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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 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604256N / <i>Threat Simulator Development</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	0.000	60.968	22.043	20.862	-	20.862	-	-	-	-	-	-
0602: <i>Electronics W/F Env Simulation (ECHO)</i>	0.000	52.582	14.730	14.008	-	14.008	-	-	-	-	-	-
0672: <i>Effect Nav E/W (ENEWS)</i>	0.000	8.386	7.313	6.854	-	6.854	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This is a continuing program that consolidates the design, fabrication and integration of Naval Electronic Warfare (EW) threat simulators for increased managerial emphasis and coordination. These simulator development efforts provide realistic Developmental and Operational Test and Evaluation environments to test EW systems and defensive tactics. These projects develop threat Anti-Air and Anti-Ship weapon system simulators in accordance with the Services' requirements.

The 0602 Project, Electronic Warfare Environment Simulation, directly supports the Test and Evaluation resource requirements for all Naval Air EW development programs to include multi-spectral situational awareness and countermeasures. Programs in development and future programs include: Joint Strike Fighter, EA-18G, Low Band Transmitter, Next Generation Jammer, Advanced Anti-Radiation Guided Missile (AARGM), Long Range Anti-Ship Missile (LRASM), and Triton.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under RESEARCH, DEVELOPMENT, TEST and EVALUATION MANAGEMENT SUPPORT because it supports efforts directed toward sustaining or modernizing installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	62.678	22.075	21.134	-	21.134
Current President's Budget	60.968	22.043	20.862	-	20.862
Total Adjustments	-1.710	-0.032	-0.272	-	-0.272
• Congressional General Reductions	-	-0.032			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.891	0.000			
• SBIR/STTR Transfer	-0.819	0.000			
• Rate/Misc Adjustments	0.000	0.000	-0.272	-	-0.272

Change Summary Explanation

Schedule: Not applicable.
 Technical: Not applicable.

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Appropriation/Budget Activity 1319 / 6					R-1 Program Element (Number/Name) PE 0604256N / <i>Threat Simulator Development</i>				Project (Number/Name) 0602 / <i>Electronics W/F Env Simulation (ECHO)</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
0602: <i>Electronics W/F Env Simulation (ECHO)</i>	0.000	52.582	14.730	14.008	-	14.008	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The objective of this project is development of necessary simulation facilities and approaches to allow determination of the effectiveness of Electronic Warfare (EW) in real world engagement situations and to support the introduction of modern, effective EW systems into Naval Aviation platforms. The heavy use of test resources by all Services demonstrates the importance of these assets.

The Electronic Warfare Environment Simulation project is unique because it is the only program within the Department of Defense which develops and provides Naval anti-air warfare threat assets for Test and Evaluation (T&E).

This project directly supports the T&E resource requirements for all Naval Air EW development programs, to include multi-spectral situational awareness and countermeasures. Programs in development and future programs include: Joint Strike Fighter, EA-18G, Low Band Transmitter, Next Generation Jammer, Advanced Anti-Radiation Guided Missile (AARGM), Long Range Anti-Ship Missile (LRASM), and Triton.

This project provides for the development of an Integrated Air Defense T&E capability to be fielded at each of the three sites comprising the Navy's Tri-Center complex: Naval Air Warfare Center Weapons Division, China Lake and Point Mugu in CA, and Naval Air Warfare Center Aircraft Division, Patuxent River, MD.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Requirements and Validation	0.590	1.046	0.605	0.000	0.605
Articles:	-	-	-	-	-
Description: Validate and track intel updates of the threat systems necessary for the operation and continuous improvement of Navy laboratories and ranges which provide engineering support, testing and analysis to the developers, integrators, testers and users of systems and technologies that counter or penetrate air defenses.					
FY 2021 Plans:					
- Continue to provide program management, systems engineering, and requirements identification for the development of simulators and foreign material acquisition.					
- Continue to validate simulators and stimulators at the Navy tri-lab centers.					
FY 2022 Base Plans:					

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Appropriation/Budget Activity 1319 / 6	R-1 Program Element (Number/Name) PE 0604256N / <i>Threat Simulator Development</i>	Project (Number/Name) 0602 / <i>Electronics W/F Env Simulation (ECHO)</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>- Continue to provide program management, systems engineering, and requirements identification for the development of simulators and foreign material acquisition.</p> <p>- Continue to validate simulators and stimulators at the Navy tri-lab centers.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: The funding decrease from FY 2021 to FY 2022 is due to a reduced requirement for validation reports due to the number of projects that completed in FY 2021 including the L-Band radar signal emulators, S-Band radar signal emulators, passive radar systems, early warning radar systems, signal detection systems, closed-loop threat simulator, and the conversion of a threat system.</p>					
<p>Title: Acquisition and Measurement Capabilities</p> <p align="right">Articles:</p> <p>Description: Provide the test community with modern threat target acquisition systems and effective measurement systems necessary for Test and Evaluation of airborne early warning, situational awareness, detection and targeting systems and airborne response systems. Project investments in FY 2019, FY 2020 and FY 2021 support procurement and integration of advanced, threat representative electronic warfare (EW) target acquisition radars to establish a frequency diverse, dense and geographically dispersed threat integrated air defense system to support operationally realistic testing of F-35, Next Generation Jammer, EA-18G and Triton in a threat representative anti-access area denial environment that does not currently exist on any Department of Defense open air range.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Complete upgrades to the Naval Air Warfare Center ranges to support OT of the JSF by preparing sites for L-Band radar signal emulators, S-Band radar signal emulators, passive radar systems, early warning radar systems and signal detection and location systems. - Continue the development of two threat signal augmentation simulators for NAWCWD. - Initiate site preparation for three radar signal emulators at NAWCWD. <p>FY 2022 Base Plans:</p> <ul style="list-style-type: none"> - Continue the development of two threat signal augmentation simulators for NAWCWD. 	40.330	7.897	1.805	0.000	1.805
	-	-	-	-	-

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Appropriation/Budget Activity 1319 / 6	R-1 Program Element (Number/Name) PE 0604256N / <i>Threat Simulator Development</i>	Project (Number/Name) 0602 / <i>Electronics W/F Env Simulation (ECHO)</i>				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
		FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Continue site preparation for three radar signal emulators at NAWCWD.						
FY 2022 OCO Plans: N/A						
FY 2021 to FY 2022 Increase/Decrease Statement: The funding decrease from FY 2021 to FY 2022 is due to the completion of upgrades to support JSF OT testing.						
Title: Engagement Capabilities		11.662	5.787	11.598	0.000	11.598
		Articles:	-	-	-	-
Description: Provide the test community with the modern threat engagement systems necessary for Test and Evaluation of airborne alert, Situation Awareness, targeting systems and airborne response systems.						
FY 2021 Plans:						
<ul style="list-style-type: none"> - Complete the conversion of a threat system and integrate it at NAWC WD China Lake. - Continue the upgrade and integration of missile simulation models. - Continue the minor upgrades to open air and laboratory threat systems. - Complete the development of a naval-based threat radar closed-loop simulator for installation in laboratories at Naval Air Warfare Center Weapons Division and Naval Air Warfare Center Aircraft Division and designed for open air range implementation. Deliver products to the laboratories. -Initiate analysis and development of a reconfigurable closed-loop threat simulator designed for integration at laboratories and the open-air ranges. 						
FY 2022 Base Plans:						
<ul style="list-style-type: none"> - Continue the upgrade and integration of missile simulation models. - Continue the minor upgrades to open air and laboratory threat systems. - Continue design and development of a reconfigurable closed-loop threat simulator for integration and utilization at laboratories and the open-air ranges. - Initiate upgrade of a closed-loop threat simulator by adding a new threat model to the simulators at Naval Air Warfare Center Weapons Division Pt. Mugu and Naval Air Warfare Center Aircraft Division Pax River. - Initiate analysis and design for a closed-loop simulator of a sea based surface to air missile system for laboratory and open-air range implementation at Naval Air Warfare Center Weapons Division Pt. Mugu and China Lake and Naval Air Warfare Center Aircraft Division Pax River. 						
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					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> The funding increase from FY 2021 to FY 2022 is due to initiation of multiple projects including upgrade of a closed-loop threat simulator by adding a new threat model, and analysis and design for a closed-loop simulator of a sea based surface to air missile system.					
Accomplishments/Planned Programs Subtotals					52.582
					14.730
					14.008
					0.000
					14.008
C. Other Program Funding Summary (\$ in Millions)					
N/A					
Remarks					
D. Acquisition Strategy					
Not Applicable.					

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

Appropriation/Budget Activity 1319 / 6	R-1 Program Element (Number/Name) PE 0604256N / Threat Simulator Development	Project (Number/Name) 0672 / Effect Nav E/W (ENEWS)
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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
0672: Effect Nav E/W (ENEWS)	0.000	8.386	7.313	6.854	-	6.854	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY 2021, the Classified Program has been discontinued.

A. Mission Description and Budget Item Justification

The objective of the Effectiveness of Naval Electronic Warfare (EW) Systems (ENEWS) Project is the development, maintenance, upgrade and application of critical simulation assets to determine the effectiveness of Electronic Warfare (EW) for the surface Navy in simulated real-world engagement scenarios. ENEWS provides the Surface Navy with Anti-Ship Capable Missile (ASCM) simulators, Modeling and Simulation (M&S) and state-of-the-art evaluation facilities to support the introduction of modern, effective shipboard and off-board EW systems and tactics for EW Programs of Record (POR). ENEWS develops, maintains and operates hardware simulators, digital simulations (M&S) of legacy, modern and advanced threat ASCMs that provide EW PORs an integrated simulation capability through at-sea captive carry field trials with flyable simulators, digital ASCM models and the Central Target Simulator (CTS) hardware-in-the-loop evaluation facility. The reliance of ENEWS assets by the Naval Sea Systems Command, Commander, Operational Test and Evaluation Force (COMOPTEVFOR), Office of Naval Research (ONR) and other EW Research, Development, Test and Evaluation (T&E) agencies speaks to the overall importance of this project. The project provides support and effectiveness evaluations for EW system designs, Engineering Test (ET), Development Test (DT), Operational Test (OT) events including and the development and utilization of techniques and tactics. In the past, ENEWS quick reaction capabilities have provided significant support and solutions in crisis situations such as the Libyan crises, Iran threat, Persian Gulf crisis, and Operation Desert Shield/Storm. Simulation Display (SIMDIS) is a modeling tool developed under the ENEWS Project to support visualization of test events. SIMDIS has been adopted by most Department of Defense (DoD) T&E ranges as a effective tool that provides two and three dimensional graphical and video displays of live and post-test event data for EW T&E. One of the primary threats to surface ships is ASCM systems. The ENEWS Project is unique in that it is the only project within DoD dedicated to developing and providing realistic ASCM assets to test and evaluate the effectiveness of shipboard EW systems and tactics against these type threats. The ENEWS Project is a critical part of the Office of the Secretary of Defense Test Resource Master Plan. This plan employs many of ENEWS assets for planning, analysis, testing, and verification of shipboard and off-board Electronic Warfare systems techniques and tactics. As part of its normal activities, ENEWS provides Development Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E), and Follow-on Operational Test and Evaluation (FOT&E) support to the surface Navy for all ship classes. ENEWS provides support to multiple surface Navy programs including: Surface Electronic Warfare Improvement Program (SEWIP), Advanced-Offboard Electronic Warfare (AOEW), Nulka, Rapid Anti-ship Integrated Defense System, MK245 Giant tests, advanced Infrared (IR) decoys, decoy placement, ship Infrared signature and radar cross section measurement of DDG-51, LPD-17, DD-21 and Patrol Craft class ships, and other ship self-defense initiatives, including the Future Naval Capability process. In addition, ENEWS assets support effectiveness evaluations for North Atlantic Treaty Organization (NATO) ships' Electronic Warfare systems in joint allied exercises and joint EW exercises such as Rim of the Pacific (RIMPAC) and Northern Edge test events.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Classified Program	4.000	0.000	0.000	0.000	0.000

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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 align="right">Articles:</p> <p>Description: Details about this program are classified.</p> <p>Details about this program and any changes are classified.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p>	-	-	-	-	-
<p>Title: Hardware Simulation Systems</p> <p align="right">Articles:</p> <p>Description: Maintain and perform hardware and software upgrades to the Effectiveness of Naval Electronic Warfare (EW) Systems (ENEWS) inventory of flyable and shore based Anti-Ship Capable Missile (ASCM) Electro-Optic/Infrared (EO/IR), Visible and Radio Frequency (RF) simulators and simulation systems. Perform periodic evaluation of IR and RF simulators to assess simulation operational performance and collect data for comparison with previously recorded data. Also includes development and maintenance of all simulator control consoles, captive-carry pods and power supplies.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Complete hardware and software upgrades to a programmable EO/IR airborne SIP. - Complete software upgrade a ground based EO/IR programmable simulator. - Complete hardware and software upgrades to towed EO/IR simulator. - Continue software upgrade for flyable EO/IR simulator. - Introduce two new simulation assets into the ENEWS inventory and prepare them for flight and field testing. - Initiate hardware upgrades for two RF and one EO/IR flyable simulators. - Maintain and upgrade 25 hardware simulators, 5 programmable simulators, simulator control panels and the antenna test rig to support the SEWIP Block 3 and AOEW effectiveness evaluations. <p>FY 2022 Base Plans:</p>	2.675	3.818	3.430	0.000	3.430
	-	-	-	-	-

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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
<ul style="list-style-type: none"> - Continue to maintain custom instrumentation equipment such as digital data acquisition and ground truth systems. - Continue to maintain flight certifications and installation of systems in flyable captive carry pods for field-testing. - Continue to maintain and upgrade 25 hardware simulators, 5 programmable simulators, simulator control panels and the antenna test rig to support Surface Electronic Warfare Improvement Program (SEWIP) Block 3 and Advanced-Offboard Electronic Warfare (AOEW)effectiveness evaluations. - Complete hardware upgrade to one flyable Radio Frequency (RF) simulator and one programmable Electro-Optic/Infrared (EO/IR) flyable simulator. - Complete hardware and software upgrade to a second flyable RF hardware simulator. - Initiate/Integrate higher performance components for increased reliability. - Initiate one new simulation asset into the Effectiveness of Naval Electronic Warfare (EW) Systems (ENEWS) inventory and prepare system for flight and field-testing. - Initiate software upgrade to one Electro-Optic/Infrared (EO/IR) hardware simulator. <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: No significant changes from FY 2021 to FY 2022.</p>					
<p>Title: Simulation Characterization, Verification and Requirements</p> <p align="right">Articles:</p> <p>Description: Provides for the generation of formal documentation of hardware-based Anti-Ship Capable Missile (ASCM) threat simulators. Develop reports that contain detailed descriptions and parametric data of the ASCM threat simulators and compares the simulator's data to the actual threat's parametric data. Provide technical management functions in support of the ENEWS project; engineering and technical support requirements for the ASCM simulators and upgrades to meet Development Test (DT)/Operational Test (OT) testing requirements, development of detailed test resource requirements and provides an interface between the Office of the Deputy Chief of Naval Operations for Information Warfare (OPNAV N2/N6), Office of Naval Research, and ENEWS oversight activities.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue to develop reports that compare parametric data of ASCM threat simulators to the parametric data of the actual threat for two RF simulators. 	0.300	0.745	0.800	0.000	0.800
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)							
<ul style="list-style-type: none"> - Provide technical and management support to the ENEWS project. - Initiate and complete the FY 2021 ENEWS Program Management Plan. - Draft and submit monthly reports, performance based management and analysis assessments and financial execution reports. - Conduct characterization testing of two RF simulators and initiate development of verification reports that compares parametric data of the ASCM threat simulators to the parametric data of the actual threat. <p>FY 2022 Base Plans:</p> <ul style="list-style-type: none"> - Continue to develop reports that compare parametric data of Anti-Ship Capable Missile (ASCM) threat simulators to the parametric data of the actual threat for two Radio Frequency (RF) simulators. - Continue draft and submit monthly reports, performance based management assessments and financial execution reports. - Continue to conduct characterization testing of two RF simulators and initiate development of verification reports that compares parametric data of the ASCM threat simulators to the parametric data of the actual threat. - Continue to provide technical and management support to the ENEWS project. - Initiate/Develop test plan for one RF simulator to identify parameters for measurement. - Initiate and complete the FY2022 Effectiveness of Naval Electronic Warfare Systems (ENEWS) Program Management Plan. <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: No significant changes from FY 2021 to FY 2022.</p>							
Title: Support and Computers Simulation Systems							
Description: Perform upgrades and preventative maintenance to Electro-Optic/Infrared, Digital, and Radio Frequency Laboratory Simulation Testing facilities including flight support equipment based on existing and emerging complex threat systems. Employ these simulation tools and assets into a total EW effectiveness methodology to evaluate EW systems effectiveness. Development of testing & evaluation scenarios and							
		Articles:	1.411	2.750	2.624	0.000	2.624
			-	-	-	-	-

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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>environmental modeling to support Electronic Support (ES) and Electronic Attack (EA) testing and modify Anti-Ship Capable Missile (ASCM) threat simulators based on the latest data.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue maintenance and upgrades to EO/IR, digital, and RF laboratory simulation test and evaluation facilities and flight support equipment to provide ES and EA test support to SEWIP Block 3 and AOEW programs. - Continue to maintain and update the ENEWS CRUISE_Missiles ASCM models in support of M&S based EW testing for SEWIP Block 3, AOEW, and Navy Enterprise Testbed programs. - Continue updates to the Scenario and Environmental Model used to support open and closed loop simulations. - Continue upgrades to configuration control software library as new releases became available. - Continue to update and install new ship models into database and evaluate performance. - Initiate upgrades and user friendly enhancements to the Simulation Display (SIMDIS) toolset. - Evaluate various ship, Nulka, chaff and distraction chaff models for issues, test and repair any anomalies discovered. - Compare and verify the migration of existing missile simulations to the new real-time computer in CTS. At the end of FY 2021 five RF closed-loop missile simulations and two open-loop captive carry simulations will be migrated and verified in support of SEWIP Block 3 test requirements. <p>FY 2022 Base Plans:</p> <ul style="list-style-type: none"> - Continue maintenance and upgrades to EO/IR, digital, and RF laboratory simulation test and evaluation facilities and flight support equipment to provide ES and EA test support to SEWIP Block 3 and AOEW programs. - Continue to maintain and update the ENEWS CRUISE_Missiles ASCM models in support of M&S based EW testing for SEWIP Block 3, AOEW, and Navy Enterprise Testbed programs. - Continue updates to the Scenario and Environmental Model used to support open and closed loop simulations. - Continue upgrades to configuration control software library as new releases became available. - Continue to update and install new ship models into database and evaluate performance. - Continue upgrades and user friendly enhancements to the Simulation Display (SIMDIS) toolset. - Continue evaluation of various ship, Nulka, chaff and distraction chaff models for issues, test and repair any anomalies discovered. - Continue to compare and verify the migration of existing missile simulations to the new real-time computer in the Central Target Simulator (CTS). At the end of FY 2022 four Radio Frequency (RF) closed-loop missile 					

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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
simulators will be migrated and verified in support of SEWIP Block 3 test requirements. Migration of the fifth closed-loop simulation will continue into FY 2023 along with two open-loop captive-carry simulations. - Initiate integration of the replacement Target/Array Controller (TAC) into CTS. - Initiate/Integrate and thoroughly test new threat model. - Initiate development and upgrade of tools to execute digital models for Navy studies and Development Test (DT)/Operational Test (OT) test events. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: No significant changes from FY 2021 to FY 2022.					
Accomplishments/Planned Programs Subtotals	8.386	7.313	6.854	0.000	6.854

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

N/A

Remarks

D. Acquisition Strategy

Not applicable.