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Exhibit R-2, RDT&E Budget Item Justification	Date: February 1999
APPROPRIATION/BUDGET ACTIVITY: RDT&E,N/ 07	R-1 ITEM NOMENCLATURE Surface ASW Combat System Integration/ 0205620N

COST (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	12.2	13.0	16.6	19.6	18.4	15.8	7.4	6.5	CONT.	CONT.
High Dynamic Range Low Cost Towed Array Receiver/ V2662	0	4.0	0	0	0	0	0	0	0	4.0
ASW Combat Systems Integration/ V0896	0.5	2.0	2.9	3.7	2.2	2.1	0	0	CONT.	CONT.
Surf ASW System Improvements/ V1916	11.7	7.0	13.7	15.9	16.2	13.7	7.4	6.5	CONT.	CONT.
Quantity of RDT&E Articles & cost										

A. Mission Description and Budget Item Justification: The objective of this program element is to incrementally modernize existing AN/SQQ-89(V) and Surface Ship Sonar Systems. It will improve AN/SQQ-89(V) Measures of Performance (MOP) by enhancing detection, tracking, classification, data processing and display capabilities, and increasing acoustic sensor frequency bandwidth. This PE will take advantage of the AN/SQQ-89(V) open system architecture to develop and integrate the Multi-Function Towed Array (MFTA) into the AN/SQQ-89(V)15 as a backfit program. Further, this program element, under project V2662 in FY 1999, will produce a single Towed Array Acoustic Intercept Subsystem (AISS) ship set and transition the AISS technology to the surface combatant AN/SQQ-89(V)15 with MFTA baseline for integration.

B. Program Change Summary:

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>
FY 1999 President's Budget:	7.6	9.4	15.6
Appropriated Value:	8.0	9.4	
Adjustment to FY 1998 Appropriated Value/ FY 1999 President's Budget:			
a. Sonar Windows / Domes Reprogramming	+5.9		
b. SBIR Transfer	- 0.3		
c. Below Threshold Reprogramming	- 1.0		
d. Surface ASW Imp Program Realignment			+ 1.2
e. Congressional Undistributed Reductions	- 0.4		
f. Minor Pricing Adjustments		- 0.4	- 0.2
g. Congressional Add for AISS		+ 4.0	
FY 2000 PRES Budget Submit:	12.2	13.0	16.6

Funding: FY 1998 increase for fiberglass-rubber composite bow dome prototype (+5.9). FY 1998 decreases for Small Business Innovative Research (SBIR) transfer (-0.3), sponsor directed BTR (-1.0), and Congressional undistributed reductions (-0.4). FY 1999 Congressional increase for AISS development (+4.0). FY 2000 (+1.2) increase for development of a Digital Torpedo Interface. FY 1999 (-0.4) and FY 2000 (-0.2) decreases for Minor Pricing Adjustments.

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/ 07	Surface ASW Combat System Integration/ 0205620N	ASW Combat System Integration/ V0896

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	0.5	2.0	2.9	3.7	2.2	2.1	0	0	CONT.	CONT.
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: The Surface ASW Combat Systems Integration project will develop the MFTA specification, towed array and common processing subsystem. It will then integrate the active classification upgrades and torpedo alertment capabilities developed under project V1916 into the MFTA. The MFTA will improve AN/SQQ-89(V) MOP by increasing sensor acoustic bandwidth, providing bistatic capability, and making processing improvements to overcome the negative effects of shallow water. These MOPs relate directly to platform survivability and operational effectiveness in the littoral environment.

PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1998 ACCOMPLISHMENTS:

- (\$0.2) Purchased Navy common telemetry. Began integration and test of the ability of the Navy common telemetry and towed array hardware to function as the receiver for the mid-frequency active sonar, torpedo defense, and BroadBand Variable Depth Sonar.
- (\$0.3) Began system design specification development for the MFTA array and processor. Evaluated Towed Active Receiver Subsystem (TARS) Handling System Engineering changes for MFTA. Began the requisite studies and investigations to resolve engineering issues to support Installation Control Drawings.

2. FY 1999 PLAN:

- (\$0.700) Complete system design specification development for the MFTA array and processor.
- (\$0.658) Begin fabrication of MFTA array parts.
- (\$0.600) Begin development and integration of the MFTA processing.
- (\$0.042) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

3. FY 2000 PLAN:

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- (\$0.8) Complete fabrication of MFTA array parts.
- (\$1.8) Continue development and integration of the MFTA processing system and array.
- (\$0.3) Coordinate and conduct 4Q MFTA sea test and prepare analysis of results.

B. Other Program Funding Summary:

<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To Complete</u>	<u>Total Cost</u>
OPN P-1 Line Item 45 (BLI 213600, 213605)									
17.6	23.3	31.9	27.3	29.5	37.6	62.1	64.3	CONT.	CONT.

Related RDT&E: PE 0603553N (Surface Anti-Submarine Warfare) - Advanced ASW Development

C. Acquisition Strategy: Development work in this project is performed primarily by:

- Naval Undersea Warfare Center, Newport - AN/SQQ-89(V) Technical Direction Agent
- Lockheed Martin Corporation - Incumbent AN/SQQ-89(V) Design Agent. This contract was awarded competitively and will extend through FY 2001.
- Chesapeake Sciences Corporation - SBIR Phase III Award (June 98) for common Navy Towed Array Telemetry.
- Applied Hydro Acoustics - Competitive Contract awarded by SPAWARSSYSCOM.

Procurement of the MFTA array components will be from Chesapeake Sciences Corporation and array fabrication will be done by the winner of a competitive Omnibus Towed Array contract.

D. Schedule Profile:

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/ 07	Surface ASW Combat System Integration/ 0205620N	ASW Combat System Integration/ V0896

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
Program Milestones	1Q Begin MFTA Project					Complete MFTA Project		First (V)15+MFTA Installation (2 Systems)
Engineering Milestones		4Q Complete MFTA System Design Specification			2Q Complete Final MFTA Processing Build 5	Transition to MFTA Production		
T&E Milestones			4Q MFTA Sea Test	2Q and 4Q MFTA Sea Tests	2Q and 4Q MFTA Sea Tests		4Q Production Sea Test	
Contract Milestones	Towed Array Omnibus Contract							

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Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/ 07	Surface ASW Combat System Integration/ 0205620N	ASW Combat System Integration/ V0896

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			Cost To Complete	Total Cost	Target Value of Contract
Primary H/W & S/W Development	Var.	Misc.	0.2	1.5	Var.	2.1	Var.			CONT.	CONT.	
Subtotal Product Development			0.2	1.5		2.1				CONT.	CONT.	
Remarks: Budgeted for Lockheed Martin award fees (\$M): 0.1 in FY99 and 0.1 in FY00. There has been no award fee awarded in prior years in this project.												
Studies, Analysis, & Evaluations	Var.	Misc.	0.1	0.1	Var.	0.1	Var.			CONT.	CONT.	
Engineering & Technical Services	Var.	Misc.	0.1	0.2	Var.	0.2	Var.			CONT.	CONT.	
Subtotal Support			0.2	0.3		0.3				CONT.	CONT.	
Remarks:												
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			Cost To Complete	Total Cost	Target Value of Contract

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Developmental & Operational T&E	Var.	Misc.	0.0	0.0		0.3	Var.			CONT.	CONT.	
Subtotal T&E			0.0	0.0		0.3				CONT.	CONT.	
Remarks:												
Program Management Support	Var.	Misc.	0.1	0.2	Var.	0.2	Var.			CONT.	CONT.	
Subtotal Management			0.1	0.2		0.2				CONT.	CONT.	
Remarks:												
Total Cost			0.5	2.0		2.9				CONT.	CONT.	
Remarks:												

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N/ 07	Surface ASW Combat System Integration/ 0205620N	Surface ASW System Improvements/ V1916

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	11.7	7.0	13.7	15.9	16.2	13.7	7.4	6.5	CONT.	CONT.
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: The Surface ASW Systems Improvements project will support essential performance enhancements on AN/SQQ-89(V) and Surface Ship Sonar Systems. This project will develop and refine active classification and display upgrades to support implementation in both the AN/SQQ-89(V) hull subsystem and the MFTA. This project will integrate the MFTA, completed in project V0896, with the AN/SQQ-89(V)15 for backfit on DDG51 class ships (AN/SQQ-89(V)15A). Additionally, project V1916 will develop an interplatform ASW data link, design and interface with the Light Airborne Multi-Purpose (LAMPS) Mk III Blk II system, improve torpedo recognition algorithms and provide a digital torpedo interface to the AN/SQQ-89(V) Underwater Fire Control System (UFCS).

PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1998 ACCOMPLISHMENTS:

- (\$1.3) Completed evaluation of the Surveillance Towed Array Sensor System (SURTASS) passive software Build 12 for incorporation into the AN/SQQ-89(V).
- (\$2.3) Completed TARS mid-frequency bistatic towed array processor Advanced Development Model (ADM). Supported TARS array white ship sea test. Participated in TARS ADM gray ship demonstration. PE 0205620N provided the mid-frequency bistatic towed array processor components (dry-end).
- (\$0.9) Supported transition of active classification upgrade algorithms to improve Echo Tracker Classifier (ETC) capability in active classification.
- (\$0.7) Established requirements for and demonstrated feasibility of an ASW Data Link (virtual) to support multi-platform coordinated ASW.
- (\$0.2) Supported Navy-wide towed array efforts.
- (\$0.6) Conducted DT-IIIAN sea test assist and data analysis on an AN/SQQ-89(V) system with adjunct processing including torpedo alertment and data fusion capabilities.

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APPROPRIATION/BUDGET ACTIVITY RDT&E,N/ 07	Surface ASW Combat System Integration/ 0205620N	Surface ASW System Improvements/ V1916

- (\$4.4) Contracted for completion of preliminary design, test and analysis, preparation of detail design, tooling modifications and development of room-temperature-cured composite dome prototype.
 - (\$1.3) Provided technical direction, configuration management, quality assurance, and preparation of engineering changes for conversion to composite dome technology. Supported composite dome sea trial.
2. FY 1999 PLAN:
- (\$1.300) Complete analysis of data from TARS FY 1998 sea tests and coordinate and conduct FY 1999 TARS sea test and prepare analysis of results.
 - (\$0.700) Complete performance specification development for the TARS Engineering Development Model (EDM) to include active classification display upgrades and transition into the MFTA program.
 - (\$1.214) Continue transition of active classification upgrade algorithms for ETC to support implementation with the hull sensor and mid-frequency active MFTA.
 - (\$0.300) Begin development of an ASW Data Link (virtual) to support multi-platform coordinated ASW.
 - (\$0.200) Continue support of Navy-wide towed array commonality development efforts.
 - (\$0.700) Conduct developmental test, DT-III AO, of an AN/SQQ-89(V)6 system, and commence planning for an operational test and evaluation, OT-III G, on an AN/SQQ-89(V)6 system with active adjunct processing and the Sonar In-Situ Mode Assessment System (SIMAS) upgrade.
 - (\$0.300) Provide performance data analysis and modeling and simulation using MOP and Measures of Effectiveness (MOE) methods.
 - (\$0.200) Begin program planning and requirements definition for the LAMPS Mk III Blk II system, identify critical system performance items, establish new interfaces for the KuBand LAMPS Common Datalink (CDL), and explore methods of backfitting these changes to the maximum number of ships.
 - (\$1.200) Continue upgrades to the Torpedo Recognition Alertment Functional Segment (TRAFS) as well as develop improved torpedo detection algorithms for the AN/SQQ-89(V).

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APPROPRIATION/BUDGET ACTIVITY RDT&E,N/ 07	Surface ASW Combat System Integration/ 0205620N	Surface ASW System Improvements/ V1916

- (\$0.800) Investigate AN/SQQ-89(V) display commonality issues, minimize display formats, and standardize operator-machine interfaces.
 - (\$0.086) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.
3. FY 2000 PLAN:
- (\$0.5) Continue development of an ASW Data Link (virtual) to support multi-platform coordinated ASW.
 - (\$0.2) Continue support of Navy-wide towed array commonality development efforts.
 - (\$0.6) Complete sea test analysis of FY 1999 DT-III AO on an AN/SQQ-89(V)6 system, and conduct operational test and evaluation, OT-III H, of an AN/SQQ-89(V)6 system.
 - (\$0.4) Continue performance data analysis and modeling and simulation using MOP and MOE methods.
 - (\$2.6) Write system performance specification changes, complete KuBand LAMPS CDL data definition, write shipboard and aircraft computer program design changes, and begin writing source code changes.
 - (\$1.3) Continue upgrades to the Torpedo Recognition Alertment Functional Segment (TRAFS) as well as develop improved torpedo detection algorithms for the AN/SQQ-89(V).
 - (\$0.3) Continue investigation of AN/SQQ-89(V) display commonality issues, minimize display formats, and standardize operator-machine interfaces.
 - (\$6.6) Begin development of mid-frequency MFTA active classification and display upgrades.
 - (\$1.2) Begin design specification for the Digital Torpedo Interface to the AN/SQQ-89(V) UFCS.

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B. Other Program Funding Summary:

<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To Complete</u>	<u>Total Cost</u>
OPN P-1 Line Item 45 (BLI 213600, 213605)									
17.6	23.3	31.9	27.3	29.5	37.6	62.1	64.3	CONT.	CONT.

Related RDT&E: PE 0603553N (Surface Anti-Submarine Warfare) - Advanced ASW Development

C. Acquisition Strategy: Development work in this project is performed primarily by:

- Naval Undersea Warfare Center, Newport - AN/SQQ-89(V) Technical Direction Agent
- Naval Surface Warfare Center, Dahlgren - Mk 116 Fire Control Technical Direction Agent
- Lockheed Martin Corporation - Incumbent AN/SQQ-89(V) Design Agent. This contract was awarded competitively and will extend through FY 2001.
- Naval Research Laboratory - Technical Direction Agent for Sonar Dome Rubber Windows/ and Sonar Rubber Domes (SDRW/SRD)
- B.F. Goodrich Corporation - SDRW/SRD Production Contractor

Procurement of the AN/SQQ-89(V)15 integrated with the MFTA in this project will commence in FY 2003 on a competitive contract awarded in the FY 2002 time frame.

D. Schedule Profile:

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	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
Program Milestones		Begin LAMPS Mk III Blk II Integration	Begin Digital Torpedo Interface for AN/SQQ-89(V) UCFS	Begin MFTA Integration into AN/SQQ-89(V)15		Complete MFTA Integration into AN/SQQ-89(V)15 Complete LAMPS Mk III Blk II Integration	Complete Digital Torpedo Interface for AN/SQQ-89(V) UCFS	First (V)15+MFTA Installation (2 Systems)
Engineering Milestones	4Q Complete SURTASS Passive Evaluation	4Q Complete FY98/ FY99 TARS ADM Sea Test Analysis 4Q Complete TARS EDM Performance Spec Dev						
T&E Milestones	2Q and 4Q TARS ADM Sea Tests	4Q DT-III AO Sea Test 2Q TARS ADM Sea Test	3Q OT-IIIH Sea Test		2Q DT-III AP and OT-III J Sea Tests		2Q DT-III AQ and OT-III K Sea Tests	
Contract Milestones					Award new competitive AN/SQQ-89(V)15 procurement contract			

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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			Cost To Complete	Total Cost	Target Value of Contract
Primary H/W & S/W Development	WR	NUWC/NPT	17.5	1.4	10/98	2.6	10/99			CONT.	CONT.	
Primary H/W & S/W Development	C/CPAF	Lockheed Martin, NY	2.5	2.0	12/98	3.7	12/99			0.0	8.3	8.3
Primary H/W S/W Development	Var.	Misc.	23.6	1.1	Var.	5.0	Var.			CONT.	CONT.	
Common Systems Engineering	Var.	Misc.	0.4	0.2	Var.	0.2	Var.			CONT.	CONT.	
Subtotal Product Development			44.0	4.7		11.5				CONT.	CONT.	
Remarks: Budgeted for Lockheed Martin award fees (\$M): 0.2 in FY99 and 0.2 in FY00. Lockheed Martin's performance has been excellent in prior years, earning 100% of possible award fee for the past four award fee periods.												
Studies, Analysis, & Evaluations	Var.	Misc.	0.9	0.2	Var.	0.2	Var.			CONT.	CONT.	
Engineering & Technical Services	Var.	Misc.	1.5	0.3	Var.	0.3	Var.			CONT.	CONT.	
Subtotal Support			2.4	0.5		0.5				CONT.	CONT.	
Remarks:												
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			Cost To Complete	Total Cost	Target Value of Contract

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Developmental & Operational T&E	Var.	Misc.	3.6	0.7	Var.	0.6	Var.			CONT.	CONT.	
Miscellaneous T&E	Var.	Misc.	2.3	0.3	Var.	0.4	Var.			CONT.	CONT.	
Subtotal T&E			5.9	1.0		1.0				CONT.	CONT.	
Remarks:												
Program Management Support	Var.	Misc.	3.4	0.8	Var.	0.7	Var.			CONT.	CONT.	
Subtotal Management			3.4	0.8		0.7				CONT.	CONT.	
Remarks:												
Total Cost			55.7	7.0		13.7				CONT.	CONT.	
Remarks:												

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