| CLASSIFICATION: | UNCLASSIFIED | | | | | | |
|---|---|---|---|---|---|---|---|
| EXHIBIT R-2, RDT&E BUDGET ITEM JUSTIFICATION | | | | | | DATE February 2008 | |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | | | R-1 ITEM NOMENCLATURE<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | | | | |
| COST (In Millions) | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| Total PE Cost | 16.221 | 18.117 | 21.720 | 28.455 | 28.936 | 28.387 | 29.602 |
| 0896 / AN/SQQ-89 Modification | 3.678 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1916 / Surface ASW System Improvement | 11.547 | 10.963 | 21.720 | 28.455 | 28.936 | 28.387 | 29.602 |
| 9999 / Congressional Adds | 0.996 | 7.154 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**A. MISSION DESCRIPTION:**

The objective of this Program Element (PE) is to significantly improve existing surface ship sonar system capabilities through quick and affordable development and integration of emergent transformational technologies.

Project 0896's mission is to focus on the identification, development, test, and integration of the most promising Anti-Submarine Warfare (ASW) technologies into the AN/SQQ-89(V) Surface Undersea Warfare (USW) Combat System. This project will provide a clear transition path for emergent transformational ASW technologies to be quickly and affordably developed and incorporated into the AN/SQQ-89(V). This project promotes commonality across Navy ASW platforms by leveraging the activities of other ASW/USW programs. This project will take technologies developed by the Program Executive Office for Integrated Warfare Systems (PEO IWS), Office of Naval Research (ONR), Defense Advanced Research Planning Agency (DARPA), and the Oceanographer of the Navy. This project will capitalize on a Rapid Technology Transition (RTT) process, enabling the aggressive pursuit of improvements to system portability, extension of interoperability with multiple platforms, and opportunity to export these capabilities Navy wide. Time phased insertion of ASW Commercial-Off-The-Shelf (COTS) improvements will address the entire combat system, including new sensor integration, acoustics, fire control, contact management, performance prediction, operator productivity, and on-board training. New capabilities are evaluated by the respective RTT/Peer Review Process (PRP) working groups consisting of selected technical domain experts and then tested in an at-sea environment through the Improved Performance Sonar (IPS) testbed.

Note: All FY08-13 PE 0205620N Project 0896 effort/funding transferred into Project 1916 for consolidation purposes.

Project 1916's primary mission is to improve AN/SQQ-89(V) Measures Of Performance (MOP) by enhancing detection, tracking, classification, active and sonobuoy data processing and display capabilities, and increasing acoustic sensor frequency bandwidth. This project takes advantage of the AN/SQQ-89(V) Open System Architecture (OSA) and Acoustic Rapid COTS Insertion (ARCI) initiatives to develop and integrate a Multi-Function Towed Array (MFTA) with active sonar bistatics (Echo Tracker Classifier - ETC), an ARCI passive ASW processor, and torpedo defense capabilities (Forward and Aft sector coverage with Wake Homer protection). This COTS-based surface USW combat system, the AN/SQQ-89A(V)15, is currently planned as a backfit program for both CG47 (CG59-73 Baseline 3 and 4) and DDG51 (DDG51-112 FLT I/II/IIA) class ships. The Open Architecture (OA) (level 3 compliant) AN/SQQ-89A(V)15 system drives the spiral development process and provides budget flexibility to make COTS/OA technology solutions and ARCI-type initiatives affordable. This will be accomplished via the incorporation of select Pre-Planned Product Improvements (P3I) and emergent, transformational ASW technologies (such as, those developed under Project 0896) delivered to the AN/SQQ-89(V) prime integrator every two to three years.

Project 1916 includes funding FY08-13 for the Surface Ship Enhanced Measurement Program (SSEMP), which will measure the performance of existing and new Surface Ship ASW combat systems and enables data based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios.

Project 1916 includes funding FY09-13 for the ASW Fleet Synthetic Training (FST) program, including the development of a high fidelity acoustic simulation of a surface ship sonar based on the Improved Performance Sonar (IPS) baseline. It will build from the submarine force's Submarine Multi-Mission Team Trainer (SMMTT3) baseline for high fidelity passive simulation, improves active acoustics, develops a rapid acoustic reconstruction capability, ensures Fleet FST interoperability via the On-Board Trainer (OBT)/Battle Force Tactical Trainer (BFTT). ASW FST capability will be fielded throughout the force, while spiraling in additional ASW sensors, as well as full High Level Architecture (HLA)/ Navy Continuous Training Environment (NCTE) interoperability.

Project 1916 included FY 2007 Congressional Add funding for 'Surface Ship ASW Research and Development (R&D) Improvements'. Funding was used to continue the development of promising technologies for at-sea tests in representative war fighting environments. Project 1916 also included FY 2007 Congressional Add funding for 'Surface Ship Sonar Integrated Data Fusion Initiative'. Funding was used to support the development, test, and evaluation of an integrated sonar data fusion and display capability for Surface Ship USW Combat Systems.

Project 9A75 included FY 2007/2008 Congressional Add funding for 'Advanced Materials for Acoustic Window Applications'. Funding will be used to study the feasibility of replacing existing sonar window materials with a material that has the potential to provide a Total Ownership Cost (TOC) reduction of three (3) to five (5) times for acoustic windows used on Navy surface combatants such as the DDG 51 and DDG 1000 Class vessels, while improving mission readiness and acoustic performance. A full-scale, prototype composite AN/SQS-53C sonar window is currently being built as a first-article window. Based on the lessons learned from the first-article window produced, a second-article window is planned to be installed on a decommissioned (test-ship) Surface Combatant. After subsequent at-sea testing, data analysis, and refined modeling & simulation, a third-article window will be installed, tested, and analyzed, on an in-service Surface Combatant (DDG51 Class).

PE 0205620N also included FY 2008 Congressional Add funding for 'Long Range Synthetic Aperture Sonar for ASW' (Project number to be determined). Funding will be used to initiate processor prototype system architecture, requirements modeling, and performance predictions for an ASW Synthetic Aperture Sonar system utilizing the current Navy sonar assets of an AN/SQS-53 hull mounted sonar and the MFTA.

| CLASSIFICATION: | UNCLASSIFIED | | |
|---|---|---|---|
| EXHIBIT R-2, RDT&E BUDGET ITEM JUSTIFICATION (CONTINUATION) | | | DATE February 2008 |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | | R-1 ITEM NOMENCLATURE<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | |

**B. PROGRAM CHANGE SUMMARY:**

| Funding: | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| FY 2008 President's Budget | 18.546 | 11.200 | 14.421 |
| FY 2009 President's Budget | 16.221 | 18.117 | 21.720 |
| Total Adjustments | - 2.325 | 6.917 | 7.299 |
| | | | |
| Summary of Adjustments: | FY 2007 | FY 2008 | FY 2009 |
| Congressional Adds/Undistributed Adjustments/Rescissions | - 0.012 | 6.917 | |
| Reprogrammings | - 1.880 | | |
| Program Adjustments | | | 7.306 |
| Pricing Adjustments | | | -0.007 |
| Small Business Innovative Research (SBIR) Tax Assessment | -0.433 | | |
| Subtotal | - 2.325 | 6.917 | 7.299 |

| CLASSIFICATION: | UNCLASSIFIED | | | | | | |
|---|---|---|---|---|---|---|---|
| EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION | | | | | DATE February 2008 | | |
| APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME **0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | | | | PROJECT NUMBER AND NAME **0896/AN/SQQ-89 MODIFICATIONS** | | |
| COST (In Millions) | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| Project Cost | 3.678 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| RDT&E Articles Qty | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:**

The AN/SQQ-89 Modifications Project will focus on the identification, development, test, integration and delivery of the most promising ASW technologies to the AN/SQQ-89(V) Surface USW Combat System. This project will provide a clear transition path for emergent transformational ASW technologies (i.e., through ASW Cross Functional Board initiatives) to be quickly and affordably developed and incorporated. This project promotes commonality across Navy ASW platforms by leveraging the activities of other ASW/USW programs. This project will capitalize on a RTT process, enabling the aggressive pursuit of improvements to system portability, extension of interoperability with multiple platforms, and opportunity to export these capabilities Navy wide. Time phased insertion of ASW COTS improvements will address the entire combat system, including new sensor integration, acoustics, fire control, contact management, performance prediction, operator productivity, and on-board training. New capabilities are evaluated by the respective RTT/PRP working groups consisting of selected technical domain experts and then tested in an at-sea environment through the IPS testbed.

This project will take technologies developed by PEO IWS, ONR, DARPA, and the Oceanographer of the Navy, that achieve significant improvements in ASW effectiveness and integrate them into the AN/SQQ-89(V) Surface USW Combat System. The following improvements have been considered in the near term: develop and integrate the Low Frequency Array's (LFA) low frequency coherent multi-static processing capability for the AN/SQR-19 towed array group; leverage ARCI's Sparsely Populated Volumetric Array (SPVA) technology to increase bandwidth and incorporate acoustic intercept capability for the surface community; develop a Data Fusion capability that will integrate ASW, radar and other non-acoustic sensors into an integrated display environment thereby improving operator efficiency; develop/improve Marine Mammal Detection and Mitigation (MMDM) algorithm enhancements; and develop an effective and affordable underwater Acoustic Communications (ACOMMS) system for seamless communications between ASW platforms. Additional improvements will be developed and integrated as new, promising technologies are identified.

Note: All FY08-13 PE 0205620N Project 0896 effort/funding transferred into Project 1916 for consolidation purposes.

| CLASSIFICATION: | UNCLASSIFIED | |
|---|---|---|
| EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION | | DATE<br>February 2008 |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | PROJECT NUMBER AND NAME<br>**0896/AN/SQQ-89 MODIFICATIONS** |

**B. ACCOMPLISHMENTS/PLANNED PROGRAM:**

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Identify/Develop/Integrate ASW Technologies Into AN/SQQ-89(V) Systems** | 3.428 | 0.000 | 0.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07: Identify technologies developed by PEO IWS 5, ONR, DARPA, and the Oceanographer of the Navy that may achieve significant improvements in ASW effectiveness if integrated into the AN/SQQ-89(V) Surface USW Combat System. Selected promising technologies will be sufficiently integrated into adjunct systems installed in the AN/SQQ-89(V), such as the IPS and Scaled Improved Performance Sonar (SIPS), so that at-sea tests can be conducted and performance assessed. Integration of successful technologies will be completed for installation on CG47 and DDG51 class ships as part of IPS and SIPS software updates. Successful software improvements will also be passed on to the AN/SQQ-89(V) prime integrator as part of the spiral development build process under Project 1916, for fielding in the OSA AN/SQQ-89A(V)15 USW Combat System that is being installed on CGs 59-73 and DDGs 51-112.

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **At-Sea Testing of Select ASW Technologies** | 0.250 | 0.000 | 0.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07: Coordinate and conduct at-sea test of select emergent, significant ASW technologies on ships equipped with AN/SQQ-89(V) adjunct IPS and SIPS systems. Assess results.

**C. OTHER PROGRAM FUNDING SUMMARY:**

Related RDT&EN:

PE 0205620N Surface ASW Combat System Integration, Project 1916 Surface ASW Systems Improvements, and PE 0603553N Surface ASW, Project 1704 Undersea Warfare.

| Line Item No. and Name | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| OPN BLI 2136/AN/SQQ-89 Surface ASW Combat System | 37.378 | 30.774 | 117.685 | 120.895 | 96.030 | 106.206 | 100.210 | CONT. | CONT. |

**D. ACQUISITION STRATEGY:**

- Identify and test promising evolutionary and transformational technologies via incorporation on adjunct IPS and SIPS systems; and deliver successful technologies in the form of software updates to AN/SQQ-89(V) prime system integrator for integration into the AN/SQQ-89A(V)15 USW Combat System via spiral development build process.
- Awarded new, competitive contract for AN/SQQ-89(V) prime system integrator in FY 2007.

| CLASSIFICATION: | UNCLASSIFIED | |
|---|---|---|
| EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION (CONTINUATION) | | DATE<br>February 2008 |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | PROJECT NUMBER AND NAME<br>**0896/AN/SQQ-89 MODIFICATIONS** |

**E. MAJOR PERFORMERS:**

- Advanced Acoustic Concepts (AAC), NY - Small Business Innovative Research (SBIR) Phase III contract for common acoustic processor, acoustic intercept, and prime contractor for adjunct AN/SQQ-89(V) IPS and SIPS programs.
- Adaptive Methods (AM),VA - SBIR Phase III contract for engineering services in support of hardware/software integration, and test of advanced sensor interfaces and sensor processing improvements including Data Fusion (DF), Adaptive Beamforming (ABF), and Calibrated Reference Hydrophone (CRH) sensor interface.
- Johns Hopkins University Applied Physics Laboratory (JHU/APL), MD - Development of emerging active sonar technologies.
- Naval Sea Systems Command, Newport, RI - AN/SQQ-89(V) Technical Design Agent support.
- University of Texas Applied Research Laboratory (UT/ARL), TX - Sonar Performance Prediction Functional Segment (SPPFS) software development.

| CLASSIFICATION: | UNCLASSIFIED | | | | | | |
|---|---|---|---|---|---|---|---|
| EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION | | | | | DATE February 2008 | | |
| APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME **0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | | | | PROJECT NUMBER AND NAME **1916/Surface ASW System Improvement** | | |
| COST (In Millions) | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| Project Cost | 11.547 | 10.963 | 21.720 | 28.455 | 28.936 | 28.387 | 29.602 |
| RDT&E Articles Qty | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:**

The Surface ASW Systems Improvements Project will support essential performance enhancements to AN/SQQ-89(V) and Surface Ship Sonar Systems. This project will improve AN/SQQ-89(V) MOP by enhancing detection, tracking, classification, active and sonobuoy data processing and display capabilities, and increasing acoustic sensor frequency bandwidth.

This project will take advantage of the AN/SQQ-89(V) OSA and ARCI initiatives to develop and integrate a MFTA with active sonar bistatics (ETC), an ARCI passive ASW processor, and torpedo defense capabilities (Forward and Aft sector coverage with Wake Homer protection). This COTS-based Surface USW combat system, the AN/SQQ-89A(V)15, is currently planned as a backfit program for both CG47 (CG59-73 Baseline 3 and 4) and DDG51 (DDG51-112 FLTI/II/IIA) class ships. This project has delivered the AN/SQQ-89A(V)15 Build 0 Pre-Production Prototype, performed installation on board CG73, and conducted subsequent Developmental Test & Evaluation (DT&E) and Initial Operational Test & Evaluation (IOT&E) where the system was found 'Operationally Effective' by Command Operational Test and Evaluation Force (COMOPTEVFOR).

The OSA and high performance COTS processing hardware on ships fielded with the AN/SQQ-89A(V)15 combat system provides an opportunity to integrate select P3I as well as emergent, transformational ASW technological improvements (as developed under Project 0896) that were previously unachievable. The USW suites on these ships will require periodic upgrades to remain effective well into the 21st century. To achieve this, this project will package and deliver incremental upgrades every two years to the AN/SQQ-89A(V)15 production program via a spiral development build process by inserting maturing USW technologies, such as enhancements to improve USW performance in the littoral, and via reduced manning on AN/SQQ-89(V) equipped ships, active classification sonar upgrades, marine mammal detection and mitigation, Multi-Static Active ASW, Multi-Frequency Acoustic Communications (MF ACOMMS) between Surface Combatants and Submarines, new RAPTOR radar processing, and upgraded technologies such as algorithm improvements, increased Passive Narrow Band (PNB) frequency, improved Extended Echo Ranging (EER), and beamformer improvements. A rigorous testing program is also required to ensure that these performance enhancements are operationally effective and suitable.

Project 1916 includes an FY08-13 OSD/OMB-08 budget based transfer of the Surface Ship Enhanced Measurement Program (SSEMP) from PE 0603553N, Project 1704, beginning in FY 2008. SSEMP measures the performance of existing and new Surface Ship ASW combat systems and enables data based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios.

Project 1916 includes funding FY09-13 for the ASW Fleet Synthetic Training (FST) program, including the development of a high fidelity acoustic simulation of a surface ship sonar based on the Improved Performance Sonar (IPS) baseline. It will build from the submarine force's Submarine Multi-Mission Team Trainer (SMMTT3) baseline for high fidelity passive simulation, improves active acoustics, develops a rapid acoustic reconstruction capability, ensures Fleet FST interoperability via the On-Board Trainer

(OBT)/Battle Force Tactical Trainer (BFTT). ASW FST capability will be fielded throughout the force, while spiraling in additional ASW sensors, as well as full High Level Architecture (HLA)/ Navy Continuous Training Environment (NCTE) interoperability.

Project 1916 included FY 2007 Congressional Add funding for 'Surface Ship ASW Research and Development (R&D) Improvements'. Funding was used to continue the development of promising technologies for at-sea tests in representative war fighting environments. Project 1916 also included FY 2007 Congressional Add funding for 'Surface Ship Sonar Integrated Data Fusion Initiative'. Funding was used to support the development, test, and evaluation of an integrated sonar data fusion and display capability for Surface Ship USW Combat Systems.

Note: All FY08-13 PE 0205620N Project 0896 effort/funding transferred into Project 1916 for consolidation purposes.

| CLASSIFICATION: | UNCLASSIFIED | |
|---|---|---|
| EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION | | DATE<br>February 2008 |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | PROJECT NUMBER AND NAME<br>**1916/Surface ASW System Improvement** |

**B. ACCOMPLISHMENTS/PLANNED PROGRAM:**

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Surface Ship ASW R&D Improvements (Cong Add)** | 6.058 | 0.000 | 0.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07: (Congressional Add) Continued the development of Surface Ship ASW improvements that increased capability in passive/active sonar detection and in own ship torpedo self defense. This was through the use of portable, modular software to ease transition to new families of COTS hardware, and the low cost incorporation of improved processing algorithms. This program addressed critical surface sonar capability shortfalls, such as: passive/active ASW in difficult littoral areas, torpedo defense detection and response times in all areas, and automation technology for reduced manning. Funding addressed these shortfalls by using the Advanced Processing Builds (APB) model that has rapidly delivered transformational modernization through exploitation of application reuse and low cost incorporation of improved processing algorithms.

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Surface Ship Sonar Integrated Data Fusion Initiative (Cong Add)** | 1.800 | 0.000 | 0.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07: (Congressional Add) Developed software to consolidate the display of all surface combatant sonar contacts at a single multi-modal analysis workstation and automatically developed fused target motion solutions for threat assessment and engagement.

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **AN/SQQ-89(V) Test & Evaluation Program** | 0.450 | 0.700 | 0.700 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07-09: Provide AN/SQQ-89(V) test and evaluation planning support, System Assessment Team (SAT) analysis, update Test & Evaluation Master Plan (TEMP) to reflect AN/SQQ-89A(V)15 spiral development build program, coordinate and conduct roll-on roll-off tests of AN/SQQ-89(V) systems, provide performance data and environmental analysis, Independent Verification & Validation (IV&V), and modeling and simulation using MOP and Measures Of Effectiveness (MOE) methods.

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Enhancements via SQQ-89A(V)15 Spiral Development Build Process** | 3.239 | 7.263 | 10.520 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07-09: Developing modest enhancements to the AN/SQQ-89A(V)15 OSA via the integration of transformational technologies through a spiral development process. Items include hull-mounted Acoustic Intercept (ACI) sensor, ACI performance predictions and signal injection capabilities, MMDM Capability, hull array adaptive beamformer, towed array shape compensated beamformer, Mid-Frequency Active (MFA) Cooperative Organic Mine Defense (COMID) mine avoidance upgrades, MFA rapid replay and multi-waveform tracker, hull passive functional segment, full bandwidth towed array passive ASW and automated Torpedo Detection, Classification, and Localization (TDCL) algorithm improvements (active/passive) necessary to extend detection ranges and reduce false alert/alarm rates, new sensor Data Fusion Functional Segment (DFFS) to reduce the number of displays required for system operation, Multi-Frequency Acoustic Communications (MF ACOMMS) development, Extended Echo Ranging (EER) "Distant Thunder" integration into the AN/SQQ-89(V) airframe sensor processing suite and active functional segment, explosive source integration with AN/SQQ-89(V) processes, simplification of displays and active processing, incorporation of all IPS and SIPS features, and a Sonar Logger capability to significantly reduce operator data logging requirements. These items will be

integrated and delivered to the CG47 and DDG51 class AN/SQQ-89A(V)15 backfit production programs.

FY07-09: Resolve/troubleshoot issues/deficiencies that arise from AN/SQQ-89(V) Test & Evaluation program. Rapidly address and correct problems/deficiencies in processing, capability or operations within the following areas within the AN/SQQ-89(V) USW combat system architecture; sensor processing, acoustics, MMDM, fire control, contact management, performance prediction, operator productivity and on-board training, MFTA, Digital Fire Control Interface (DFCI), Remote Mine Hunting (RMS), MFA processing, and adaptive beamforming.

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Surface Ship Enhanced Measurement Program (SSEMP)** | 0.000 | 3.000 | 3.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY08-09: Measure the performance of existing and new Surface Ship ASW combat systems and enables data based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios. Perform Fleet exercise data reconstruction and post-test analysis each year.

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **ASW Fleet Synthetic Training (FST)** | 0.000 | 0.000 | 7.500 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY09: Begin development of a high fidelity acoustic simulation of a surface ship sonar based on the Improved Performance Sonar (IPS) baseline. It will build from the submarine force's Submarine Multi-Mission Team Trainer (SMMTT3) baseline for high fidelity passive simulation, improves active acoustics, develops a rapid acoustic reconstruction capability, ensures Fleet FST interoperability via the On-Board Trainer (OBT)/Battle Force Tactical Trainer (BFTT). ASW FST capability will be fielded throughout the force, while spiraling in additional ASW sensors, as well as full High Level Architecture (HLA)/ Navy Continuous Training Environment (NCTE) interoperability.

**C. OTHER PROGRAM FUNDING SUMMARY:**

Related RDT&EN:

PE 0205620N Surface ASW Combat System Integration, Project 0896 AN/SQQ-89 Modifications, and PE 0603553N Surface ASW, Project 1704 Undersea Warfare

| Line Item No. and Name | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| OPN BLI 2136/AN/SQQ-89 Surface ASW Combat System | 37.378 | 30.774 | 117.685 | 120.895 | 96.030 | 106.206 | 100.210 | CONT. | CONT. |

**D. ACQUISITION STRATEGY:**

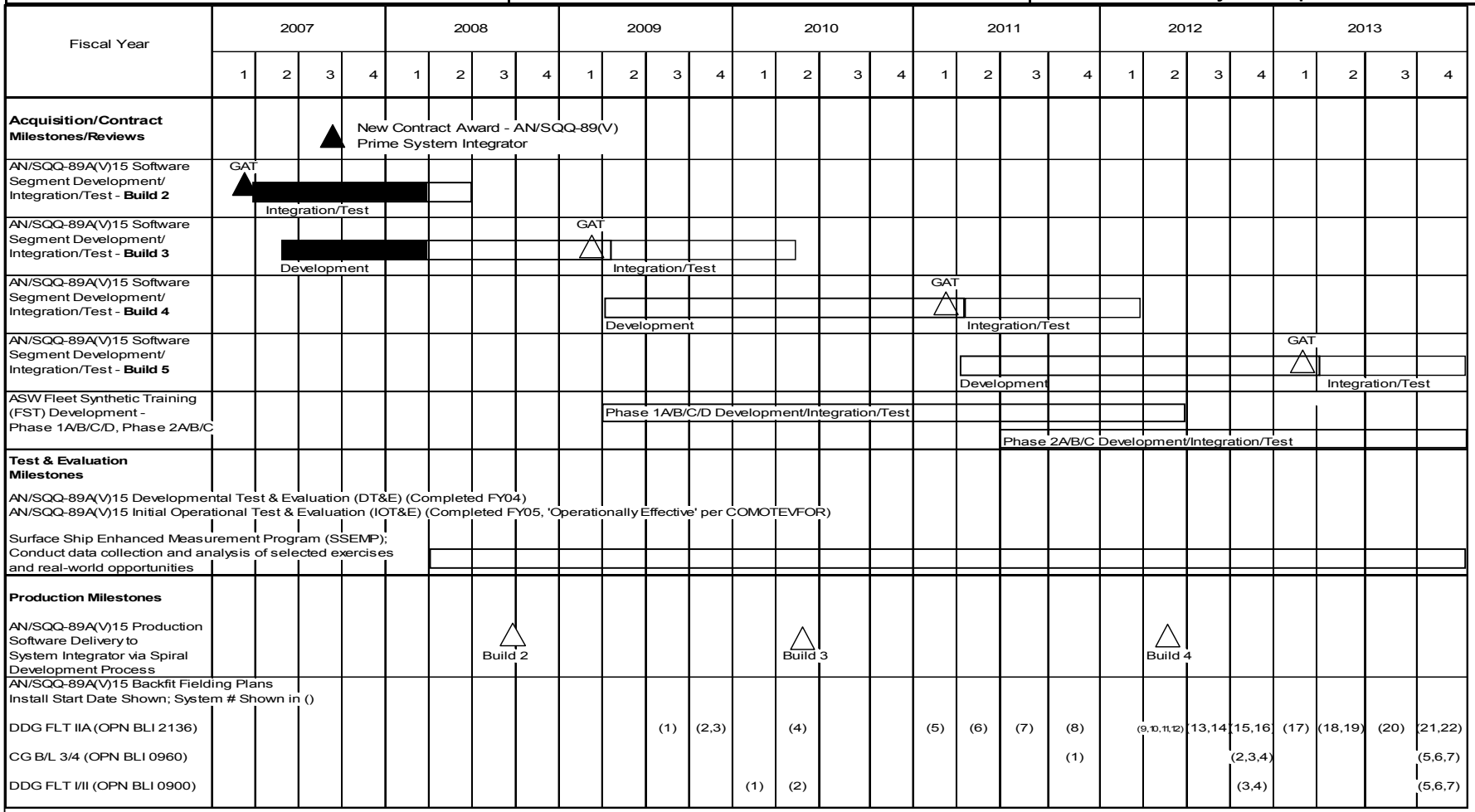
- Completed AN/SQQ-89A(V)15 Build 0 Pre-Production Prototype, performed installation, conducted DT&E, and Initial IOT&E 4Q FY 2005. Via spiral development build process, incorporate evolutionary and transformational technologies into AN/SQQ-89A(V)15 systems at scheduled intervals.
- Awarded new, competitive contract for AN/SQQ-89(V) prime system integrator in FY 2007.

**E. MAJOR PERFORMERS:**

- AAC, NY - SBIR Phase III contract for common acoustic processor, acoustic intercept, and common surface and air undersea warfare functional segments.
- AM, VA - SBIR Phase III contract for common acoustic processor and towed array/beamformer processing improvements to the MFTA functional segment and prime contractor for 'Surface Ship Sonar Integrated Data Fusion Initiative' FY 2007 Congressional Add.
- GD-AIS, VA - SBIR Phase III contract for common acoustic processor, prime contractor for 'Surface Ship ASW R&D Improvements' FY 2007 Congressional Adds provided to complete the development of promising technologies for at-sea tests in representative warfighting environments.
- JHU/APL, MD - Design, development, and integration of MFTA, Torpedo Detection Classification and Localization (TDCL) improvements, SSEMP participation in experiment planning, conduct, data reconstruction and post-exercise analysis.
- UT/ARL, TX - Design, development, and integration of active sonar and Sonar Performance Prediction Functional Segment (SPPFS) improvements, SSEMP participation in experiment planning, conduct, data reconstruction and post-exercise analysis.
- Lockheed Martin, NY - Prime AN/SQQ-89(V) System Integrator, Production, and Design Agent.
- Naval Sea Systems Command, Newport, RI - AN/SQQ-89(V) Technical Design Agent support.
- Naval Sea Systems Command, Dahlgren, VA - AN/SQQ-89(V) Technical Design Agent support.

| CLASSIFICATION: | UNCLASSIFIED | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXHIBIT R-3, RDT&E PROJECT COST ANALYSIS | | | | | | | | | DATE February 2008 | | | |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | | | | | PROJECT NUMBER AND NAME<br>**1916/Surface ASW System Improvement** | | | | | |
| Cost Categories | Contract Method & Type | Performing Activity & Location | Total PY Cost ($000) | FY 2007 Cost ($000) | FY 2007 Award Date | FY 2008 Cost ($000) | FY 2008 Award Date | FY 2009 Cost ($000) | FY 2009 Award Date | Cost to Complete ($000) | Total Cost ($000) | Target Value of Contract |
| S/W Development/Integration/Test | C/CPFF | AAC, NY | 2.365 | 0.143 | FEB-07 | 0.000 | | 0.560 | NOV-08 | CONT | CONT | 0.000 |
| S/W Development/Integration/Test | C/CPFF | AM, VA | 2.598 | 3.224 | DEC-06 | 0.979 | JAN-08 | 1.700 | NOV-08 | CONT | CONT | 0.000 |
| S/W Development/Integration/Test | C/CPFF | GD-AIS, VA | 3.196 | 5.014 | MAR-07 | 0.996 | JAN-08 | 0.700 | NOV-08 | CONT | CONT | 0.000 |
| S/W Development/Integration/Test | C/CPFF | LOCKHEED MARTIN, NY | 0.000 | 0.000 | | 1.205 | NOV-07 | 0.750 | NOV-08 | CONT | CONT | 0.000 |
| S/W Development/Integration/Test | C/CPFF | JHU/APL, MD | 0.823 | 0.000 | | 2.812 | JAN-08 | 12.700 | DEC-08 | CONT | CONT | 0.000 |
| S/W Development/Integration/Test | C/CPFF | UT/ARL, TX | 0.110 | 0.905 | MAY-07 | 1.665 | JAN-08 | 1.340 | DEC-08 | CONT | CONT | 0.000 |
| S/W TDA Support | WR | NAVSEA/NEWPORT, RI | 0.793 | 0.565 | MAY-07 | 0.844 | NOV-07 | 1.250 | NOV-08 | CONT | CONT | 0.000 |
| S/W TDA Support | WR | NAVSEA/DAHLGREN, VA | 0.203 | 0.000 | | 0.075 | NOV-07 | 0.200 | NOV-08 | CONT | CONT | 0.000 |
| S/W Development/Integration/Test | WR | VARIOUS | 0.465 | 0.738 | NOV-06 | 1.166 | NOV-07 | 1.286 | NOV-08 | CONT | CONT | 0.000 |
| **Subtotal Product Development** | | | **10.553** | **10.589** | | **9.742** | | **20.486** | | **CONT** | **CONT** | **0.000** |
| Remarks: | | | | | | | | | | | | |
| DT/OT Test Conduct/Support | WR | COMOPTEVFOR, VA | 0.004 | 0.333 | JAN-07 | 0.000 | | 0.000 | | 0.000 | 0.337 | 0.000 |
| IV&V/SAT/TEMP Assess./Update | WR | NAVSEA/NEWPORT, RI | 0.109 | 0.117 | NOV-06 | 0.600 | NOV-07 | 0.600 | NOV-08 | CONT | CONT | 0.000 |
| DT/OT/Miscellaneous T&E | WR | VARIOUS | 0.088 | 0.000 | | 0.100 | NOV-07 | 0.100 | NOV-08 | CONT | CONT | 0.000 |
| **Subtotal Test and Evaluation** | | | **0.201** | **0.450** | | **0.700** | | **0.700** | | **CONT** | **CONT** | **0.000** |
| Remarks: | | | | | | | | | | | | |
| Program Management Support | C/CPAF | BAE SYSTEMS, MD | 0.346 | 0.358 | FEB-07 | 0.371 | JAN-08 | 0.384 | NOV-08 | CONT | CONT | 0.000 |
| Program Office Travel | ALLOT | NAVSEA PEO IWS5, DC | 0.079 | 0.150 | NOV-06 | 0.150 | NOV-07 | 0.150 | NOV-08 | CONT | CONT | 0.000 |
| **Subtotal Management Services** | | | **0.425** | **0.508** | | **0.521** | | **0.534** | | **CONT** | **CONT** | **0.000** |
| Remarks: | | | | | | | | | | | | |
| **Total Cost** | | | **11.179** | **11.547** | | **10.963** | | **21.720** | | **CONT** | **CONT** | **0.000** |

| CLASSIFICATION: | UNCLASSIFIED | |
|---|---|---|
| EXHIBIT R-4, SCHEDULE PROFILE | | DATE<br>February 2008 |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATI(** | PROJECT NUMBER AND NAME<br>**1916/Surface ASW System Improvement** |



| CLASSIFICATION: | UNCLASSIFIED | | | | | | |
|---|---|---|---|---|---|---|---|
| EXHIBIT R-4a, SCHEDULE DETAIL | | | | | DATE February 2008 | | |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | | | PROJECT NUMBER AND NAME<br>**1916/Surface ASW System Improvement** | | | |
| Schedule Profile | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| New Contract Award - AN/SQQ-89(V) Prime System Integrator | 3Q | | | | | | |
| Build 2 S/W Segment Government Acceptance Test (GAT) | 1Q | | | | | | |
| Build 2 S/W Segment Integration/Test | 2Q-4Q | 1Q-2Q | | | | | |
| Build 2 Production S/W Delivery to System Integrator | | 3Q | | | | | |
| Build 3 S/W Segment Development | 2Q-4Q | 1Q-4Q | 1Q | | | | |
| Build 3 S/W Segment GAT | | | 1Q | | | | |
| Build 3 S/W Segment Integration/Test | | | 2Q-4Q | 1Q-2Q | | | |
| Build 3 Production S/W Delivery to System Integrator | | | | 2Q | | | |
| Build 4 S/W Segment Development | | | 2Q-4Q | 1Q-4Q | 1Q | | |
| Build 4 S/W Segment GAT | | | | | 1Q | | |
| Build 4 S/W Segment Integration/Test | | | | | 2Q-4Q | 1Q | |
| Build 4 Production S/W Delivery to System Integrator | | | | | | 2Q | |
| Build 5 S/W Segment Development | | | | | 2Q-4Q | 1Q-4Q | 1Q |
| Build 5 S/W Segment GAT | | | | | | | 1Q |
| Build 5 S/W Segment Integration/Test | | | | | | | 2Q-4Q |
| ASW Fleet Synthetic Training (FST) Phase 1A/B/C/D Development | | | 2Q-4Q | 1Q-4Q | 1Q-4Q | 1Q-2Q | |
| ASW FST Phase 2A/B/C Development | | | | | 3Q-4Q | 1Q-4Q | 1Q-4Q |
| Surface Ship Enhanced Measurement Program (SSEMP) | | 2Q-4Q | 1Q-4Q | 1Q-4Q | 1Q-4Q | 1Q-4Q | 1Q-4Q |
| DDG51 Class FLT IIA Backfit Install (Ships 1,2,3) | | | 3Q-4Q | | | | |
| DDG51 Class FLT IIA Backfit Install (Ship 4) | | | | 2Q | | | |
| DDG51 Class FLT IIA Backfit Install (Ships 5,6,7,8) | | | | | 1Q-4Q | | |
| DDG51 Class FLT IIA Backfit Install (Ships 9,10,11,12,13,14,15,16) | | | | | | 2Q-4Q | |
| DDG51 Class FLT IIA Backfit Install (Ships 17,18,19,20,21,22) | | | | | | | 1Q-4Q |
| CG47 Class B/L 3/4 Backfit Install (Ship 1) | | | | | 4Q | | |
| CG47 Class B/L 3/4 Backfit Install (Ships 2,3,4) | | | | | | 4Q | |
| CG47 Class B/L 3/4 Backfit Install (Ships 5,6,7) | | | | | | | 4Q |
| DDG51 Class FLT I/II Backfit Install (Ship 1) | | | | 2Q | | | |
| DDG51 Class FLT I/II Backfit Install (Ship 2) | | | | 3Q | | | |
| DDG51 Class FLT I/II Backfit Install (Ships 3,4) | | | | | | 4Q | |
| DDG51 Class FLT I/II Backfit Install (Ship 5,6,7) | | | | | | | 4Q |

| CLASSIFICATION: | UNCLASSIFIED | |
|---|---|---|
| EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION | | DATE<br>February 2008 |
| APPROPRIATION/BUDGET ACTIVITY<br>**RDTEN/BA 7** | PROGRAM ELEMENT NUMBER AND NAME<br>**0205620N/SURFACE ASW COMBAT SYSTEM INTEGRATION** | PROJECT NUMBER AND NAME<br>**9999/CONGRESSIONAL ADDS** |

**B. ACCOMPLISHMENTS/PLANNED PROGRAM:**

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Advanced Materials for Acoustic Window Applications** | 0.996 | 6.359 | 0.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY07/08 Congressional Adds: Study the feasibility of replacing existing sonar window materials with a material that has the potential to provide a Total Ownership Cost (TOC) reduction of three (3) to five (5) times for acoustic windows used on Navy surface combatants such as the DDG 51 and DDG 1000 Class vessels, while improving mission readiness and acoustic performance. A full-scale, prototype composite AN/SQS-53C sonar window is currently being built as a first-article window. Based on the lessons learned from the first-article window produced, a second-article window is planned to be installed on a decommissioned (test-ship) Surface Combatant. After subsequent at-sea testing, data analysis, and refined modeling & simulation, a third-article window will be installed, tested, and analyzed, on an in-service Surface Combatant (DDG51 Class).

| | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|
| **Long Range Synthetic Aperture Sonar for ASW** | 0.000 | 0.795 | 0.000 |
| RDT&E Articles Quantity | 0 | 0 | 0 |

FY08 Congressional Add: Initiate processor prototype system architecture, requirements modeling, and performance predictions for an ASW Synthetic Aperture Sonar system utilizing the current Navy sonar assets of an AN/SQS-53 hull mounted sonar and the MFTA. A Synthetic Aperture Sonar has the potential to significantly reduce false alarms and eliminate clutter from current US Navy ASW sonar systems. The creation of a synthetic longer array will provide acoustically derived images of contacts at extended ranges supporting the initial detection and rapid classification of ASW threats most notably irrespective of Doppler and in environments of high clutter. It does this through the synthetic formation of an aperture that provides narrow beams and constant resolution with range. This allows the formation of an image of the physical shape and aspect of the contact allowing the rejection of non ASW threat shapes as clutter while identifying high probability ASW threats.