

CLASSIFICATION:

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EXHIBIT R-2, RDT&E Budget Item Justification							DATE:			
APPROPRIATION/BUDGET ACTIVITY							June 2001			
RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-5							R-1 ITEM NOMENCLATURE			
							Submarine System Equipment Development/0604503N			
COST (\$ in Millions)	FY 2000	FY 2001	FY 2002							
Total PE Cost	70.764	72.132	43.706							
Submarine Support Equipment/F0775	0.907	0.933	0.656							
Submarine Sonar Improvement/F0219	62.463	60.652	35.966							
Submarine Integrated Antenna Systems/X0742	1.893	5.896	2.885							
Submarine Tactical Communications Systems/X1411	5.501	4.651	4.199							
Quantity of RDT&E Articles	2.5	0	0							
<p>A. (U) Mission Description and Budget Item Justification: The Submarine Support Equipment Program develops and improves submarine Electronic Warfare Support (ES) techniques and components, equipment, and systems that will increase submarine operational effectiveness in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine ES to be effective in conducting the following mission areas: Joint Littoral Warfare, Joint Surveillance, Space and Electronic Warfare and Intelligence Collection, Maritime Protection, and Joint Strike.</p> <p>(U) The Submarine Sonar Improvement Program delivers block updates to Sonar Systems installed on SSN 688, 688I, 21 and TRIDENT Class Submarines to maintain clear acoustic, tactical and operational superiority over submarine and surface combatants in all scenarios through detection, classification, localization and contact following. Current developments are focused on supporting Littoral Warfare, Regional Sea Denial, Battle Group Support, Diesel Submarine Detection, Surveillance, and Peacetime Engagement.</p> <p>(U) The Submarine Integrated Antenna Systems project develops the antennas needed to communicate in networks such as Ultra High Frequency Satellite Communications, Extremely Low Frequency (ELF), Extremely High Frequency (EHF), Super High Frequency and Global Positioning System. Hardware developments include: (a) mast-mounted systems; (b) buoyant cable systems; (c) expendable buoy systems and (d) submarine antenna distribution systems.</p>										

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APPROPRIATION/BUDGET ACTIVITY RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-5		R-1 ITEM NOMENCLATURE Submarine System Equipment Development/0604503N																									
<p>(U) The Submarine Tactical Communications Systems project provides attack submarines with an exterior communications system which: (a) minimizes the time required at communications depth; (b) enhances operability, reducing errors and manpower requirements; and (c) provides flexibility for low impact growth and change throughout the life of the submarine. Design efforts will provide increased antenna signal distribution and interconnection subsystems to accommodate ELF, EHF, and Mini-Demand Assigned Multiple Access and a message storage and processing subsystem.</p>																											
<table style="width: 100%; border: none;"> <thead> <tr> <th></th> <th>FY 2000</th> <th>FY 2001</th> <th>FY 2002</th> </tr> </thead> <tbody> <tr> <td>FY 2001 President's Budget:</td> <td>48.896</td> <td>34.801</td> <td></td> </tr> <tr> <td>Appropriated Value:</td> <td>48.896</td> <td>34.801</td> <td>36.293</td> </tr> <tr> <td>Adjustment to FY 2000/2001 Appropriated Value/</td> <td>21.868</td> <td>37.331</td> <td>7.413</td> </tr> <tr> <td>FY 2001 President's Budget:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>FY 2002 President's Budget Submit:</td> <td>70.764</td> <td>72.132</td> <td>43.706</td> </tr> </tbody> </table>					FY 2000	FY 2001	FY 2002	FY 2001 President's Budget:	48.896	34.801		Appropriated Value:	48.896	34.801	36.293	Adjustment to FY 2000/2001 Appropriated Value/	21.868	37.331	7.413	FY 2001 President's Budget:				FY 2002 President's Budget Submit:	70.764	72.132	43.706
	FY 2000	FY 2001	FY 2002																								
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FY 2001 President's Budget:																											
FY 2002 President's Budget Submit:	70.764	72.132	43.706																								
<p>(U) Change Summary Explanation:</p> <p style="margin-left: 20px;">Funding: See individual project summaries for specific data.</p> <p style="margin-left: 20px;">Schedule: See individual project summaries</p> <p style="margin-left: 20px;">Technical: See individual project summaries</p>																											

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EXHIBIT R-2a, RDT&E Project Justification							DATE: June 2001			
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER Submarine Spt Equipment Dev/0604503N				PROJECT NAME AND NUMBER Submarine Support Equipment Program/F0775					
COST (\$ in Millions)	FY 2000	FY 2001	FY 2002							
Project Cost	0.907	0.933	0.656							
RDT&E Articles Qty	0	0	0							

A. (U) Mission Description and Budget Item Justification: This program develops and improves techniques and components, equipment, and systems that will increase submarine operational effectiveness in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for Submarine Electronic Support Measures to be effective in conducting the following mission areas: Joint Littoral Warfare; Joint Surveillance, Space and Electronic Warfare and Intelligence Collection; Maritime Protection; and Joint Strike. Specific efforts include: (1) AN/BLQ-10 ES System software problem evaluation and resolution, (2) de-installation of the AN/BLQ-10 ES System EDM from the Developmental Test (DT)/Operational Test (OT) test platform and and restoration to pre-test ES configuration. and (3) Engineering and Manufacturing Development of advanced technology transitioned from the Advanced Submarine Support Equipment Program (ASSEP), project F0770. The AN/BLQ-10 ES System problem evaluation will provide correction of system problems identified during Land Based Integration Testing (LBIT), DT/Operational Evaluation (OPEVAL) and Follow-on Test and Evaluation (FOT&E).

(U) Program Accomplishment and Plans:

1. (U) FY 2000 Accomplishments:

- (U) (\$.693) Performed AN/BLQ-10 EDM system updates as identified during Operational Assessment and OPEVAL.
- (U) (\$.214) Performed at-sea technical and operational evaluations of AN/BLQ-10 ES System EDM on USS Annapolis.

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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001																								
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER Submarine Spt Equipment Dev/0604503N	PROJECT NAME AND NUMBER Submarine Support Equipment Program/F0775																								
<p>2. (U) FY 2001 Plan:</p> <ul style="list-style-type: none"> - (U) (\$.245) Perform AN/BLQ-10(V) ES System problem evaluation and resolution as a result of fleet operator feedback. - (U) (\$.671) De-Install AN/BLQ-10 ES System EDM from USS Annapolis test platform and restore to pre-test ES configuration (AN/WLR-8, AN/BRD-7 etc.). - (U) (\$.017) Portion of extramural program reserved for Small Business Innovative Research Assessment in accordance with 15 USC 638. <p>3. (U) FY 2002 Plan:</p> <ul style="list-style-type: none"> - (U) (\$.656) Software and hardware improvements associated with OPEVAL and ASSEP project F0770 transition. <p>(U) Program Change Summary:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: right;">FY 2000</th> <th style="text-align: right;">FY 2001</th> <th style="text-align: right;">FY 2002</th> </tr> </thead> <tbody> <tr> <td>FY 2001 President's Budget:</td> <td style="text-align: right;">1.007</td> <td style="text-align: right;">0.942</td> <td style="text-align: right;">0.654</td> </tr> <tr> <td>Appropriated Value:</td> <td style="text-align: right;">1.007</td> <td></td> <td></td> </tr> <tr> <td>Adjustment to FY 2000/2001 Appropriated Value/</td> <td style="text-align: right;">-0.100</td> <td style="text-align: right;">-0.009</td> <td style="text-align: right;">0.002</td> </tr> <tr> <td>FY 2001 President's Budget:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>FY 2002 President's Budget Submit:</td> <td style="text-align: right;">0.907</td> <td style="text-align: right;">0.933</td> <td style="text-align: right;">0.656</td> </tr> </tbody> </table>				FY 2000	FY 2001	FY 2002	FY 2001 President's Budget:	1.007	0.942	0.654	Appropriated Value:	1.007			Adjustment to FY 2000/2001 Appropriated Value/	-0.100	-0.009	0.002	FY 2001 President's Budget:				FY 2002 President's Budget Submit:	0.907	0.933	0.656
	FY 2000	FY 2001	FY 2002																							
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EXHIBIT R-2a, RDT&E Project Justification				DATE:	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT NAME AND NUMBER		PROJECT NAME AND NUMBER	
RDT&E, N/BA-5		Submarine Spt Equipment Dev/0604503N		Submarine Support Equipment Program/F0775	
(U) Change Summary Explanation:					
Funding: FY00 decrease of \$0.076 was for various minor program adjustments, and decrease of \$0.024 for Small Business Initiative. FY01 decrease of \$0.009 is for 0.7% pro-rata reduction. FY 02 increase of \$0.002 is for minor pricing adjustments and government wide rescission.					
Schedule: Not Applicable					
Technical: Not Applicable					
B. (U) Other Program Funding Summary:					
		FY 2000	FY 2001	FY 2002	
OPN Line 256000	BLQ-10 688I/21 Backfit	15.837	5.400	10.548	
PE0204281N					
SSEP ML015					
ML017	BLQ-10 Fld Chg Kits	0.000	0.000	1.040	
ML018	IEM Fld Change Kits	0.000	0.000	0.000	
OPN Line 256005	SSN 688I/21BLQ-10 Installation	0.023	0.953	1.557	
PE 0204281N					
SSEP ML5IN					
O&M,N		0.677	1.830	2.030	
PE 0702827N/Subhead 8B2B					
SSEP					
SCN LI 201300		0.000	20.667	21.827	
PE 0204287N					
Partial (AN/BLQ-10 ES Only)					

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Exhibit R-2a, RDT&E Project Justification
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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER Submarine Spt Equipment Dev/0604503N	PROJECT NAME AND NUMBER Submarine Support Equipment Program/F0775
<p>Related RDT&E: (U) PE 0603562N/Submarine Tactical Warfare System (U) PE 064558N/New SSN Combat Systems Development/Project F1950 (U) PE 064558N/New SSN Combat Systems Development/Project F2430</p> <p>C. (U) Acquisition Strategy: LRIP approved November 99 and Full rate production approval planned October 2000. Current efforts in this project consist of Product Improvements (Tech Insertion) to the AN/BLQ-10(V) ES system.</p> <p>D. (U) Schedule Profile: ESM Program Schedule attached.</p>		

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Exhibit R-2a, RDT&E Project Justification
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Exhibit R-3 Cost Analysis (page 1)							DATE: June 2001					
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER						
RDT&E, N/BA-5			Submarine Sys Equip Dev/0604503N			Submarine Support Equipment Program/F0775						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date			
Primary Hardware Development												
IEM/HPI Interface	SS/CPIF	SENSYS Tech Newington, V	2.700									
AN/BLQ-10 ES/IEM BDE EDMS	C/FFP	Lockheed Syracuse, NY	7.778									
AN/BLQ-10 ES Product Improvement	SS/FFP	Lockheed Syracuse, NY	0.398	0.693	03/00	0.172	12/00	0.656	12/00			
Ancillary Hardware Development												
Systems Engineering	WR	NUWC Newport, RI	4.392	0.142	10/00	0.671						
Miscellaneous	VARIOUS	VARIOUS	12.759	0.023	Var	0.059	Var	0.000	N/A			
Licenses												
Tooling												
GFE (AN/UYQ-70 Displays)	C/FFP	Lockheed Eagan, MN	0.700									
IEM ADSU EMD (EDMs)	C/CPIF/CPAF	E-Systems Goleta, CA	38.386									
Award Fees	C/CPAF	E-Systems Goleta, CA	0.200									
Subtotal Product Development			67.313	0.858		0.902		0.656				
Remarks:												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
Engineering Technical Services	C/CPIF	GRCI McLean, VA	2.700									
Studies Analysis & Evaluations	MIPR	MITRE McLean, VA	1.000									
GFE												
Subtotal Support			3.700	0.000		0.000		0.000				
Remarks:												

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Exhibit R-3, Project Cost Analysis
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Exhibit R-3 Cost Analysis (page 2)								DATE: June 2001				
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER						
RDT&E, N/BA-5			Submarine Sys Equip Dev/0604503N			Submarine Support Equipment Program/F0775						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date			
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.000		0.000		0.000				
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Management Support Services	C/CPAF	EG&G, Arlington, VA	0.292	0.000	N/A	0.000	N/A	0.000	N/A			
Travel	TO's	Various		0.049	10/00	0.031	10/00	0.000	N/A			
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.292	0.049		0.031		0.000				
Remarks:												
Total Cost			71.305	0.907		0.933		0.656				
Remarks:												

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Exhibit R-3, Project Cost Analysis
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EXHIBIT R-2a, RDT&E Project Justification					DATE: June 2001				
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER				PROJECT NAME AND NUMBER				
RDT&E, N/BA-5	Submarine Sys Equip Dev/0604503N				Submarine Sonar Improvement/F0219				
COST (\$ in Millions)	FY 2000	FY 2001	FY 2002						
Project Cost	62.463	60.652	35.966						
RDT&E Articles Qty	2.5	0	0						

A. (U) Mission Description and Budget Item Justification: This program delivers block updates to Sonar Systems installed on SSN 688, 688I, 21 and TRIDENT Class Submarines to maintain clear acoustical, tactical and operational superiority over submarine and surface combatants in all scenarios through detection, classification, localization and contact following. Current developments, detailed below, are focused on supporting Littoral Warfare, Regional Sea Denial, Battle Group Support, Diesel Submarine Detection, Surveillance, and Peacetime Engagement. A-RCI is a multi-phased, evolutionary development effort geared toward addressing Acoustic Superiority issues through the rapid introduction of interim development products applicable to SSN 688, 688I Flight, SSN21, and SSBN 726 Class Submarines. A-RCI Phases I and II introduce towed array processing improvements; A-RCI Phase III introduces spherical array processing improvements. The AN/BSY-1 High Frequency Upgrade is a stand-alone program which will be introduced as A-RCI Phase IV for SSN 688I and Seawolf Class only and carries on to FY03. As part of CNO N872's plan to maintain acoustic superiority for In-Service Submarines a joint cooperative effort with NAVSEA (SEA 93, ASTO) to deliver annual Advanced Processing Builds (APBs). The capabilities in the APBs will be integrated as part of A-RCI certified systems. This effort, known as the N872 Business Plan funds the APB integration efforts with the Multi-Purpose Processor as well as the AN/BQQ-10 Sonar system beginning in FY02. This budget submit also reflects development of the Total Ship Monitoring System as well as Acoustic Intelligence (ACINT 21) capabilities to be introduced into the Fleet. Precision Bottom Mapping transition, integration and testing begin in FY01. Towed systems development efforts will focus on: (a) tow cable improvements for shallow water towing in littoral environments; (b) hydrophone and telemetry cost and risk reduction initiatives; (c) mechanical endurance improvements; (d) TB-29 (A) towed array Engineering Developmental Model (EDM) development; and (e) TB-16 replacement EDM development. The TB-29(A) array will provide additional war fighting capability over the TB-23 at a reduced unit cost compared to the TB-29, through the use of Commercial Off The Shelf (COTS) telemetry, lower cost hydrophones, and fewer non-acoustic sensors. AN/BSY-2 efforts are focused on ARCI-(V)5 development which implements ARCI Phases II-IV in the Seawolf Class submarines. AN/BSY-2 development also delivers a CCS MK2 Variant to the Seawolf Class.

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		June 2001
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-5	Submarine Sys Equip Dev/0604503N	Submarine Sonar Improvement/F0219
<p>1. (U) FY 2000 Accomplishments:</p> <ul style="list-style-type: none"> - (U) (\$ 9,159) Continued development of A-RCI phase III. Conducted at-sea testing of A-RCI Phase I – IV. - (U) (\$ 8.957) Continued development of A-RCI Phase IV. Continued Advanced Processing Build Sea Testing. - (U) (\$23.863) Continued research, development, training, and deployment of the Multipurpose Processor - (U) (\$ 9.050) Continued development of TB-29(A) towed array. - (U) (\$.900) Continued development for DTC Improvements. - (U) (\$ 8.434) Began ARCI-(V)5 development integration. - (U) (\$ 2.100) Began Precision Bottom Mapping transition, integration and testing. <p>2. (U) FY 2001 Plan:</p> <ul style="list-style-type: none"> - (U) (\$11.945) Continue Advance Processing Build Sea Testing, Integration and Certification. - (U) (\$5.433) Complete development, Opeval and Techeval for A-RCI Phase III and IV. - (U) (\$25,000) Continued research, development, training, and deployment of the Multipurpose Processor - (U) (\$3.555) Continue development of TB-29 (A) towed array. - (U) (\$1.918) Begin development of TB-16 replacement. - (U) (\$.900) Continue development for DTC Improvements. - (U) (\$6.914) Continue ARCI-(V)5 development and integration. - (U) (\$3.500) Continue Precision Bottom Mapping transition, integration and testing. - (U) (\$1.487) Small Business Innovation Research Assessment <p>3. (U) FY 2002 Plan:</p> <ul style="list-style-type: none"> - (U) (\$22.388) Continue Advance Processing Build Sea Testing, Integration and Certification. - (U) (\$ 1.465) Complete development, Techeval and Opeval of TB-29 A towed array, and obtain Milestone III. - (U) (\$ 3.920) Continue development of TB-16 replacement. - (U) (\$.900) Continue development for DTC Improvements. - (U) (\$4.793) Continue ARCI-(V)5 development, integration and test. - (U) (\$2.500) Continue Precision Bottom Mapping transition, integration and testing. 		

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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001	
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER Submarine Sys Equip Dev/0604503N	PROJECT NAME AND NUMBER Submarine Sonar Improvement/F0219	
(U) Program Change Summary:			
	FY 2000	FY 2001	FY 2002
FY 2001 President's Budget:	40.023		24.540
Appropriated Value:	40.023	28.214	
Adjustment to FY 2000/2001 Appropriated Value/	22.440	32.438	11.426
FY 2001 President's Budget:			
FY 2002 PRESBUDG Budget Submit:	62.463	60.652	35.966
(U) Change Summary Explanation:			
<p>Funding: FY 2000 increase of \$22,440 is attributed to increases of \$0.061M for Restoring Issue 62288 Outsourcing and \$28.0M for 631 - MFP & BQG-5 Plus-up and decreases of -\$2.3M for Reduction of NMRS OM&N funding, -\$0.363M for Across the Board Reduction, -\$1,455M for FY00 (Small Business Initiative and the decrease of \$1.503 was for various minor program adjustments and undistributed reductions. FY 2001 increase of \$32,438M is attributed to increases of \$33.0M Congressional Plus-up for development of the Multi-Purpose Processor and ARCI and a decrease of \$562 for other minor adjustments. FY2002 increase of \$11.426M is attributed to an increase of \$11,300 for BSO Realignment Residual issue and an increase of \$0.126M for minor pricing adjustments.</p> <p>Schedule: The completion of Block 3B2 has been rescheduled from the last quarter of FY00 to the first quarter of FY01. The completion of TECHEVAL/OPEVAL has been rescheduled from the last quarter of FY00 to the third quarter of FY01. The TB-29A Array Technical and Opeval have been delayed to FY02 due to a development start caused by contract protest and stop work order. The ARCI TECHEVAL/OPEVAL schedule has been modified. This test events have been extended to the end of FY01.</p> <p>Technical: A-RCI increases technical capabilities over programs through the use of commercial off the shelf components, open system architecture, and leveraging advanced development efforts. Due to a program replan B2-CI Phase 2 has been replaced by ARCI-(V)5. ARCI-(V)5 brings ARCI Phases II-IV to the SEAWOLF Class Submarines. ARCI-(V)5 adds improved Towed Array (Concurrent spatial vernier threatband processing), Large Spherical Array and High Frequency Array improvements as well as replacing the aging and obsolete Enhanced Modular Signal Processors with COTs based Multi Purpose Processors. scheduling of Block 3B2 and the subsequent rescheduling of TECHEVAL and OPEVAL can be attributed to additional software fixes that were required for delivery in the Block 3B2 product prior to the conduct of TECHEVAL/OPEVAL.</p>			
B.			
	FY 2000	FY 2001	FY 2002
OPN BLI 21470	211.942	111.613	88.016
RELATED RDT&E:			
PE 0604524N (Submarine Combat Systems) PE 0604558N (New SSN Combat Systems Development) PE 0604561N (SSN-21 Development) PE 0604562N (Submarine Tactical Warfare System (ENG))			

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APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER Submarine Sys Equip Dev/0604503N	PROJECT NAME AND NUMBER Submarine Sonar Improvement/F0219
<p>C. (U) Acquisition Strategy: The TB-29(A) will be developed and manufactured under the US Navy Towed Systems Omnibus contract, awarded in FY99 to Lockheed Martin Integrated Systems, Bethesda, MD using full and open competition. This flexible contract vehicle will be used by submarine, surface ship, and surveillance towed system program offices. The contract is planned to take advantage of economies of scale in development and manufacturing and to encourage the use of commonality among all Navy towed systems. A Low-Rate Initial Production (LRIP) approval was granted for TB-29 (A) and contract was awarded in FY00. A second Low-Rate Initial Production (LRIP) approval was granted for TB-29 (A) and contract was awarded in the second quarter FY01. An Operational Evaluation (OPEVAL) on a SSN688 or SSN688I platform is planned in FY02 to support a Milestone III Release to Fleet (RTF) decision for TB-29(A).</p> <p>A-RCI utilizes an open architecture and Commercial Off-the-Shelf products in support of new and upgraded sonar systems. A sole source cost plus award fee contract was awarded to Lockheed Martin Federal Systems and Digital System Resources. Program Review with Milestone Decision Authority was conducted in December 1999 granting approval for the FY00 production option.</p> <p>A Sole Source Cost Plus Award Fee with multiple option years ending in FY 2001 was awarded to Lockheed Martin, Syracuse in 1996. A contract extension is contemplated followed by a new sole source contract with Lockheed Martin Corporation.</p> <p>D. (U) Schedule Profile: See attached schedules.</p>		

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EXHIBIT R-2a, RDT&E Project Justification

DATE:

June 2001

APPROPRIATION/BUDGET ACTIVITY

PROGRAM ELEMENT NAME AND NUMBER

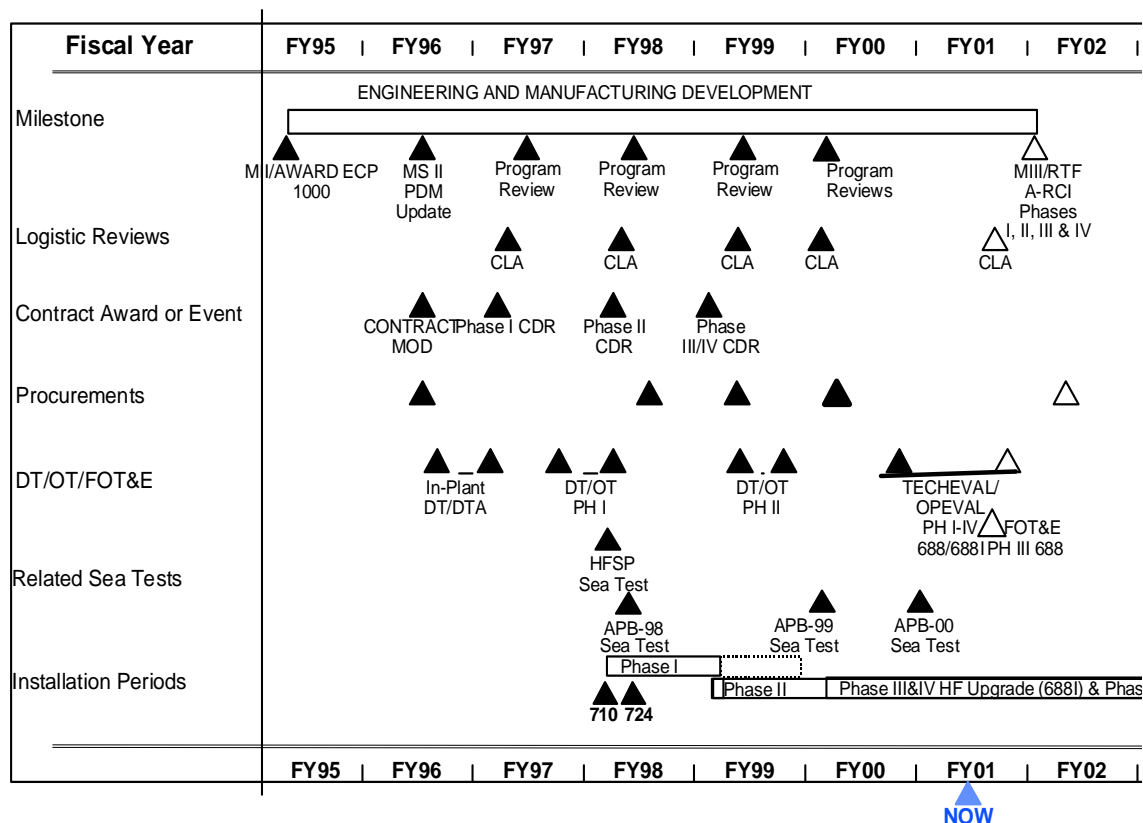
PROJECT NAME AND NUMBER

RDT&E, N/BA-5

Submarine Sys Equip Dev/0604503N

Submarine Sonar Improvement/F0219

SONAR MASTER PROGRAM SCHEDULE



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Exhibit R-3 Cost Analysis (page 1)										DATE:					
APPROPRIATION/BUDGET ACTIVITY										PROGRAM ELEMENT			PROJECT NAME AND NUMBER		
RDT&E, N/BA-5										SSN-688 and Trident Modernization/0604503N			Submarine Sonar Improvement/F0219		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date						
Primary Hardware Development	C/Various	Lockheed Martin (OMNIBUS)	3.561	7.398	N/A	2.928	N/A	0.000	N/A						
Primary Hardware Development	SS/Various	Chesapeake Science	4.428	0.463	N/A	0.000	N/A	4.415	N/A						
Primary Hardware Development	SS/CPAF	Lockheed Manassas, VA	65.110	13.550	N/A	8.543	N/A	8.903	N/A						
Ancillary Hardware Development															
Systems Engineering	WR	NUWC Newport, RI	59.738	6.513	11/99	7.827	10/00	2.504	10/01						
Systems Engineering	SS/CPAF	LMC, Syracuse	0.000	3.875	11/99	1.566	N/A	0.000	N/A						
Systems Engineering	Various	Various	6.000	3.627	N/A	3.993	N/A	3.302	N/A						
Miscellaneous	Various	Various	2.888	4.235	N/A	3.884	N/A	3.849	N/A						
Licenses															
Tooling															
GFE															
Award Fees	SS/CPAF	Lockheed, Syracuse NY	0.000	0.385		0.110	N/A	0.000	N/A						
Subtotal Product Development			141.725	40.046		28.851		22.973							
<p>Remarks: Maximum award fee budgeted for LMC, Syracuse contract averages 10% of the value placed on contract. Maximum award fee budgeted for Lockheed Martin Federal Systems contract averages 12% of the value placed on contract</p> <p>10/1/96 - 3/31/97 received a rating of outstanding and 100% award .</p> <p>4/1/97 - 9/30/97 received a rating of outstanding and 100% award.</p> <p>10/1/97 - 3/31/98 received a rating of above average and 80% award.</p> <p>4/1/98 - 9/30/98 received a rating of outstanding and 100% award</p> <p>10/1/98 - 3/31/99 received a rating of outstanding and 100% award</p> <p>4/1/99 - 9/30/99 received a rating of Outstanding and 100% award.</p> <p>10/1/99 - 3/31/00 received a rating of Outstanding and 100% award.</p>															
Development Support Equipment															
Primary Software Development	SS/CPAFF	Digital Systems Resources,VA	24.000	21.300	11/99	29.800	N/A	10.000	N/A						
Training Development															
Integrated Logistics Support															
Configuration Management															
Technical Data															
GFE															
Subtotal Support			24.000	21.300		29.800		10.000							
Remarks:															

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Exhibit R-3, Project Cost Analysis
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Exhibit R-3 Cost Analysis (page 2)								DATE: June 2001				
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER						
RDT&E, N/BA-5			SSN-688 and Trident Modernization/0604503N			Submarine Sonar Improvement/F0219						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date			
Developmental Test & Evaluation												
Operational Test & Evaluation												
Developmental/Operational T&E	Various	Various	4.072	0.355	N/A	1.224	N/A	2.200	N/A			
Tooling												
GFE												
Subtotal T&E			4.072	0.355		1.224		2.200				
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Management Support Services	Various	Various	1.372	0.687	N/A	0.702	N/A	0.718	N/A			
Travel	PD	NAVSEA	0.360	0.075	N/A	0.075	N/A	0.075	N/A			
Labor (Research Personnel)												
Overhead												
Subtotal Management			1.732	0.762		0.777		0.793				
Remarks:												
Total Cost			171.529	62.463		60.652		35.966				
Remarks:												

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Exhibit R-3, Project Cost Analysis
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EXHIBIT R-2a, RDT&E Project Justification							DATE: June 2001			
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5		PROGRAM ELEMENT NAME AND NUMBER SSN 688 & Trident Modernization/0604503N			PROJECT NAME AND NUMBER Submarine Integrated Antenna System/X0742					
COST (\$ in Millions)		FY 2000	FY 2001	FY 2002						
Project Cost		1.893	5.896	2.885						
RDT&E Articles Qty		N/A	N/A	N/A						

A. (U) Mission Description and Budget Item Justification: The Submarine Integrated Antenna System (SIAS) project provides for the development of submarine antennas designed to (a) Improve the Data Rate capabilities of Submarine Antenna and their interface to the External Communications System (ECS), (b) improve submarine antenna performance and Data Rate while the submarine is operating at speed and depth, (c) provide antenna compatability with new wave forms and receiver equipment, and (d) improve antenna design to reduce Total Ownership Cost. The project funds research and development for submarine antennas including OE-538/BRC Multi-Function Antenna, Submarine High Data Rate (HDR) Antenna, P3I to the HDR Antenna including military Ka and Common Tactical Data Link (TCDL) for communciations with UAVs, Advance HDR Antenna Development and OE-538 Improved UHF Gain development. For improved performance at depth and speed, the project funds the development of the Multi-Element Buoy Cable Antenna (MBCA) and the On-Hull Antenna.

(U) Program Accomplishments and Plans:

1. (U) FY 2000 Accomplishments:

- (U) (\$0.422) HDR - Continued development and operational testing.
- (U) (\$0.358) OE-538 - Initiated development for design changes required for submarine platform applications i.e. Trident Class.
- (U) (\$1.113) Antenna Transition Engineering - Evaluated Transitional Antenna Technology, cataloged data, and provided testing of critical antenna parameters to meet submarine platform requirements. Continued development of UHF SATCOM 3dB antenna gain. Investigated UAV link requirements and antenna modifications required to support this effort.

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Exhibit R-2a, RDT&E Project Justification

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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER SSN 688 & Trident Modernization/0604503N	PROJECT NAME AND NUMBER Submarine Integrated Antenna System/X0742

2. (U) FY 2001 Plan:

- (U) (\$0.373) OE-538 - Continue development for design changes required for submarine platform application i.e. Trident.
- (U) (\$5.523) Antenna Transition Engineering - Continue development of UHF SATCOM 3dB antenna gain. Continue development of improved UHF SATCOM antenna subsystem to upgrade the OE-538 antenna. Continue to perform program definition and risk reduction for the next generation submarine antenna system. Continue technology and SATCOM assessments and system configuration option evaluation for the Advanced High Data Rate (AdvHDR) mast and Advanced Buoyant Cable (AdvBCA) antenna systems. \$5.0M is Congressional Plus-up funding to improve UHF antenna systems providing higher data rate communications with the objective to enable global connectivity across all submarine missions in accordance with network centric doctrine.

3. (U) FY 2002 Plan:

- (U) (\$0.365) OE-538 - Continue (Trident) Engineering and Development (Non-Recurring Engineering).
- (U) (\$0.800) Advanced HDR - Complete specifications to provide broadband frequency coverage communications multi-functionality and higher data rates over existing antennas at periscope depth while maintaining stealth objective.
- (U) (\$1.720) Antenna Transition Engineering - Provide continued program definition, system specifications, and risk reduction to the next generation antenna systems for planned FY03 EMD program starts, AdvHDR, and AdvBCA. Continue technology performance and maturity assessment for rapid insertion potential to upgrade current antenna systems for support of emerging SATCOM circuits to meet evolving fleet requirements.

B. (U) Program Change Summary:

	FY 2000	FY 2001	FY 2002
FY 2001 President's Budget:	2.019	0.951	843
Appropriated Value:	2.019	0.951	
Adjustment to FY 2000/2001 Appropriated Value	0.126	4.945	2.042
FY 2002 President's Budget Submit:	1.893	5.896	2.885

(U) Change Summary Explanation:

Funding: N/A

- 1) FY 2000 decrease of \$0.118M for Miscellaneous Navy Adjustments, .008M for Section 8055 Congressional Proportionate Rescissions.
- 2) FY 2001 decrease of \$0.042M for Section 8086 .7% pro-rata reduction and \$0.013M for Government wide rescission PL 106-554 Sec. 1. \$5.000M increase to comply with Congressional Plus-up for Antenna Technology Improvements.
- 3) FY2002 increase of \$2.0M for Common Submarine Radio Room and and in crease \$0.042M for program adjustments.

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Exhibit R-2a, RDT&E Project Justification

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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001								
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER SSN 688 & Trident Modernization/0604503N	PROJECT NAME AND NUMBER Submarine Integrated Antenna System/X0742								
<p>Schedule:</p> <p>1) OE-538/BRC: RFDAC ACU Variant will begin installations with the OE-538 multi-function mast in FY02.</p> <p>Technical: N/A</p> <p>C. (U) Other Program Funding Summary:</p> <table><tr><td></td><td>FY 2000</td><td>FY 2001</td><td>FY 2002</td></tr><tr><td></td><td>83.241</td><td>77.241</td><td>89.309</td></tr></table> <p>OPN Line 313000 Hardware and 313005 Installation (Full)</p> <p>RELATED RDT&E:</p> <p>PE 0602232N (Space and Electronic Warfare (SEW) Technology)</p> <p>PE 0303109N (Satellite Communications) – Provides for the EHF transmitter and receiver that utilizes the antenna developed under this program.</p>				FY 2000	FY 2001	FY 2002		83.241	77.241	89.309
	FY 2000	FY 2001	FY 2002							
	83.241	77.241	89.309							

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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER SSN 688 & Trident Modernization/0604503N	PROJECT NAME AND NUMBER Submarine Integrated Antenna System/X0742

D. (U) Acquisition Strategy:

	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>
Program Milestones	2Q OE-538/BRC MSIII	3Q HDR MSIII	
Engineering Milestones			
T&E Milestones	4Q HDR DT/OTII		4Q OE-538/Trident FOT&E
Contract Milestones	3Q HDR (LRIP)* 2Q OE-538 (FRP)	3Q HDR (FRP)	

* MSII decision for 9 LRIPs in FY 1999 and 13 in FY 2000.

E. (U) Schedule Profile: See paragraph C above.

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Exhibit R-2a, RDT&E Project Justification
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Exhibit R-3 Cost Analysis (page 1)								DATE: June 2001				
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER						
RDT&E, N/BA-5			SSN 688 & Trident Modernization/0604503N			Submarine Integrated Antenna System/X0742						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date					
Primary Hardware Development												
Hardware Development	CPFF	Raytheon Marlboro, MA	3.868	0.000	N/A	0.000	N/A					
Hardware Development	WX	NUWC Newport, RI	2.082	5.370	Various	0.365	Various					
Hardware Development	TBD	TBD										
Software Development	Various	Various	0.300	0.000	Various	0.000	Various					
Ancillary Hardware Development												
Systems Engineering	Various	Various	2.243	0.425	Various	2.353	Various					
Site Platform Integration	Various	Various	0.100	0.000	Various	0.000	Various					
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			8.593	5.795		2.718						
Remarks:												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support	Various	Various	0.255	0.000	Various	0.000	Various					
Configuration Management												
Technical Data	Various	Various										
GFE												
Subtotal Support			0.255	0.000		0.000						
Remarks:												

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Exhibit R-3, Project Cost Analysis
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Exhibit R-3 Cost Analysis (page 2)								DATE: June 2001					
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER							
RDT&E, N/BA-5			SSN 688 & Trident Modernization/0604503N			Submarine Integrated Antenna System/X0742							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date						
Developmental Test & Evaluation													
Operational Test & Evaluation													
Developmental/Operational T&E	Various	Various	1.223	0.000	Various	0.000	Various						
Tooling													
GFE													
Subtotal T&E			1.223	0.000		0.000							
Remarks:													
Contractor Engineering Support													
Government Engineering Support													
Program Management Support	Various	Various	0.674	0.101	Various	0.167	Various						
Management Support Services													
Travel													
Labor (Research Personnel)													
Overhead													
Subtotal Management			0.674	0.101		0.167							
Remarks:													
Total Cost			10.745	5.896		2.885							
Remarks:													

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Exhibit R-3, Project Cost Analysis
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EXHIBIT R-2a, RDT&E Project Justification					DATE: June 2001				
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER				PROJECT NAME AND NUMBER				
RDT&E, N/BA-5	SSN 688 & Trident Modernization/0604503N				Submarine Tactical Communication System/X1411				
COST (\$ in Millions)	FY 2000	FY 2001	FY 2002						
Project Cost	5.501	4.651	4.199						
RDT&E Articles Qty	N/A	N/A	N/A						

A. (U) Mission Description and Budget Item Justification: The Submarine Tactical Communications System project provides submarines with communications systems designed to: (a) enhance data throughput through automation and integrated network management; (b) copy tactical data networks, (c) provide submarines IP connectivity; (d) be interoperable with other U.S. and allied military networks; and (e) improve reliability, maintainability, and availability. This is accomplished by providing the submarine with a properly integrated mix of Navy standard and commercial off-the-shelf communication equipment covering a wide range of frequencies and modes. This project includes the Submarine Communications Support System (SCSS) which provides a system engineering approach for the design and evaluation of wideband and narrowband modernization plans. In addition, the project provides support for the Land-Based Submarine Radio Room (LBSRR) for evaluation and integration of new systems prior to introduction into the Fleet. The project includes system engineering efforts associated with demonstration of new technology which will allow the submarine to be a participant in battle group and joint operations. The new technology will increase the submarine's communications, command, and control capability and interoperability with the rest of the Navy. This program also provides funds to integrate Satellite Link-16 into the SCSS and the transition to a Tactical Data Link. This project also funds the follow-on program to SCSS, the Common Submarine Radio Room (CSRR). CSRR will leverage the development of VIRGINIA Class Exterior Communications System (ECS) which includes Open Systems Architecture (OSA) and install the VIRGINIA ECS on all classes of submarines. For OHIO Class submarines, the TRIDENT Integrated Radio Room (IRR) will be replaced with the CSRR instead of a SCSS variant. The SSN21 Class submarines will be the first to receive the upgrade and will be followed by the OHIO Class submarines. LOS ANGELES Class submarines will be upgraded beginning in FY06.

(U) Program Accomplishments and Plans:

1. (U) FY 2000 Accomplishments:

- (U) (\$4.232) SCSS - Completed design and began integration of SCSS Phase I. Began planning and design of the Common Submarine Radio Room.
- (U) (\$1.269) Submarine Tactical Data Link (STDL) - Continued integration and development testing for STDL.

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Exhibit R-2a, RDT&E Project Justification

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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001																					
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER SSN 688 & Trident Modernization/0604503N	PROJECT NAME AND NUMBER Submarine Tactical Communication System/X1411																					
<p>2. (U) FY 2001 Plan:</p> <ul style="list-style-type: none"> - (U) (\$4.361) SCSS and CSRR (Includes Trident SCSS) – Complete integration of SCSS Phase I. Continue design of CSRR. - (U) (\$0.290) Submarine Tactical Data Link (STD L) – Continue integration and development testing for STD L . <p>3. (U) FY 2002 Plan:</p> <ul style="list-style-type: none"> - (U) (\$4.199) CSRR (Includes Trident SCSS) – Complete design of CSRR and begin integration for OHIO and SEAWOLF Class submarines. 																							
<p>B. (U) Program Change Summary:</p> <table> <thead> <tr> <th></th> <th>FY 2000</th> <th>FY 2001</th> <th>FY 2002</th> </tr> </thead> <tbody> <tr> <td>FY 2001 President's Budget:</td> <td>5.847</td> <td>4.694</td> <td></td> </tr> <tr> <td>Appropriated Value:</td> <td>5.847</td> <td>4.694</td> <td>10.256</td> </tr> <tr> <td>Adjustment to FY 2000/2001 Appropriated Value</td> <td>-0.346</td> <td>-0.043</td> <td>-6.057</td> </tr> <tr> <td>FY 2002 President's Budget Submit:</td> <td>5.501</td> <td>4.651</td> <td>4.199</td> </tr> </tbody> </table> <p>(U) Change Summary Explanation:</p> <p>Funding: N/A</p> <ol style="list-style-type: none"> 1) FY 2000 decrease of \$0.0323M Miscellaneous Navy Adjustments \$0.023M for Section 8055 Congressional Proportionate Rescissions. 2) FY 2001 decrease of \$0.033M for Section 8086 .7% pro-rata reductionand \$0.010M for Government wide rescission PL 106-554 Sec. 1. 3) FY 2002 decrease of \$6,100M for Common Submarine Radio Room and an increase of \$0.043M for various program adjustments. 					FY 2000	FY 2001	FY 2002	FY 2001 President's Budget:	5.847	4.694		Appropriated Value:	5.847	4.694	10.256	Adjustment to FY 2000/2001 Appropriated Value	-0.346	-0.043	-6.057	FY 2002 President's Budget Submit:	5.501	4.651	4.199
	FY 2000	FY 2001	FY 2002																				
FY 2001 President's Budget:	5.847	4.694																					
Appropriated Value:	5.847	4.694	10.256																				
Adjustment to FY 2000/2001 Appropriated Value	-0.346	-0.043	-6.057																				
FY 2002 President's Budget Submit:	5.501	4.651	4.199																				

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Exhibit R-2a, RDT&E Project Justification
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EXHIBIT R-2a, RDT&E Project Justification		DATE: June 2001								
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-5	PROGRAM ELEMENT NAME AND NUMBER SSN 688 & Trident Modernization/0604503N	PROJECT NAME AND NUMBER Submarine Tactical Communication System/X1411								
<p>Schedule: N/A</p> <p>Technical: N/A</p> <p>C. (U) Other Program Funding Summary:</p> <table><tr><td></td><td>FY 2000</td><td>FY 2001</td><td>FY 2002</td></tr><tr><td></td><td>83.241</td><td>77.241</td><td>89.309</td></tr></table> <p>OPN Line 31300 Hardware and 313005 Installation (Full)</p> <p>RELATED RDT&E:</p> <p>PE 0204163N (Fleet Communications)</p> <p>PE 0602232N (Space & Electronic Warfare (SEW) Technology)</p>				FY 2000	FY 2001	FY 2002		83.241	77.241	89.309
	FY 2000	FY 2001	FY 2002							
	83.241	77.241	89.309							

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EXHIBIT R-2a, RDT&E Project Justification		DATE:
		June 2001
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDTE&E, N/BA-5	SSN 688 & Trident Modernization/0604503N	Submarine Tactical Communication System/X1411
<p>C. (U) Acquisition Strategy: SCSS the system engineering and integration for the N87/N6 narrowband and wideband modernization plans on SSN 688 Class submarines. CSRR transforms multiple suites of class-specific, closed system equipment to the VIRGINIA Class ECS which incorporates OSA communications equipment. The SCSS and TRIDENT SCSS programs are combined to provide the funding required to implement CSRR on all classes of submarines.</p> <p>CSRR will:</p> <ul style="list-style-type: none"> Leverage off VIRGINIA Class ECS design. Use VIRGINIA Class ECS control and management software. Apply a systems approach to design and implementation of JMCOMS. Maximize use of COTS products and emerging technologies. 		
	<u>FY 2000</u>	<u>FY 2001</u>
		<u>FY2002</u>
Program Milestones		
Engineering Milestones		(STD L) 1Q LBSRR DT-I
T&E Milestones		(SCSS) 1Q TECHEVAL DT-IIA (SCSS) 2/3Q OPEVAL (LBSRR) OT-IIA (SCSS) 4Q OPEVAL (SSN OT-IIA) (STD L) 1Q NCTSI Certification (STD L) 2/3Q OPEVAL (at sea) (STD L) 4Q Operational Test
Contract Milestones		

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Exhibit R-2a, RDT&E Project Justification
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Exhibit R-3 Cost Analysis (page 1)							DATE: June 2001						
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER							
RDT&E, N/BA-5			SSN 688 & Trident Modernization/0604503N			Submarine Tactical Communication System/X1411							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date						
Primary Hardware Development													
Hardware Development	CPFF	SSC-SD San Diego, CA	1.900	0.500	TBD	0.000	TBD						
Hardware Development*	CPFF	SSC-SD San Diego, CA			TBD	0.500	TBD						
Software Development	CPFF	SSC-SD San Diego, CA	1.100	0.500	TBD	0.350	TBD						
Software Development	WX	NUWC Newport, RI	4.000	1.200	Various	1.040	TBD						
Ancillary Hardware Development													
Systems Engineering	Various	Misc Labs	3.848	0.915	Various	0.776	Various						
Site Platform Integration													
Licenses													
Tooling													
GFE													
Award Fees													
Subtotal Product Development			10.848	3.115		2.666							
Remarks: * SCSS Development for VIRGINIA and TRIDENT Classes													
Development Support Equipment													
Software Development													
Training Development													
Integrated Logistics Support			0.000	0.000		0.150							
Configuration Management													
Technical Data													
GFE													
Subtotal Support			0.000	0.000		0.150							
Remarks:													

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Exhibit R-3, Project Cost Analysis
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Exhibit R-3 Cost Analysis (page 2)								DATE: June 2001					
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER							
RDT&E, N/BA-5			SSN 688 & Trident Modernization/0604503N			Submarine Tactical Communication System/X1411							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date						
Developmental Test & Evaluation													
Operational Test & Evaluation													
Developmental/Operational T&E	Various	Various	2.775	0.930	Various	0.758	Various						
Tooling													
GFE													
Subtotal T&E			2.775	0.930		0.758							
Remarks:													
Contractor Engineering Support													
Government Engineering Support													
Program Management Support	Various	Various	2.311	0.606	Various	0.625	Various						
Management Support Services													
Travel													
Labor (Research Personnel)													
Overhead													
Subtotal Management			2.311	0.606		0.625							
Remarks:													
Total Cost			15.934	4.651		4.199							
Remarks:													

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Exhibit R-3, Project Cost Analysis
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