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Exhibit R-2, RDT&E Budget Item Justification	Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/4	R-1 ITEM NOMENCLATURE Submarine Tactical Warfare Systems/0603562N

COST (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	4.0	4.5	4.7	4.3	5.4	5.7	5.8	5.9	Continuing	Continuing
F0770/Advanced Sub. Spt. Equipment	1.8	2.5	2.3	2.4	3.3	3.4	3.5	3.6	Continuing	Continuing
V1739/Sub. Special Ops Spt. Devel.	2.2	2.1	2.3	1.9	2.1	2.3	2.3	2.4	Continuing	Continuing
Quantity of RDT&E Articles & cost	4/3.1	3/3.3	2/2.4	2/2.6	3/3.4	3/3.2	2/2.4	1 /2.5	Continuing	Continuing

A. (U) Mission Description and Budget Item Justification: The Submarine Tactical Warfare Systems program element is comprised of the Advanced Submarine Support Equipment Program and the Submarine Special Operations Support Development Program. The overall goal of the program is to improve submarine operational effectiveness through the development of advanced Research and Development (R& D) and Electronic Support Measures (ESM) technologies. The goal of the Advanced Submarine Support Equipment Program (ASSEP) is to increase submarine operational effectiveness through improvements in electronic warfare (i. e., threat warning, over-the-horizon targeting, and expanded tactical reconnaissance) and electronic imaging. A continuing need exists to improve submarine capabilities in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. The Submarine Special Operations Support Development program responds to the increased threat of Naval activity in the Littorals and the continuing threat of submarine and surface ship activity in regions of the world through the development of advanced submarine R& D technology to provide improved operational capability in shallow water regions. Particular emphasis is placed in the areas of sonar operability and maintainability, Littoral operations, mine warfare, tactical surveillance, and other submarine support missions. Efforts include assessment of combat system effectiveness, development of Arctic shallow water specific improvements for existing sonars, development of class specific Arctic operational guidelines and the testing of ice-capable submarine support structures. This program also provides the framework for various R& D programs to conduct Test and Evaluation in shallow water and Arctic regions.

B. (U) Program Change Summary: (show total funding, schedule, and technical changes for the program element that have occurred since the last submission).

	FY 1998	FY 1999	FY 2000
(U) FY 1999 President's Budget:	4.0	4.7	5.6
(U) Appropriated Value:	4.9	4.7	
(U) Adjustment to FY 1998 Appropriated Value/ FY 1999 President's Budget:			
a. SBIR/Cong Undistributed. Reductions	-0.2	-0.2	-0.035
b. Minor Submarine ESM Adjustments	-0.7		-0.9
c. Outsourcing Adjustment			-0.008
d. NWCF NUWC Rates			+0.010
e. NWCF NSWC Rates			+0.002
(U) FY 2000/01 PRES Budget Submit:	4.0	4.5	4.7

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(U) Change Summary Explanation:

- (U) Funding: The FY98 decrease of \$0.9M is due to an SBIR assessment (\$.045M), Congressional Undistributed Reductions (\$0.179M) and minor submarine ESM adjustments (\$0.7M). The FY99 decrease of \$.159M is due to Congressional Undistributed Reductions. The FY00 decrease of \$0.955M is due to minor submarine ESM adjustments (\$0.9M), outsourcing adjustment (\$.008), NWCF NUWC Rate adjustment (\$.010) and NWCF NSWC Rate adjustment (\$.002) and Congressional Undistributed Reductions (\$.035M).
- (U) Schedule: As a result of the funding cuts in FY2000 and FY2001, Ultra High Frequency (UHF) Satellite Communications (SATCOM) Transmit/Receive scope development effort will be deferred from FY2000 start to FY2002 start. Millimeter Wave (MMW) development will be stretched one year, all other projects will slip in schedule approximately 3 months.
- (U) Technical: Not applicable.

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/4	Program Element Name & No. Submarine. Tactical Warfare Systems/0603562N	Project Name and Number. Advanced Submarine Support Equipment Program (ASSEP)/F0770

Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	1.8	2.5	2.3	2.4	3.3	3.4	3.5	3.6	Continuing	Continuing
RDT&E Articles Qty	2	2	0	1	1	2	0	0	Continuing	Continuing

A. (U) Mission Description and Budget Item Justification: This program develops submarine ESM equipment and image processing technology. A continuing need exists to improve submarine capabilities in these areas to enhance 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 ESM and imaging to be effective in conducting the following mission areas: Joint Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence Collection, Maritime Protection and Joint Strike. Specific efforts include development of: Radar Cross Section Reduction (RCSR) Techniques, Sensor Technology Insertion Program (STIP), and ESM Technology Insertion Program (ESMTIP). The RCSR evaluates the vulnerability of submarine masts, periscopes and sensors to radar and infrared threats and evaluates the state of the art in radar absorbent material, resulting in potential periscope/ mast engineering improvements to reduce the counter-detection threat. The STIP and ESMTIP programs develop submarine unique improvements to mast, periscope and hull mounted ESM electromagnetic and electro-optic sensors based on emerging technologies that are available from DOD Exploratory Development Programs, industry Independent Research and Development, and other sources. Feasibility demonstration models (FDMs) are developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing. STIP projects include: Laser detection and warning (LIDAR); radio frequency (RF) extensions; RF bandwidth improvements; passive localization; upgrades to the Imaging Mast sensors and software; and advanced antenna arrays for beam steering and high resolution direction finding enhancements. ESMTIP projects include: improvements to signal sorting and recognition methods to support classification and identification of ESM contacts encountered during Littoral operations; signal processing improvements for processing of low probability of intercept signals; voice/ language recognition and human/ machine interface (HMI) enhancements. All programs funded in this project are non- acquisition category programs in accordance with Non-Acquisition Program Definition Document (NAPDD) # 428- 87. The test articles identified consist of critical components of FDM's that will be fully developed during engineering development into Engineering Development Models (EDM's).

(U) Program Accomplishments and Plans:

1. (U) FY 1998 Accomplishments:

- (U) (\$ 0.1) Continued Radar cross Section Reduction (RCSR) techniques and materials investigation.
- (U) (\$ 1.2) Completed development of LIDAR Warning Receiver.
- (U) (\$ 0.3) Completed development of shock hardened radome and update of simulation tools.
- (U) (\$ 0.2) Initiated development of FDM's for Passive Localization, Millimeter Wave (MMW) Frequency Extension and Imaging Auto Target Recognition and Tracking Algorithms.
- (U) The estimated total cost of the two sets of FDM components initiated during this fiscal year is \$0.9M

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2. (U) FY 1999 Plans:

- (U) (\$ 0.3) Continue Radar Cross Section Reduction (RCSR) techniques and materials investigation.
- (U) (\$ 1.6) Continue Sensor Technology Insertion Program (STIP) development of Passive Localization, Imaging Auto Target Recognition and enhancement in MMW signal reception.
- (U) (\$ 0.5) Initiate STIP and Electronic Support Measures Technology Insertion Program (ESMTIP) development of Type 18 Low Band Direction Finding (DF) and Counter Detection and Range Assessment.
- (U) (\$.033) Portion of extramural program is reserved for Small Business Innovative Research assessment in accordance with 15 USC 638.
- (U) The estimated total cost of the two sets of Feasibility Demonstration Models (FDM) components initiated during this fiscal year is \$1.1M.

3. (U) FY 2000 Plans:

- (U) (\$ 0.2) Continue RCSR techniques and materials investigation.
- (U) (\$ 0.8) Continue STIP development of Passive Localization, Imaging Auto Target Recognition and MMW frequency extension.
- (U) (\$ 0.4) Continue STIP development of Low Band DF.
- (U) (\$ 0.4) Continue ESMTIP development of Counter Detection and Range Assessment.
- (U) (\$ 0.5) Initiate ESMTIP development of Combat Control System (CCS) interface for SSN 688 and Integrated Electronic Support (ES) Workstation.

B. (U) Other Program Funding Summary: Not applicable.

(U)Related RDT&E:

(U) PE 0604503N(Submarine System Equipment Development)

(U) PE 0604558N(New Design SSN Development)

(U) PE 0604777N(Navigation /ID Systems)

C. (U) Acquisition Strategy: This project will optimize technology insertion using a build-test-build approach to support Electronic Support (ES) operational needs. Operational needs have been based on FY97 COMSUBLANT/COMSUBPAC command technology issues, New Design SSN (NSSN) Operational Requirements Document objectives, a review, assessment and prioritization of Sensor and Processor efforts and SSN force level projections for SSN688/688I and SSN21 classes through FY2015. The STIP and ESMTIP efforts will develop submarine unique improvements to mast, periscope and hull mounted ESM electromagnetic and electro-optic sensors based on emerging technologies that are available from DOD Exploratory Development Programs, industry Independent Research and Development, and other sources. Feasibility Demonstration Models (FDMs) will be developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing.

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999
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D. (U) Schedule Profile. See attached schedule.

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ASSEP Schedules

	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	
Radar Cross-Section Reduction (RCSR)	Signature Phase		At-Sea Model Test	Next Gen	Signature Study	Deliver EDM			
Sensor Technology Insertion (STIPs)									
LIDAR Warning Receiver (LWR)	Deliver EDM		Transition to EBC						
Passive Ranging (Bi-Static Radar)	Performance Spec		Deliver EDM	At-Sea Testing					
UNDEX Hardened Radome	Deliver EDM		Deliver Production Version						
Photonics Mast Auto Recognition and Track	Performance Spec		Deliver Track S/W	Deliver Recog S/W	At-Sea Testing				
Frequency Extension	Performance Spec		Deliver EDM			Land-Based Testing			
Advanced Shared Aperture Antennas					Concept Study	Design	Int Spec		
Photonics Mast Low Band DF	Performance Spec						Deliver EDM		
UHF SATCOM Transmit/Receive					Candidate Antenna Design Demonstrations				
Offboard ESM Sensors					Concept Study/Begin EDM Development				
Low Band Precision DF for Photonics					Industry Solicitation				
ESM Technology Insertion Projects (ESMTIPs)									
Counter Detection/Range Assessment	Concept Definition		Test Bed Assy	Pilot Eval	At-Sea Testing	Final ECP			
CCS Interface for Legacy Platforms			Interface Spec	S/W Test	Land-Based Testing				
Integrated ES Workstation for Legacy Platforms			Interface Spec	S/W Delivery			Feet Evaluation		
Communication Signal Onboard Trainer					Design Concept				

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Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/4	PROGRAM ELEMENT NAME AND NUMBER Submarine Tactical Warfare Systems/0603562N	PROJECT NAME AND NUMBER Advanced Submarine Support Equipment Program (ASSEP)/F0770

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development LIDAR Warning Receiver	C/CPIF	JHU/APL Laurel, MD.	3.1	0	N/A	0	N/A			0	3.1	3.1
STIP FDM's	RCP	TBD	0	0.9	1/99	0.6	1/00			Cont.	Cont.	TBD
ESMTIP FDM's	RCP	TBD	0	0	N/A	0.5	1/00			Cont.	Cont.	TBD
Systems Engineering	WR	NUWC Newport, RI	9.3	1.1	11/98	0.9	11/99			Cont.	Cont.	N/A
GFE	N/A	N/A	0	0	N/A	0	N/A			N/A	N/A	N/A
Miscellaneous	Various	Various	7.2	0.3	Var.	0.2	Var.			Cont.	Cont.	N/A
Subtotal Product Development			19.6	2.3		2.2				Cont.	Cont.	
Remarks:												
Miscellaneous Engineering Technical Services	Various	Various	0.9	.01	11/98	.01	11/99			Cont.	Cont.	N/A
GFE												
Subtotal Support			0.9	.01		.01				Cont.	Cont.	N/A
Remarks												
Subtotal T&E												
Remarks Not applicable.												
Miscellaneous Management Support Services	Various	Various	1.0	0.1	11/98	0.1	11/99			Cont.	Cont.	N/A
Award Fee	N/A	N/A										
Studies Analysis & Evaluations	Various	Various	0.8	0	N/A	0	N/A			0	0.8	N/A
Subtotal Management			1.8	0.1		0.1				Cont.	Cont.	N/A
Remarks												
Total Cost			22.3	2.4		2.3				Cont.	Cont.	
Remarks												

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/4	Program Element Name & No. Submarine Tactical Warfare Systems/P.E. 0603562N	Project Name and Number. Submarine Special Operations Support Development/V1739

Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	2.2	2.1	2.3	1.9	2.1	2.3	2.3	2.4	CONT.	CONT.
RDT&E Articles Qty	Arctic ex. (2)	Arctic ex. (1)	CONT.	CONT.						

A. (U) Mission Description and Budget Item Justification: This program responds to the increased threat of Naval activity in the Littoral and continuing threat of submarine and surface ship activity in all regions of the world through the development of advanced submarine operational concepts. It places particular emphasis on submarine operability and mission support in unique environments. Efforts include assessment of combat system effectiveness, use of high frequency sonars in Arctic regions, testing of ice-capable submarine structures, and development of class specific Arctic shallow water operational guidelines. This program also provides the framework for various Research and Development (R&D) programs to conduct Test and Evaluation in the shallow water and Arctic regions.

(U) Program Accomplishments and Plans

1. (U) FY 1998 Accomplishments

- (U) (\$2.0) Conducted/Supported an Arctic Science Exercise (SCICEX) and ICEX 1-98.
- (U) (\$0.2) Provide updates to the Naval Warfare Publication (NWP) concerning routine and emergency under-ice surfacing operations for SSN 688.

2. (U) FY 1999 Plans

- (U) (\$2.1) Conduct/support an Arctic Science Exercise and plan for ICEX 1-00.
- (U) (\$0.047) Portion of extramural program is reserved for Small Business Innovation Research Assessment in accordance with 15 USC 638.

3. (U) FY 2000 Plans

- (U) (\$2.4) Conduct/Support SCICEX 1-00 and ICEX 1-00.

B. (U) Other Program Funding Summary: Not Applicable

C. (U) Acquisition Strategy: NON-ACAT Program

D. (U) Schedule Profile: See Attached Schedule

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APPROPRIATION/BUDGET ACTIVITY RDT&E,N/4	Program Element Name & No. Submarine Tactical Warfare Systems/P.E. 0603562N	Project Name and Number. Submarine Special Operations Support Development/V1739

Program Element: 0603562N
 Project Number: V1739
 Title: Submarine Special Operations Support Development

Schedule Profile

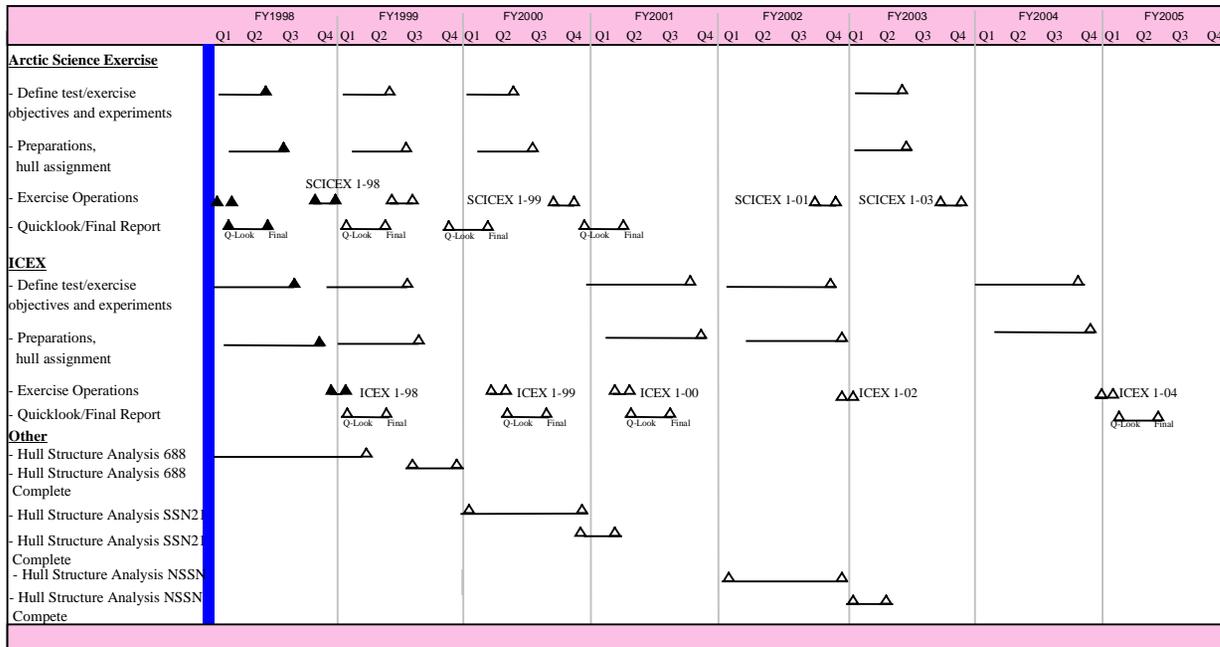


Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/4	PROGRAM ELEMENT NAME AND NUMBER Submarine Tactical Warfare Systems/P.E. 0603562N	PROJECT NAME AND NUMBER Submarine Special Operations Support Development/V1739

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYS Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NSWC Carderock	1.3	0.2	11/98	0.2	11/99					
GFE												
Subtotal Product Development			1.3	0.2	11/98	0.2	11/99					
Remarks:												
Subtotal Support Not applicable												
Remarks:												
Developmental Test & Evaluation	WR	SUBDEVRON 5	6.7	1.67	11/98	1.94	11/99/			Cont.	Cont.	Cont.
	WR	CMDR, 3 rd NAVCON BRIGADE	.05	.05	10/98	.05	10/99			Cont.	Cont.	Cont.
Operational Test & Evaluation												
GFE												
Subtotal T&E			6.8	1.72		1.99				Cont.	Cont.	Cont.
Remarks:												
Contractor Engineering Support												
Program Management Support				.16	11/98	.16	11/99			Cont.	Cont.	Cont.
Travel				.02	10/98	.02	10/99			Cont.	Cont.	Cont.
Labor (Research Personnel)												
Overhead												
Subtotal Management				.18		.18				Cont.	Cont.	Cont.
Remarks:												
Total Cost			8.1	2.1		2.4						
Remarks:												