signal data processor (SDP). A digital receiver/exciter (DREX) with high-performance computing technology will be a key component in the new system. The current SPS-49 radar has no software so new software is being developed to mimic the current radar functions to maintain compatibility with internal and external interfaces. This effort will improve SPS-49 electronic protection, have increased surveillance range and increased slow moving small target detection, as well as reduce total ownership cost with lower unit cost and smaller size/weight/power requirements. Funding is also to complete development, test and evaluation, validation and integration of a technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar. FY22 is the last year of funding for this program. Funding will complete test and evaluation, and validation on a prototype radar for the technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar. In addition, FY22 funds will be used to complete subsystem integration scheduled for early FY23.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	67.167	77.852	0.000	-	0.000
Current President's Budget	64.544	62.028	81.254	-	81.254
Total Adjustments	-2.623	-15.824	81.254	-	81.254
• Congressional General Reductions	-	-0.157			
• Congressional Directed Reductions	-	-15.667			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.215	0.000			
• SBIR/STTR Transfer	-2.408	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	81.254	-	81.254

Change Summary Explanation

- FY21 funding decrease is due to a \$.215M reduction for payment of a canceled accounts liability and \$2.408M for an SBIR reduction.
- FY22 funding decrease is due to a \$15.667M reduction for SPEIR (excess to need) and \$0.157M for an FFRDC reduction.
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- FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>				Project (Number/Name) 3232 / <i>Multi-Mission Signal Processor</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3232: <i>Multi-Mission Signal Processor</i>	168.193	2.761	2.967	2.626	-	2.626	3.211	3.104	3.018	3.043	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Multi-Mission Signal Processor (MMSP): The development of MMSP provides simultaneous Anti-Air Warfare (AAW)/Ballistic Missile Defense (BMD) multi-mission capability for DDG 51 class ships as part of the Aegis Modernization Program. This capability is utilized for DDG 113 and follow new construction and Aegis Ashore. Modifies SPY-1D transmitters to enable dual beam for reduced frame times and better reaction time, provides stability for all D(V) waveforms, and avoids operational degradation. The SPY-1 radar system detects, tracks, and supports engagements of a broader range of threats. MMSP improves performance in littoral, ducted clutter, electronic attack (EA), and chaff environments and provides greater commonality in computer programs and equipment. This effort also provides for the development of MMSP on Destroyers Commercial Off The Shelf (COTS) refresh and MMSP technology refresh. MMSP/AEGIS Linear Processing System (ALPS) integration provides adjunct processing for data collection.

The FY23 funding request supports development of MMSP including the commencement of technology refresh to support Aegis Modernization due to Diminishing Manufacturing Sources and Material Shortages (DMSMS) and obsolescence issues. MMSP-Restoration (MMSP-R) includes software updates required on new computer platforms. Engineering efforts will be required to assess alternate technologies and determine optimal MMSP architectural solutions, which will include system security requirements. Additionally, funding is required for technology development to support integration of ALPS into MMSP-R, continuation of MMSP-R development to support AEGIS modernization and ACB16 MMSP improvements, and MMSP-R Engineering Change Proposal (ECP)/Software updates.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: SYSTEMS ENGINEERING	2.761	2.967	2.626	0.000	2.626
Articles:	-	-	-	-	-
FY 2022 Plans:					
- Initiate ACB16 Commercial Off The Shelf (COTS) Refresh ECPs					
- Radar Integrated Product Team (IPT) support of Capability Package 22 (CP-22) Certification					
- Continue MMSP-R development to support AEGIS Modernization due to DMSMS and obsolescence issues					
- Continue to maintain alignment with the Ballistic Missile Defense (BMD) Program and the associated BMD Signal Processor (BSP) adjunct to incorporate BMD capability within MMSP during AEGIS Modernization					
- Initiate MMSP-R ECP/software updates					
- Continue to support Advanced CapabilityBuild (ACB)16 MMSP improvements					

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Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3232 / <i>Multi-Mission Signal Processor</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- Complete MMSP/ALPS requirements analysis and specification update and commence MMSP-R/ALPS technology development					
<i>FY 2023 Base Plans:</i> - Continue ACB16 Commercial Off The Shelf (COTS) Refresh ECPs - Continue MMSP-R development to support AEGIS Modernization due to DMSMS and obsolescence issues - Continue to maintain alignment with the BMD Program and the associated BSP adjunct to incorporate BMD capability within MMSP during AEGIS Modernization - Continue to support ACB16 MMSP improvements - Continue MMSP-R ECP/software updates - Continue MMSP-R/ALPS technology development					
<i>FY 2023 OCO Plans:</i> N/A					
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Decrease in FY23 defers some radar computer program efforts within MMSP/ALPS Technology Development to FY24.					
Accomplishments/Planned Programs Subtotals	2.761	2.967	2.626	0.000	2.626

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• OPN/0900: <i>BLI 0900/OPN DDG Modernization</i>	509.768	535.667	770.341	-	770.341	738.221	920.549	829.843	950.427	9,227.494	18,131.554

Remarks

D. Acquisition Strategy
Multi-Mission Signal Processor (MMSP) provides simultaneous AAW/BMD Multi-mission capability for AEGIS Modernization Program and leverages BMD 4.0.1 and SPY-1D (V) designs. Lockheed Martin (Moorestown, New Jersey) is awarded a sole source, cost-plus-fixed-fee, level-of-effort job order under a Basic Ordering Agreement (BOA) via NSWC Crane in support of the AEGIS weapons system, AN/SPY-1 radar. Efforts include engineering services and incidental supplies for radar readiness enhancements and improvements. Work will be performed in Moorestown, New Jersey. The current period of performance on the BOA is through August 2023 and will continue under a follow-on BOA. MMSP development efforts support integration of BMD 5.0 signal processing, and will lead to the OPN/SCN procurement

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for shore sites and shipsets. MMSP technology refresh will be incorporated into Baseline 9 and follow. MMSP/ALPS integration provides adjunct processing for data collection.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3232 / <i>Multi-Mission Signal Processor</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SYSTEM ENGINEERING	SS/CPFF	Lockheed Martin : Moorestown, NJ	118.086	0.000		0.000		0.000		-		0.000	0.000	118.086	-
SYSTEM ENGINEERING	C/CPFF	AEGIS Techrep : Moorestown, NJ	5.746	0.158	Jan 2021	0.107	Mar 2022	0.107	Dec 2022	-		0.107	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	SS/FP	APL/JHU : Laurel, MD	5.161	0.000		0.000		0.000		-		0.000	0.000	5.161	-
SYSTEM ENGINEERING	WR	CSCS : Dahlgren, VA	1.755	0.062	Jan 2021	0.068	Oct 2021	0.068	Jan 2023	-		0.068	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	NRL : Washington, DC	3.381	0.110	Dec 2020	0.114	Dec 2021	0.130	Nov 2022	-		0.130	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	MIPR	MIT/LL : Lexington, MA	1.453	0.000		0.000		0.000		-		0.000	0.000	1.453	-
SYSTEM ENGINEERING	WR	NSWC/DD : Dahlgren, VA	10.286	0.719	Nov 2020	0.352	Mar 2022	0.363	Oct 2022	-		0.363	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	SCSC : Wallops Island, VA	0.019	0.000		0.000		0.000		-		0.000	0.000	0.019	-
SYSTEM ENGINEERING	WR	NSWC/CR : Crane, IN	7.462	0.821	Jan 2021	1.529	Oct 2021	1.157	Oct 2022	-		1.157	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	NSWC/PHD : Port Hueneme, CA	4.601	0.415	Nov 2020	0.437	Oct 2021	0.441	Oct 2022	-		0.441	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	Office of Naval Research : Arlington, VA	5.779	0.000		0.000		0.000		-		0.000	0.000	5.779	-
Subtotal			163.729	2.285		2.607		2.266		-		2.266	Continuing	Continuing	N/A

Remarks

- Since PB22, FY21 Product Development funding was reduced due to payment of a canceled accounts liability.
- Since PB22, NSWC Crane's FY21 tasking on LM BOA was reduced for a canceled accounts liability and to fund NSWC Dahlgren to resolve interface problems between MMSP-R and an ancillary device. Funding was also realigned to Management Services to support additional Radar IPT efforts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Travel	Allot	PEOISW2 : Washington, DC	0.256	0.010	Jan 2021	0.010	Apr 2022	0.010	Jan 2023	-		0.010	Continuing	Continuing	Continuing
Support Management Services	C/CPIF	SPA : Washington, DC	0.406	0.466	Dec 2020	0.350	Nov 2021	0.350	Nov 2022	-		0.350	Continuing	Continuing	Continuing
Support Management Services	SS/CPIF	SPA (Bridge) : Washington, DC	1.403	0.000		0.000		0.000		-		0.000	0.000	1.403	-
Support Management Services	C/CPIF	SPA (SEAPORT) : Washington, DC	2.247	0.000		0.000		0.000		-		0.000	0.000	2.247	-
Support Management Services	C/CPFF	CACI : Washington, DC	0.094	0.000		0.000		0.000		-		0.000	0.000	0.094	-
Support Management Services	C/CPFF	TMB : Washington, DC	0.031	0.000		0.000		0.000		-		0.000	0.000	0.031	-
Support Management Services	C/CPFF	Strategic Insight : Washington, DC	0.027	0.000		0.000		0.000		-		0.000	0.000	0.027	-
Subtotal			4.464	0.476		0.360		0.360		-		0.360	Continuing	Continuing	N/A

Remarks
Since PB22, FY21 and FY22 Management Services funding increased to support additional Radar IPT efforts.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	168.193	2.761	2.967	2.626	-	2.626	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3232				
MMSP Technology Refresh to Support AEGIS Modernization	1	2021	4	2027
MMSP-R ECPs	1	2021	4	2021
MMSP/ALPS Requirements Analysis and Specifications Update	1	2021	2	2022
MMSP-R Engineering Assessment	3	2021	3	2021
ACB16 Phase 2 Certification	4	2021	4	2021
ACB16 COTS Refresh (ECPs)	1	2022	4	2027
MMSP ECP and Software Updates	1	2022	4	2027
CP-22 Certification Support	2	2022	2	2022
MMSP/ALPS Technology Development	3	2022	3	2024
MMSP/ALPS Integration and Test	4	2024	4	2027

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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
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Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Shipboard Passive Electro-Optical Infrared (SPEIR) Block I will be an open architecture system that addresses near-term capability requirements and associated gaps identified in the 2019 SPEIR Capability Development Document (CDD). This program answers an urgent counter unmanned aircraft system operational need for the Fleet to provide an initial capability by FY26. The SPEIR acquisition leverages technology developed under the Office of Naval Research's (ONR's) Combined EO/IR Surveillance and Response System (CESARS) Science and Technology (S&T) effort, specifically related to the Shipboard Panoramic EO/IR Cueing and Surveillance System (SPECSS).

SPEIR Block I will provide a common 360-degree EO/IR Electronic Support (ES) capability to surface ships that will passively find, fix, track, and target current / emerging threats in support of the following warfare missions: Anti-Ship Cruise Missile (ASCM) Defense, Counter-Unmanned Aircraft Systems (UAS), Counter-Fast Attack Craft / Fast In-shore Attack Craft (FAC/FIAC), and Mobility.

SPEIR Block I will consist of a passive Wide Field of View (WFOV) capability with a 360-degree field-of-view optical sensors for autonomous detection and tracking for 24/7 day/night shipboard situational awareness. SPEIR Block I will also include an enhanced, high resolution Narrow-Medium Field of View (NFOV) and laser range-finding capability that will provide 3D target tracking, identification, and threat assessment. SPEIR Block I will have limited integration with shipboard combat systems to exchange target track data and disseminate motion imagery.

This program includes risk reduction initiatives for modeling and simulation, sensor protection counter-countermeasures, Sensor Fusion Algorithms and combat system track publishing to enable limited Combat System Integration (CSI). SPEIR Block II will be a future program that will build on the modular open system architecture of Block I to address longer-term capability requirements to include an expanded spatial coverage envelope, Periscope Detection and Discrimination (PDD) and Mine Like Object (MLO) avoidance. SPEIR Block II will also provide full combat system integration and will include a government software development and integration effort for Soft-Kill Coordination System (SKCS) to manage ES engagements.

The FY23 funding request supports detailed hardware and software design of the SPEIR Block I system, completion of initial software builds and associated integration effort, and limited procurement of material for Engineering Development Models (EDMs). Scope includes execution of Preliminary Design Review (PDR), continued test planning, training curriculum development and Modeling and Simulation (M&S) development and maturation. Increases from FY21 through FY24 are consistent with expected ramp up of developmental activities of a new Acquisition Category II program during the Engineering and Manufacturing Development (E&MD) phase. FY21 included partial year funding to initiate program execution and to award the E&MD contract, FY22 includes funding to execute system design and development activities, and FY23 includes funding focusing on E&MD contract execution, including one major System Engineering Technical Review (SETR) event (PDR) that will baseline

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system design to support same year (FY23) procurement of limited EDM materials. Additionally, FY23 will include planning, processes and procedures for system integration and development test. RDT&E costs are anticipated to ramp down starting in FY25 as Integration & Test planning is complete, EDM material procurements are completed, and all three (3) EDMs are assembled and integrated to support the execution of developmental test events prior to program transition to the Production phase.					
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
Title: SPEIR Block I Systems Engineering					
Articles:					
	34.812	14.813	15.147	0.000	15.147
	-	-	-	-	-
FY 2022 Plans:					
<ul style="list-style-type: none"> - Conduct MS B Review - Award Engineering & Manufacturing Development Contract - Commence support of Engineering Development Model (EDM) hardware and software development and integration - Review and assess contract deliverables - Conduct preparation and support for Integrated Baseline Review (IBR) - Conduct preparation and support for System Requirements Review (SRR)/System Functional Review (SFR) - Continue development of training curriculum - Continue test planning - Continue test program Modeling and Simulation (M&S) development and maturation 					
FY 2023 Base Plans:					
<ul style="list-style-type: none"> - Continue support of Engineering Development Model (EDM) hardware and software development and integration - Continue review and assessment of contract deliverables - Prepare for and conduct Preliminary Design Review (PDR) - Continue development of training curriculum - Continue test planning - Continue test program Modeling and Simulation (M&S) development and maturation 					
FY 2023 OCO Plans:					
N/A					
FY 2022 to FY 2023 Increase/Decrease Statement:					
Increase in FY23 aligns with planned development efforts.					
Title: SPEIR Block I Development	8.110	33.390	53.935	0.000	53.935

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Articles:	-	-	-	-	-
FY 2022 Plans:					
- Commence Engineering & Manufacturing Development (E&MD) design activities					
- Prepare for and conduct Integrated Baseline Review (IBR)					
- Prepare for and conduct System Requirements Review/System Functional Review (SRR/SFR)					
- Commence integrated topside design activities for DDG 51 class					
- Commence integration activities to ensure compatibility with AEGIS and SSDS Combat Systems					
FY 2023 Base Plans:					
- Commence purchase of Long Lead Material items for up to three (3) Engineering Development Model (EDM) builds					
- Continue Engineering & Manufacturing Development (E&MD) design activities					
- Commence development end item software builds					
- Prepare for and conduct Preliminary Design Review (PDR)					
- Prepare for Critical Design Review (CDR)					
- Development and initial delivery of Interface Control Documents					
- Development and initial delivery of Logistics Products Data					
- Completion of risk management framework Step 3: Implement Security Controls					
- Continue integrated topside design activities for DDG 51 class					
- Continue integration activities to ensure compatibility with AEGIS and SSDS Combat Systems					
FY 2023 OCO Plans:					
N/A					
FY 2022 to FY 2023 Increase/Decrease Statement:					
Increase in FY23 is required to support additional scope of design and development activities, specifically software development, as well as execution of one major design Systems Engineering Technical Review and the initial procurement of LLM materials for three (3) EDMs.					
Accomplishments/Planned Programs Subtotals	42.922	48.203	69.082	0.000	69.082

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

Line Item	FY 2021	FY 2022	FY 2023	FY 2023	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Cost To	
			Base	OCO	Total					Complete	Total Cost
• OPN/2980: <i>SPEIR</i>	0.000	0.000	0.000	-	0.000	37.603	27.456	28.068	28.620	3,416.970	3,538.717

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

D. Acquisition Strategy

SPEIR will develop initial capability and required upgrades based on integrating technology advances and adding functional capabilities in an evolutionary fashion. Each Block acquisition program will be developed and contracted in an individual yet coordinated and overlapping fashion. Specifically, SPEIR involves the work performed under the CESARS program sponsored by ONR and transitioning the passive EO/IR component (SPECSS) which focuses on designing/architecting an advanced, integrated, EO/IR WFOV surveillance capability system for Naval Surface Platforms. After completion of Milestone B, the SPEIR program will utilize a full and open competition to award a cost plus fixed fee contract for Engineering and Manufacturing Development (E&MD). This competitive contract will also include fixed price incentive fee options for future procurement of Low Rate Initial Production (LRIP) units following Milestone C planned for FY25. The initial E&MD contract will include the procurement of a production-level Technical Data Package (TDP) to support full and open competition for future procurement of additional LRIP and Full Rate Production (FRP) units.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy											Date: April 2022				
Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>					Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>				

Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
SPEIR Block 1 Development	C/CPIF	TBD : TBD	0.000	8.110	Mar 2022	33.390	Mar 2022	53.935	Jan 2023	-		53.935	Continuing	Continuing	Continuing
Subtotal			0.000	8.110		33.390		53.935		-		53.935	Continuing	Continuing	N/A

Remarks
 1) Increase from FY21 to FY22 is required to support contract award activities and ramp up of system design and development activities including SFR/SRR and the preparation and execution of the Integrated Baseline Review (IBR). Since PB22, FY22 funding has decreased due to funding reductions.

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
SPEIR Block I Integrated Logistics Support	WR	NSWC Crane : Crane, IN	0.000	1.800	Jan 2021	0.750	Nov 2021	0.765	Nov 2022	-		0.765	Continuing	Continuing	Continuing
SPEIR Block I Systems Engineering Support	WR	NSWC Crane : Crane, IN	0.000	4.400	Jan 2021	2.478	Nov 2021	2.508	Nov 2022	-		2.508	Continuing	Continuing	Continuing
SPEIR Block I Systems Engineering Support	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.800	Mar 2021	0.600	Nov 2021	0.612	Nov 2022	-		0.612	Continuing	Continuing	Continuing
SPEIR Block I Systems Engineering Support	WR	NRL : Washington, DC	0.000	3.200	Feb 2021	1.230	Nov 2021	1.255	Nov 2022	-		1.255	Continuing	Continuing	Continuing
SPEIR Block I Systems Engineering Support	SS/CPFF	APL : Laurel, MD	0.000	2.800	Apr 2021	1.800	Nov 2021	1.815	Nov 2022	-		1.815	Continuing	Continuing	Continuing
SPEIR Block I Systems Engineering Support	MIPR	MIT-LL : Cambridge, MA	0.000	1.375	Mar 2021	0.523	Nov 2021	0.612	Nov 2022	-		0.612	Continuing	Continuing	Continuing
SPEIR Block I Platform Integration Studies	C/BA	BIW : Bath, ME	0.000	0.600	Jul 2021	0.300	Nov 2021	0.306	Nov 2022	-		0.306	Continuing	Continuing	Continuing
SPEIR Sensor Fusion	MIPR	GTRI : Atlanta, GA	0.000	0.287	Aug 2021	0.250	Nov 2021	0.255	Nov 2022	-		0.255	Continuing	Continuing	Continuing
SPEIR Sensor Fusion	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.331	Mar 2021	0.230	Nov 2021	0.235	Nov 2022	-		0.235	Continuing	Continuing	Continuing
SPEIR Sensor Fusion	SS/CPFF	APL : Laurel, MD	0.000	1.289	Mar 2021	0.500	Nov 2021	0.510	Nov 2022	-		0.510	Continuing	Continuing	Continuing
SPEIR Sensor Fusion	WR	NSWC Crane : Crane, IN	0.000	1.840	Jan 2021	0.900	Nov 2021	0.918	Nov 2022	-		0.918	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>
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Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
SPEIR Track Publishing	WR	NSWC Dahlgren : Dahlgren, VA	0.000	1.215	Mar 2021	0.500	Nov 2021	0.510	Nov 2022	-		0.510	Continuing	Continuing	Continuing
SPEIR Track Publishing	SS/CPFF	APL : Laurel, MD	0.000	0.552	Apr 2021	0.500	Nov 2021	0.510	Nov 2022	-		0.510	Continuing	Continuing	Continuing
Subtotal			0.000	20.489		10.561		10.811		-		10.811	Continuing	Continuing	N/A

Remarks
 1) Decrease from FY21 to FY22 is due to significant investment in risk reduction efforts that completed in FY21 as well as Government Support teams executing tasking in FY21 that will transition to the Product Development Prime Contractor in FY22, including requirements definition and management, support to future capability studies, ship integration studies, and image processing dataset development.

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
SPEIR Block I Test Planning/T&E Events	WR	NSWC Crane : Crane, IN	0.000	2.790	Jan 2021	1.300	Nov 2021	1.326	Nov 2022	-		1.326	Continuing	Continuing	Continuing
SPEIR Block I Test Planning/T&E Events	WR	NRL : Washington, DC	0.000	6.008	Feb 2021	0.900	Nov 2021	0.918	Nov 2022	-		0.918	Continuing	Continuing	Continuing
SPEIR Block I Test Planning/T&E Events	SS/CPFF	APL : Laurel, MD	0.000	1.750	Apr 2021	0.600	Nov 2021	0.612	Nov 2022	-		0.612	Continuing	Continuing	Continuing
SPEIR Block I Test Planning/T&E Events	WR	COMOPTEVFOR : Norfolk, VA	0.000	0.200	Jul 2021	0.152	Dec 2021	0.155	Dec 2022	-		0.155	Continuing	Continuing	Continuing
Subtotal			0.000	10.748		2.952		3.011		-		3.011	Continuing	Continuing	N/A

Remarks
 1) Decrease from FY21 to FY22 is due to execution of risk reduction and data collection test events with SPECSS prototype that completed in FY21.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
SPEIR Block I Program Management	C/CPFF	SPA ESS (SEAPORT) : Washington, DC	0.000	1.500	Mar 2021	0.500	Nov 2021	0.510	Nov 2022	-		0.510	Continuing	Continuing	Continuing
SPEIR Block I Program Management	C/CPFF	TMB BFM (SEAPORT) : Washington, DC	0.000	1.500	Jul 2021	0.500	Nov 2021	0.510	Nov 2022	-		0.510	Continuing	Continuing	Continuing
SPEIR Block I Program Management	C/CPFF	BAH ILS (SEAPORT) : Washington, DC	0.000	0.500	Aug 2021	0.250	Nov 2021	0.255	Nov 2022	-		0.255	Continuing	Continuing	Continuing
SPEIR Block I Program Management	Sub Allot	NAVSEA Travel : Washington, DC	0.000	0.075	May 2021	0.050	Oct 2021	0.050	Oct 2022	-		0.050	Continuing	Continuing	Continuing
Subtotal			0.000	3.575		1.300		1.325		-		1.325	Continuing	Continuing	N/A

Remarks
1) Decrease from FY21 to FY22 is due to the higher level of effort necessary in FY21 to support execution of significant risk reduction efforts in FY21 and to complete all necessary program documentation in order to complete Milestone B on time.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	42.922	48.203	69.082	-	69.082	Continuing	Continuing	N/A

Remarks

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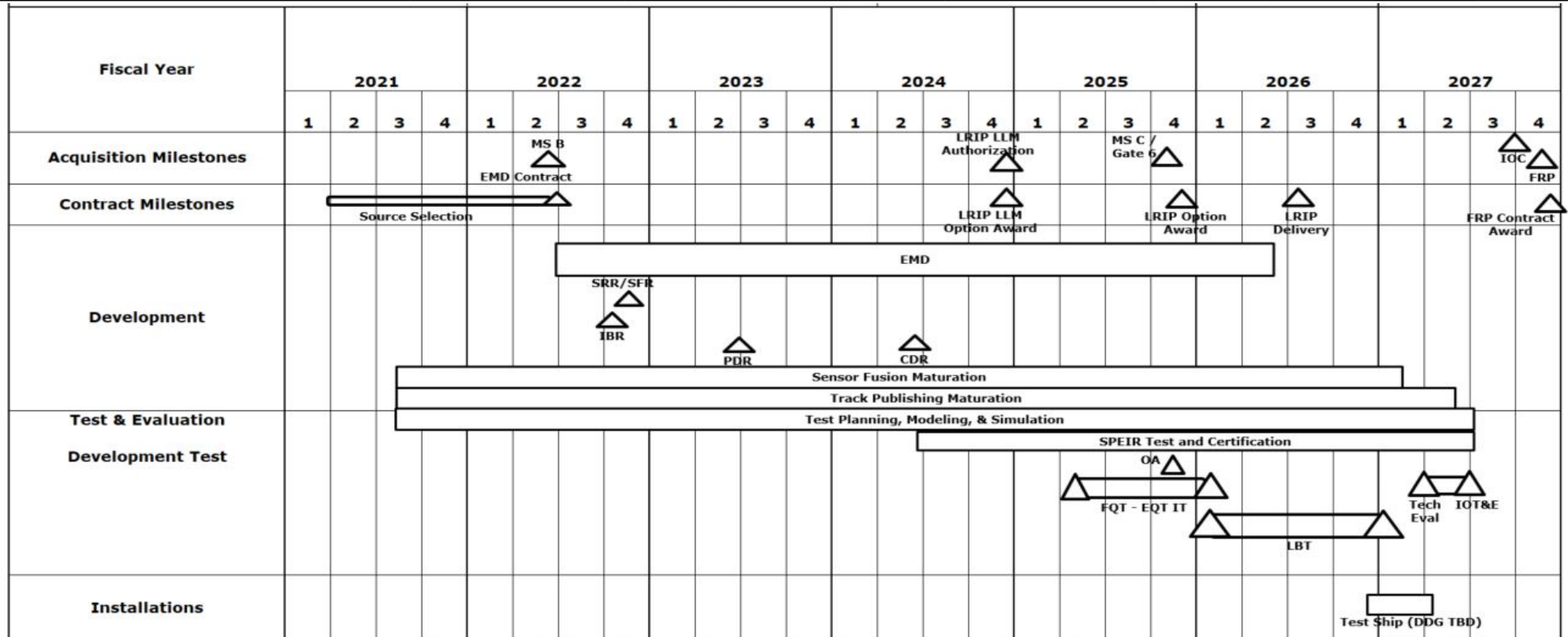
Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy

Date: April 2022

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604501N / Advanced Above Water Sen
sors

Project (Number/Name)
3243 / Shipboard Passive Electro-Optical
Infrared Development



Acronyms: CDR - Critical Design Review; EMD - Engineering & Manufacturing Development; EQT - Environmental Qualification Testing; FQT - Formal Qualification Testing; FRP - Full Rate Production; IBR - Integrated Baseline Review; IT - Integrated Testing; IOC - Initial Operational Capability; IOT&E - Initial Operational Test & Evaluation; LBT - Land Based Testing; LLM - Long Lead Material; LRIP - Low Rate Initial Procurement; MS - Milestone; OA - Operational Assessment; PDR - Preliminary Design Review; SFR - System Functional Review; SRR - System Requirements Review

Changes from PB2022 due to delay in start of program, resulting in delay of EMD contract award with cascading effects on SRR/SFR, IBR, Sensor Fusion Maturation, Track Publishing Maturation, Test Planning, and Modeling & Simulation all moving one quarter to the right. Additionally, MS B shifted from FY2021 to FY2022 and PDR shifted from FY2022 to FY2023.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3243				
Sensor Fusion Maturation	3	2021	1	2027
Track Publishing Maturation	3	2021	2	2027
Test Planning, Modeling & Simulation	3	2021	3	2027
Milestone B	2	2022	2	2022
E&MD Contract Award	2	2022	2	2022
Engineering & Manufacturing Development (E&MD)	2	2022	2	2026
System Requirements Review/System Functional Review (SRR/SFR)	4	2022	4	2022
Integrated Baseline Review (IBR)	4	2022	4	2022
Preliminary Design Review (PDR)	3	2023	3	2023
Critical Design Review (CDR)	2	2024	2	2024
Test and Certification	3	2024	3	2027
LRIP Long Lead Material (LLM) Authorization	4	2024	4	2024
LRIP LLM Option Award	4	2024	4	2024
Formal Qualification Test (FQT) / Environmental Qualification Test (EQT) Integrated Testing (IT)	2	2025	1	2026
Operational Assessment (OA)	4	2025	4	2025
Milestone C	4	2025	4	2025
LRIP Option Award	4	2025	4	2025
Land Based Test (LBT)	1	2026	1	2027
LRIP Delivery	3	2026	3	2026
Test Ship Availability (DDG TBD)	4	2026	2	2027

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3243 / <i>Shipboard Passive Electro-Optical Infrared Development</i>

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Tech Eval/Initial Operational Test & Evaluation (IOT&E)	2	2027	3	2027
Initial Operational Capability (IOC)	4	2027	4	2027
Full Rate Production (FRP)	4	2027	4	2027
FRP Contract Award	4	2027	4	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>				Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3301: <i>Improved Capabilities SPY-1 Radar</i>	52.323	11.068	9.896	9.546	-	9.546	14.494	12.991	11.794	11.969	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Improved Capabilities for SPY-1 Radar: These Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions are intended to reduce cascading failures, mitigate obsolescence issues, and improve reliability in support of Anti-Air Warfare (AAW) and Ballistic Missile Defense (BMD) missions while still providing AN/

SPY-1 Radar Total Ownership Cost Reductions. Improvements, such as Solid State Insertion to address Diminishing Manufacturing Sources and Material Shortages (DMSMS), will yield reductions in annual fleet maintenance costs and is a top fleet requirement as part of the AEGIS Wholeness initiative. In addition to RM&A improvements, warfighting improvements funded in this line include: Transmitter Noise Cancellation (TNC) development will include hardware/software to counter low radar cross section, low altitude threats. Side Lobe Blanking (SLB) addresses shortfalls in mixed electronic attack environment while in an Integrated Air and Missile Defense (IAMD) mode. The Ship-Based Non-Cooperative Target Recognition (SBNCTR) program Phases 2, 2A and 3 will develop algorithms to provide classification for targets. Transition of Advanced Calibration Experiment (ACE) Phases 1 and 2 from Baseline 7 into Baseline 9. Incorporate Elevated Radar Advanced Calibration Experiment (ERACE) Phases 1/2 and 3 into Baseline 9. Electronic Attack (EA) and Rapid Radar Capability Improvement Program (R2CIP) develop solutions for evolving EA threats.

The FY23 funding request supports the start of SLB Technology Development, continues the development efforts of SBNCTR Phase 2A, TNC phase 1 & 2, EA improvements and dLNA Requirements and Specification Analysis, and completes SLB Requirements Analysis and Specification and Elevated Radar Advanced Calibration Experiment (ERACE) Phase 1/2.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Improved Capabilities SPY-1 Radar	11.068	9.896	9.546	0.000	9.546
Articles:	-	-	-	-	-
FY 2022 Plans:					
- Continue SBNCTR Phase 2A development to include integration of other sensors and threats and conduct In Process Review (IPR) #3					
- Continue TNC Phase 1 development					
- Continue TNC Phase 2 development and conduct IPR #1					
- Commence Side Lobe Blanking (SLB) requirement analysis & specification					
- Continue EA improvements technology development, integration and test					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<ul style="list-style-type: none"> - Continue Radar Improvements Analysis - Continue digital Low Noise Amplifier (dLNA) requirements and specification analysis - Continue ERACE Phase 1/2 development and conduct ERACE Phase 1/2 FLEX Event to test multiple sensors in an at-sea operational environment <p>FY 2023 Base Plans:</p> <ul style="list-style-type: none"> - Continue SBNCTR Phase 2A development to include integration of other sensors - Continue TNC Phase 1 development and complete integration and test - Continue TNC Phase 2 development - Complete SLB requirement analysis & specification and commence SLB technology development - Continue EA improvements technology development, integration and test - Continue Radar Improvements Analysis - Complete digital Low Noise Amplifier (dLNA) requirements and specification analysis - Complete ERACE Phase 1/2 development and complete certification <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Due to an FY23 funding reduction, SBNCTR I&T and TNC IPR#2 shifted to FY24.</p>					
Accomplishments/Planned Programs Subtotals	11.068	9.896	9.546	0.000	9.546

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• O&MN/1C1C/0702228N: <i>O&M,N AEGIS Wholeness SPY Transmitter Reliability</i>	3.997	4.133	4.490	-	4.490	4.642	4.702	5.641	5.754	Continuing	Continuing
• OPN/2980: <i>OPN SPY-1 RM&A IMPROVEMENTS</i>	27.152	15.667	13.491	-	13.491	47.906	45.271	45.483	55.668	Continuing	Continuing

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>

D. Acquisition Strategy

Improved Capabilities SPY-1 Reliability, Maintainability, and Availability (RM&A) will design and develop an Ordnance Alterations (ORDALT) Package for fixes and modifications to known transmitter, signal processor, microwave tube (MWT), and logistic shortcomings. Lockheed Martin Corporation (Moorestown, New Jersey) was awarded a sole source, cost-plus-fixed-fee, level-of-effort job order under a Basic Ordering Agreement (BOA) via NSWC Crane. The contract supports the development and fielding of AN/SPY-1 Radar capability upgrades and reliability improvements in support of AEGIS combat system. The current period of performance on the BOA is through August 2023 and will continue under a follow-on BOA. Investment in development of SPY-1 RM&A improvements to address failure mechanisms and improve reliability is planned to continue beyond the FYDP. Radar capability upgrades (SBNCTR, TNC, ACE, ERACE and SLB) and reliability improvements will be incorporated into Baseline 9 and follow.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
SYSTEM ENGINEERING	MIPR	Office of Naval Research : Arlington, VA	1.000	0.000		0.000		0.000		-		0.000	0.000	1.000	-
SYSTEM ENGINEERING	C/CPFF	Raytheon : Sudbury, MA	1.941	0.000		0.000		0.000		-		0.000	0.000	1.941	-
SYSTEM ENGINEERING	WR	NSWC/Crane, IN : Crane, IN	17.464	6.507	Jan 2021	5.855	Oct 2021	4.903	Nov 2022	-		4.903	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	SS/CPFF	Lockheed Martin : Moorestown, NJ	18.234	0.000		0.000		0.000		-		0.000	0.000	18.234	-
SYSTEM ENGINEERING	SS/CPFF	AEGIS Techrep : Moorestown, NJ	1.064	0.302	Jan 2021	0.207	Mar 2022	0.207	Dec 2022	-		0.207	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	SS/FP	APL/JHU : Laurel, MD	1.610	0.663	Feb 2021	0.518	Jan 2022	0.421	Jan 2023	-		0.421	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	CSCS : Dahlgren, VA	0.610	0.216	Jan 2021	0.122	Oct 2021	0.068	Jan 2023	-		0.068	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	NRL : Washington, DC	1.312	0.362	Jan 2021	0.550	Dec 2021	0.675	Nov 2022	-		0.675	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	MIPR	MIT/LL : Lexington, MA	1.419	0.315	Jan 2021	0.545	Feb 2022	0.625	Feb 2023	-		0.625	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	NSWC DD : Dahlgren, VA	5.113	2.165	Nov 2020	1.500	Oct 2021	1.928	Nov 2022	-		1.928	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	WR	NSWC/PHD : Port Hueneme, CA	0.680	0.218	Nov 2020	0.189	Jan 2022	0.309	Nov 2022	-		0.309	Continuing	Continuing	Continuing
SYSTEM ENGINEERING	MIPR	DTIC : Fort Belvior, VA	0.284	0.000		0.000		0.000		-		0.000	0.000	0.284	-
SYSTEM ENGINEERING	WR	SCSC Wallops : Wallops Island, VA	0.032	0.000		0.000		0.000		-		0.000	0.000	0.032	-
SYSTEM ENGINEERING	C/FFP	Raytheon : Waltham, MA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Subtotal			50.763	10.748		9.486		9.136		-		9.136	Continuing	Continuing	N/A

Remarks
1. The Lockheed Martin/PEO IWS 1.0 contract ended July 2021. FY21 funding and follow on funding transitioned to the NSWC Crane BOA.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			

2. Since PB22, NSWC Crane FY22 tasking on the LM BOA was reduced primarily to fund additional Radar IPT efforts across various field activities.

Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Travel	Allot	PEOIS2 : Washington, DC	0.039	0.020	Jan 2021	0.020	Mar 2022	0.020	Jan 2023	-		0.020	Continuing	Continuing	Continuing
Support Management Services	C/CPIF	SPA : Washington, DC	1.340	0.300	Dec 2020	0.390	Mar 2022	0.390	Nov 2022	-		0.390	Continuing	Continuing	Continuing
Support Management Services	SS/CPIF	SPA (Bridge) : Washington, DC	0.181	0.000		0.000		0.000		-		0.000	0.000	0.181	-
Subtotal			1.560	0.320		0.410		0.410		-		0.410	Continuing	Continuing	N/A

Remarks
Since PB22, FY22 Management Services funding has increased to support additional Radar IPT analysis for dLNA development.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	52.323	11.068	9.896	9.546	-	9.546	Continuing	Continuing	N/A

Remarks

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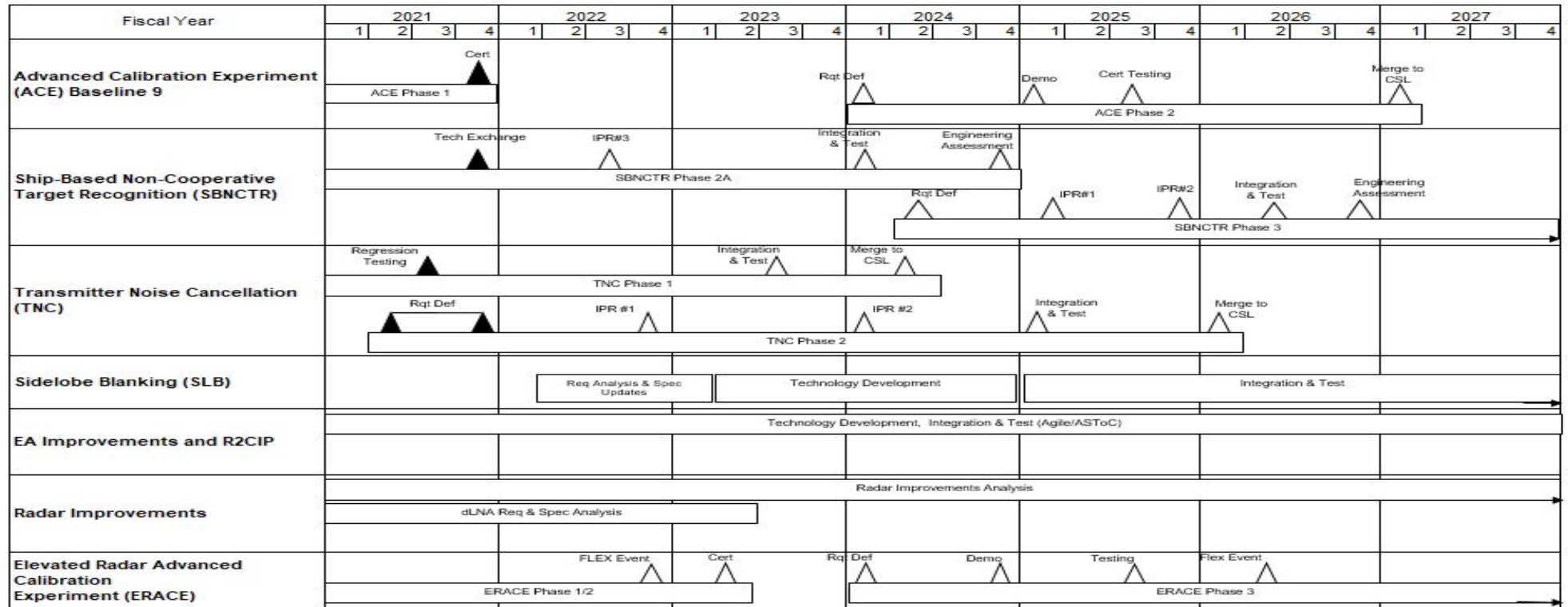
Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy

Date: April 2022

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604501N / *Advanced Above Water Sen
sors*

Project (Number/Name)
3301 / *Improved Capabilities SPY-1 Radar*



SBNCTR PHASE 3, SLB, EA Improvements and R2CIP, Radar Improvements and ERACE Phase 3 continue beyond the FYDP.
 Since PB22, ACE Phase I Cert shifted to the right 1 QTR to align with BL 3.2.2. cert and dLNA Requirement and Specification Analysis extended 2 QTRs to align with anticipated POM 23 funding.
 Since PB22, a Tech Exchange was added in FY21 to SBNCTR Phase 2A. IPR#3 shifted 5 quarters to develop CONOPS and await IWS 1.0 decision on baseline integration. I&T shifted 5 quarters due to funding reduction in FY23.
 TNC requirements definition has been extended 2 QTRs and will now complete 4 QTR FY21.
 ERACE is targeted to be part of a future capability build.
 Historically, Radar Improvement efforts focused on transmitter upgrades. Scope has expanded to include Signal Processor and Antenna groups as well as transmitter group.

Acronyms:

ASToC: AEGIS Speed to Capability
 CSL: Common Source Library
 dLNA: digital Low Noise Amplifier (previously DRE)

EA: Electronic Attack
 ERACE: Elevated Radar ACE
 FLEX: Fleet Exercise

I&T: Integration & Test
 IPR: In-Process Review
 R2CIP: Rapid Radar Capability Improvement Program

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3301				
ACE Phase 1 Development	1	2021	4	2021
EA Improvements and R2CIP Technology Development, Integration & Test	1	2021	4	2027
Radar Improvements Analysis	1	2021	4	2027
digital Low Noise Amplifier (dLNA) Requirements & Specification Analysis	1	2021	2	2023
TNC Phase 2 Requirements Definition	2	2021	4	2021
TNC Phase 1 Regression Testing	3	2021	3	2021
ACE Phase 1 Certification	4	2021	4	2021
SBNCTR Phase 2A Tech Exchange	4	2021	4	2021
SLB Requirements Analysis and Specification	2	2022	1	2023
SBNCTR Phase 2A IPR #3	3	2022	3	2022
TNC Phase 2 IPR #1	4	2022	4	2022
ERACE Phase 1/2 Flex Event	4	2022	4	2022
SLB Technology Development	2	2023	4	2024
ERACE Phase 1/2 Certification	2	2023	2	2023
TNC Phase 1 Integration & Test	3	2023	3	2023
ACE Phase 2 Requirements Definition	1	2024	1	2024
SBNCTR Phase 2A Integration & Test	1	2024	1	2024
TNC Phase 2 IPR #2	1	2024	1	2024
ERACE Phase 3 Requirements Definition	1	2024	1	2024
TNC Phase 1 Merge to Common Source Library	2	2024	2	2024
SBNCTR Phase 3 Requirements Definition	2	2024	2	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3301 / <i>Improved Capabilities SPY-1 Radar</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SBNCTR Phase 2A Engineering Assessment	4	2024	4	2024
ERACE Phase 3 Demo	4	2024	4	2024
ACE Phase 2 Demo	1	2025	1	2025
TNC Phase 2 Integration and Test	1	2025	1	2025
SLB Integration and Test	1	2025	4	2027
SBNCTR Phase 3 IPR #1	1	2025	1	2025
ACE Phase 2 Certification Testing	3	2025	3	2025
ERACE Phase 3 Testing	3	2025	3	2025
SBNCTR Phase 3 IPR #2	4	2025	4	2025
TNC Phase 2 Merge to CSL	1	2026	1	2026
SBNCTR Phase 3 Integration and Test	2	2026	2	2026
ERACE Phase 3 Flex Event	2	2026	2	2026
SBNCTR Phase 3 Engineering Assessment	4	2026	4	2026
ACE Phase 2 Merge to CSL	1	2027	1	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>			Project (Number/Name) 3408 / <i>AN/SPS-49 Technical Refresh</i>				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3408: <i>AN/SPS-49 Technical Refresh</i>	12.611	7.793	0.962	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.366
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

AN/SPS-49 Technology Refresh: AN/SPS-49 is the only Air Surveillance Radar on the LSD 41/49 class ships. Continued degradation and increasingly low radar availability of the AN/SPS-49 Radar is greatly impacting deployed missions, impacting safety of flight and affecting LSD Air Warfare capability and operations and as a result, AN/SPS-49 Technology Refresh is required. This AN/SPS-49 Technology Refresh will include Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions which will reduce cascading failures and mitigate obsolescence issues. In addition, this effort replaces key components to include: transmitter, receiver, exciter, antenna elevation servo control, radar system control, display and signal data processor (SDP). A digital receiver/exciter (DREX) with high-performance computing technology will be a key component in the new system. The current SPS-49 radar has no software so new software is being developed to mimic the current radar functions to maintain compatibility with internal and external interfaces. This effort will improve SPS-49 electronic protection, have increased surveillance range and increased slow moving small target detection, as well as reduce total ownership cost with lower unit cost and smaller size/weight/power requirements. Funding is also to complete development, test and evaluation, validation and integration of a technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar. FY22 is the last year of funding for this program. Funding will complete test and evaluation, and validation on a prototype radar for the technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar. In addition, FY22 funds will be used to complete subsystem integration scheduled for early FY23.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: AN/SPS-49 Technology Refresh	7.793	0.962	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2022 Plans:					
- Complete Critical Design Review (CDR)					
- Begin installing for integration tests at NRL and Crane					
- Build prototype to begin validating models					
- Conduct Test Readiness Reviews (TRRs)					
- Complete integration of DREX with Signal Data Processor (SDP) and transmitter designs at NRL					
FY 2023 Base Plans:					
- Prepare for receipt of prototype					
FY 2023 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3408 / <i>AN/SPS-49 Technical Refresh</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
N/A					
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY22 is the last year of funding for this program. Integration and testing completes in FY22 in preparation for receipt of prototype in FY23.					
Accomplishments/Planned Programs Subtotals	7.793	0.962	0.000	0.000	0.000

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

Remarks

D. Acquisition Strategy
To accomplish the SPS-49 Tech Refresh, the Navy is leveraging an Other Transactional Authority (OTA) contract for Industrial Base Analysis and Sustainment Program (IBAS) Radar Systems Should Cost Model/Prototypes for Defense Affordability and Industrial Base Resiliency awarded by OSD in Q4 FY18.

Early start development of technologies funded using Small Business Innovative Research (SBIR), Rapid Insertion Funds (RIF), Technology Insertion Funds (TIF) and OSD's Industrial Base Analysis and Sustainment (IBAS) programs will be integrated to provide a below deck technology refresh of the AN/SPS-49 Long Range Air Surveillance Radar. Funds will be used to perform Initial Technical Review, Analysis of Alternatives, System Requirements Review, System Functional Review, Preliminary Design Review and Critical Design Review.

Funding for the OTA contract is required to complete subsystem development to include transmitter, receiver/exciter, processor and antenna control unit, integration of the subsystems, and integration with the legacy radar including the antenna, conduct test readiness reviews, full system test and evaluation for factory acceptance, and delivery of two Engineering Development Models (EDMs).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen</i> <i>sors</i>	Project (Number/Name) 3408 / <i>AN/SPS-49 Technical Refresh</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
System Engineering	MIPR	Army : Picatinny, NJ	12.585	5.738	May 2021	0.000		0.000		-		0.000	0.000	18.323	-
Subtotal			12.585	5.738		0.000		0.000		-		0.000	0.000	18.323	N/A

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Engineering	WR	NRL : Washington, DC	0.000	0.300	Nov 2020	0.150	Oct 2021	0.000		-		0.000	0.000	0.450	-
Government Engineering	WR	NSWC/Crane : Crane. IN	0.000	0.292	Nov 2020	0.205	Oct 2021	0.000		-		0.000	0.000	0.497	-
Government Engineering	WR	NSWC/PHD : Port Hueneme, CA	0.000	0.045	Nov 2020	0.050	Oct 2021	0.000		-		0.000	0.000	0.095	-
Government Engineering	WR	NSWC/CD : Bethesda, MD	0.000	0.060	Nov 2020	0.030	Oct 2021	0.000		-		0.000	0.000	0.090	-
Subtotal			0.000	0.697		0.435		0.000		-		0.000	0.000	1.132	N/A

Remarks
FY21 Government Engineering decrease is due to reduction of land based test site test requirements.

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Engineering	WR	NRL : Washington, DC	0.000	0.680	Oct 2020	0.156	Oct 2021	0.000		-		0.000	0.000	0.836	-
Government Engineering	WR	NSWC/Crane : Crane. IN	0.000	0.522	Oct 2020	0.271	Oct 2021	0.000		-		0.000	0.000	0.793	-
Government Engineering	WR	NSWC/PHD : Port Hueneme, CA	0.000	0.100	Oct 2020	0.050	Oct 2021	0.000		-		0.000	0.000	0.150	-
Subtotal			0.000	1.302		0.477		0.000		-		0.000	0.000	1.779	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3408 / <i>AN/SPS-49 Technical Refresh</i>
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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 Support	C/CPIF	DTI : Washington, DC	0.026	0.056	Aug 2021	0.050	Mar 2022	0.000		-		0.000	0.000	0.132	-
Subtotal			0.026	0.056		0.050		0.000		-		0.000	0.000	0.132	N/A

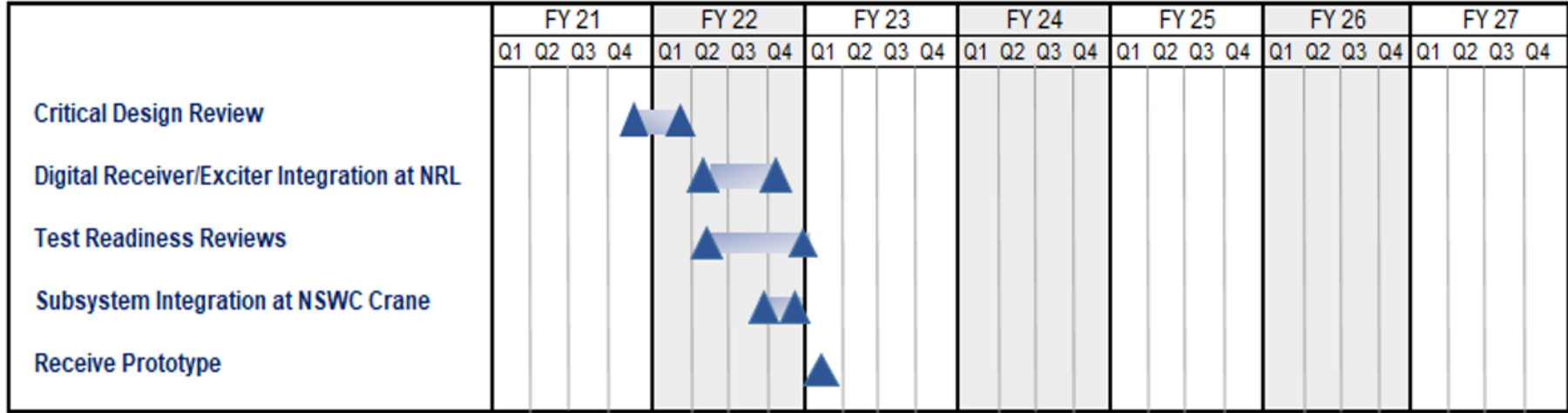
Remarks
FY21 additional requirement for Management Services is to assist with kick-off and completion of CDR in preparation of design approval and subsystem integration and testing.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.611	7.793	0.962	0.000	-	0.000	0.000	21.366	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sen sors</i>	Project (Number/Name) 3408 / <i>AN/SPS-49 Technical Refresh</i>



Contract Period of Performance (PoP) ends AUG 2023

Budget profile capitalizes on early development contracts funded by Small Business Innovation Research (SBIR), Rapid Innovation Funds (RIF), OSD Industrial Base Analysis and Sustainment (IBAS) Programs.

Since PB22, schedule has slipped up to 60 days due to delays in receiving material to build the prototype.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / <i>Advanced Above Water Sensors</i>	Project (Number/Name) 3408 / <i>AN/SPS-49 Technical Refresh</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Proj 3408</i>				
Critical Design Review (CDR)	4	2021	1	2022
Digital Receiver/Exciter Integration/Test at NRL	2	2022	4	2022
Test Readiness Reviews (TRR)	2	2022	4	2022
System/Subsystem Integration Testing at NSWC Crane	3	2022	4	2022
Receive Prototype	1	2023	1	2023