DEPARTMENT OF THE NAVY
FY 1999 AMENDED BUDGET ESTIMATES



19980319 039

JUSTIFICATION OF ESTIMATES
FEBRUARY 1998

RESEARCH, DEVELOPMENT, TEST & EVALUATION, NAVY
BUDGET ACTIVITY 4

DTIC QUALITY INSPECTED 4

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Errata Sheet

Research, Development, Test and Evaluation, Navy---BA4

In the R-1 Summary Exhibit for R-1 Line Item #36, PE 0603504N, Advanced Submarine Combat Systems Development, it lists the PE as having R-2 and R-3 materials in the classified book. All exhibits associated with this PE are unclassified. A corrected R-1 Summary Exhibit, which removes the erroneous information, is included.

Also, R-1 Line Item # 53, PE 0603609N, Conventional Munitions, was omitted from the final printed version of the Research, Development, Test and Evaluation, Navy BA-4 book. This item is also enclosed with this errata sheet.

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UNCLASSIFIED

Department of the Navy
FY 1999 RDT&E,N Program

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 1998

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
29	0603207N	Air/Ocean Tactical Application	4	17.265	15.499	28.82	U
30	0603208N	Training System Aircraft	4	1.963	-	-	U
31	0603216N	Aviation Survivability	4	12.237	16.447	8.164	U
32	0603254N	ASW Systems Development (R2/R3 Materials provided in Classified Budget Book)	4	20.682	23.962	20.184	U
33	0603261N	Tactical Airborne Reconnaissance	4	27.497	10.262	1.479	U
34	0603382N	Adv Combat System Technology	4	3.685	5.077	8.653	U
35	0603502N	Surface & Shallow Water Mine Countermeasures	4	82.210	71.146	73.491	U
36	0603504N	Adv Submarine Combat Systems Dev	4	36.549	60.087	68.402	U
37	0603506N	Surface Ship Torpedo Defense (Prior Year Only -- R2/R3 Not Required)	4	5.107	-	-	U
38	0603512N	Carrier Systems Development	4	13.555	19.976	154.307	U
39	0603513N	Shipboard System Component Dev	4	17.404	22.022	27.725	U
40	0603514N	Ship Combat Survivability	4	8.131	6.840	7.595	U
41	0603525N	PILOT FISH (Classified -- Material Not Available)	4	89.956	113.659	117.094	U
42	0603536N	RETRACT JUNIPER (Classified -- Material Not Available)	4	9.462	9.388	11.055	U
43	0603542N	Radiological Control	4	2.729	2.940	3.600	U
44	0603553N	Surface ASW	4	3.453	5.491	11.871	U
45	0603561N	Advanced Submarine System Dev	4	61.679	110.618	60.520	U
46	0603562N	Submarine Tactical Warfare Sys	4	4.296	4.007	4.676	U
47	0603563N	Ship Concept Advanced Design	4	14.356	15.713	14.900	U
48	0603564N	Ship Prelim Design & Feasibility Studies	4	15.761	52.084	42.668	U
49	0603570N	Advanced Nuclear Power Systems (R2/R3 Materials included in Classified Budget Book)	4	129.571	121.639	118.342	U
50	0603573N	Adv Surface Machinery Systems	4	64.459	46.324	58.419	U
51	0603576N	CHALK EAGLE (Classified -- Material Not Available)	4	142.165	131.501	122.031	U
52	0603582N	Combat System Integration	4	5.672	7.379	9.654	U
53	0603609N	Conventional Munitions	4	24.255	37.236	39.775	U

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54	0603610N	Advanced Warhead Dev (MK-50) (Info Contained in R1 Line 114)	4	0.599	-	-	U
55	0603611M	Marine Corps Assault Vehicles	4	36.261	68.186	104.822	U
56	0603612M	MC Mine Countermeasures	4	0.001	-	1.958	U
57	0603635M	MC Ground Combat/Support System	4	40.542	40.357	37.133	U
58	0603654N	Jt Serv Explosive Ordnance Dev	4	6.580	10.301	10.756	U
59	0603658N	Cooperative Engagement Capability	4	-	206.851	131.623	U
60	0603711N	Fleet Tactical Development (Prior Year Only -- R2/R3 Not Required)	4	3.167	-	-	U
61	0603713N	Ocean Engineering Development	4	8.002	10.283	15.257	U
62	0603721N	Environmental Protection	4	47.882	55.685	59.438	U
63	0603724N	Navy Energy Program	4	3.899	4.037	4.59	U
64	0603725N	Facilities Improvement	4	2.124	6.521	1.86	U
65	0603734N	CHALK CORAL (Classified -- Material Not Available)	4	74.293	90.562	97.552	U
66	0603746N	RETRACT MAPLE (Classified -- Material Not Available)	4	79.167	115.179	117.186	U
67	0603748N	LINK PLUMERIA (Classified -- Material Not Available)	4	34.971	28.266	22.123	U
68	0603751N	RETRACT ELM (Classified -- Material Not Available)	4	24.984	23.577	11.665	U
69	0603755N	Ship Self Defense	4	267.344	9.597	12.33	U
70	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.332		U
71	0603787N	Special Processes (Classified -- Material Not Available)	4	88.428	78.209	81.743	U
72	0603790N	NATO Research and Development	4	9.381	9.672	11.004	U
73	0603795N	Gun Weapons Systems Technology	4	52.595	58.998	110.104	U
74	0603800N	Joint Adv Strike Technology Program	4	243.286	449.674	463.402	U
75	0603851M	Non -Lethal Warfare Dem/Val	4	-	16.290	22.592	U
76	0603852N	Arsenal Ship DEM/VAL (Info Contained in R1 Line 94) (Prior Year Only -- R2/R3 Not Required)	4	27.317	-	-	U
77	0603860N	JPALS	4	-	2.894	-	U
78	0603889N	Counterdrug RDT&E	4	20.027	-	-	
79	0604327N	Hardened Target Munitions	4	-	4.839	9.827	U
80	0604707N	SEW Architecture/Eng Support	4	6.539	8.395	17.955	U
		Total Demonstration and Validation (Dem/Val)		1,904.375	2,219.002	2,358.35	

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UNCLASSIFIED

Department of the Navy
FY 1999 RDT&E,N Program
Alphabetic Listing

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy — DATE: February 1998

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
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49	0603570N	Advanced Nuclear Power Systems	4	129.571	121.639	118.34	U
		(R2/R3 Materials included in Classified Budget Book)					
45	0603561N	Advanced Submarine System Dev	4	61.679	110.618	60.520	U
54	0603610N	Advanced Warhead Dev (MK-50)	4	0.599	-	-	U
		(Info Contained in R1 Line 114)					
29	0603207N	Air/Ocean Tactical Application	4	17.265	15.499	28.824	U
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		(Info Contained in R1 Line 94)					
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32	0603254N	ASW Systems Development	4	20.682	23.962	20.184	U
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52	0603582N	Combat System Integration	4	5.672	7.379	9.65	U
70	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.332	-	U
53	0603609N	Conventional Munitions	4	24.255	37.236	39.775	U
59	0603658N	Cooperative Engagement Capability	4	-	206.851	131.623	U
78	0603889N	Counterdrug RDT&E	4	20.027	-	-	
62	0603721N	Environmental Protection	4	47.882	55.685	59.438	U
64	0603725N	Facilities Improvement	4	2.124	6.521	1.861	U
60	0603711N	Fleet Tactical Development	4	3.167	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
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58	0603654N	Jt Serv Explosive Ordnance Dev	4	6.580	10.301	10.756	U
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37	0603506N	Surface Ship Torpedo Defense	4	5.107	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
33	0603261N	Tactical Airborne Reconnaissance	4	27.497	10.262	1.479	U
30	0603208N	Training System Aircraft	4	1.963	-	-	U
		Total Demonstration and Validation (Dem/Val)		1,904.375	2,219.002	2,358.359	

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FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0363 Insensitive Munitions Advanced Development	7,803	9,844	12,512	14,557	14,717	16,689	18,967	CONT.	CONT.
K2299 Non-Nuclear Expendable Ordnance (NNEO)	0	1,808	2,296	1,361	902	965	984	CONT.	CONT.
U1821 Conventional Fuze/Warhead Package	16,452	21,508	24,967	32,848	24,508	19,012	19,459	CONT.	CONT.
U2393 Optical Fuze Correlator	0	4,076	0	0	0	0	0	0	4,076
TOTAL	24,255	37,236	39,775	48,766	40,127	36,666	39,410	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: **INSENSITIVE MUNITIONS ADVANCED DEVELOPMENT (IMAD) (Project S0363):** Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft, and personnel. This IMAD program will provide, validate and transition technology for explosives, propellants and ordnance to enable production of munitions insensitive to unplanned stimuli with no reduction to combat performance.

NON-NUCLEAR EXPENDABLE ORDNANCE (NNEO) (Project K2299): This item addresses improvements to Navy surface launched (2T) non-nuclear expendable ordnance. It supports transition of the Multi-Function Fuze from Engineering and Manufacturing Development (E&MD) to production.

CONVENTIONAL FUZE/WARHEAD PACKAGE (Project U1821): The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. Current specific requirements and initiatives to address them include: the ability to defeat anti-ship missiles attacking at extremely low altitudes by improving SPARROW Missile through the Missile Homing Improvement Program (MHIP) to counter deceptive countermeasures; demonstrate advance missile fuzing systems to defeat extremely low-altitude and low

observable targets with the Advance Threat Fuze; develop advanced integrated guidance/fuzing and warhead mass-focusing systems to increase lethality against current and emerging threats. This project will, in future years, also provide the vehicle to address emergent requirements by transitioning mature fuze and warhead technology from conceptual developments to engineering development with minimum technical and financial risk.
OPTICAL FUZE CORRELATOR (U2393): The purpose of this effort is to enhance next generation Target Des crimination and Aimpoint selection performance.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0363 Insensitive Munitions Advanced Development	7,803	9,844	12,512	14,557	14,717	16,689	18,967	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:
Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft and personnel. This program will provide, validate and transition technology to all new weapon developments and priority weapon systems and enable production of munitions insensitive to these stimuli with no reduction in combat performance. The Insensitive Munitions (IM) Advanced Development Program is the Navy's focused effort on propellants, propulsion units, explosives, warheads, fuzes and pyrotechnics to reduce the severity of cook-off and bullet/fragment impact reactions, minimizing the probability for sympathetic detonation, both in normal storage and in use, increasing ship survivability and satisfying performance and readiness requirements. Each technology area is divided into subtasks addressing specific munition/munition class IM deficiencies. Energetic materials producibility is demonstrated to assure national capability to produce and load munitions systems. The program is being closely coordinated with other Military Departments, NATO and allied countries to eliminate redundant efforts and maximize efficiency. A joint service IM requirement has been developed. Insensitive munitions are identified as a DoD critical technology requirement and considered as part of a weapon design per DoD 5000.2R.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($817) Validated and analyzed weapon systems POA&Ms for IM compliance. Analyzed the availability of critical chemicals.

- (U) ($2,292) Demonstrated high explosives which show improved IM characteristics while maintaining or improving operational performance. Demonstrated an energy-managed IM compliant booster explosive for VLS missiles. Completed scale-up, performance and vulnerability testing of a castable CL-20 based explosive and qualify if warranted. Completed qualification of improved underwater explosives.

- (U) ($3,459) Evaluated and demonstrated IM propellants and propulsion systems which provided improved or comparable performance to in-service systems and better IM characteristics. Combined candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Initiated formulation evaluation of ADN based propellant. Demonstrated high stiffness composite and injection molded motor cases. Completed demonstration and evaluation of prototype IM advanced booster propulsion systems for large diameter, 13-inch or greater, rocket motors for surface missile systems (SMS).

- (U) ($290) Forward financing FY98 requirements for low execution rate.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: S0363
PROJECT TITLE: Insensitive Munitions Advanced Development

2. (U) FY 1998 PLAN:

- (U) ($1,078) Continue validation and analysis of weapon systems POA&Ms for IM compliance. Analyze the availability of critical chemicals.

- (U) ($2,953) Demonstrate high explosives which show improved IM characteristics while maintaining or improving operational performance. Demonstrate deformable high explosives for new Anti-Air-Warfare Warheads. Demonstrate internal blast explosive, high performance pressed metal accelerating explosive and deformable explosive. Qualify an insensitive high bubble energy underwater explosive. Complete qualification of a castable CL-20 based explosive.

- (U) ($995) Evaluate IM ordnance concepts. Conduct system demonstrations of new high explosives combined with improved warhead and booster designed to support technology transitions. Continue data base applications that reduce and enhance IM warhead design and test effort.

- (U) ($4,818) Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Continue scale-up, performance and vulnerability testing of ADN based propellant. Demonstrate performance of super high pressure composite case motor. Demonstrate insensitive high energy booster propellants and motors.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: S0363 PROJECT TITLE: Insensitive Munitions Advanced Development

3. (U) FY 1999 PLAN:

- (U) ($1,200) Continue validation and analysis of weapon systems POA&Ms for IM compliance. Analyze the availability of critical chemicals.

- (U) ($4,081) Demonstrate high explosives which show improved IM characteristics while maintaining or improving operational performance. Demonstrate high performance cast explosive. Qualify internal blast explosive, high performance pressed metal accelerating explosive and deformable explosive.

- ((U) ($1,645) Evaluate IM ordnance concepts. Conduct system demonstrations of new high explosives combined with improved warhead and booster designed to support technology transitions. Continue data base applications that reduce and enhance IM warhead design and test efforts.

- ($5,586) Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Complete scale-up, performance and vulnerability testing of ADN based propellant. Demonstrate an insensitive, multi-mission, high performance rocket motor. Evaluate and demonstrate hybrid rocket motor concepts for IM compliance. Demonstrate high pressure propellants in high pressure composite motor cases.

FY1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: S0363
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Insensitive Munitions Advanced Development

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	9,884	10,145	12,715
(U) Appropriated Value	10,306	10,145	0
(U) Adjustments to FY 1997/98 Appropriated Value/FY1998 President's Budget			
(a) Undistrib adjust and funding realignments-2,503	-301	-203	
(U) FY 1999 President's Budget Submit	7,803	9,844	12,512

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 decrease results from undistributed adjustments and funding realignments (-$2,503K).
(U) Funding: FY 1998 decrease results from undistributed reductions (-$301K).
(U) Funding: FY1999 decrease results from undistributed reductions (-$203K).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: S0363 PROJECT TITLE: Insensitive Munitions Advanced Development

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) Not applicable.

(U) RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602111N (Surface/Aerospace Surveillance and Weapons Technology)
(U) PE 0602314N (Undersea Surveillance and Weapons Technology)
(U) PE 0602315N (MCM, Mining and Special Warfare Technology)
(U) PE 0603216N (Aviation Survivability)
(U) PE 0604603N (Unguided Conventional Air-launched Weapons)
(U) Cooperative technology transfer efforts with all weapons project offices are in progress. Close liaison is maintained with PE 0603514N (Ship Combat Survivability).

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: CONVENTIONAL MUNITIONS

PROJECT NUMBER: S0363
PROJECT TITLE: Insensitive Munitions Advanced Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Technology Optimization & Characterization	2,276	2,679	3,366
b. Technology Development & Demonstration	3,104	4,640	6,275
c. Technology Transition	670	740	950
d. Technical Coordination	1,038	1,050	1,161
e. Program Management	690	700	725
f. Travel	25	35	35
TOTAL	7,803	9,844	12,512

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: S0363
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Insensitive Munitions Advanced Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
NAWCWPNDIV China Lake	WR	10/97	CONT.	CONT.	77,234	3,959	5,067	5,578	CONT.	CONT.
NSWCDD	WR	10/97	CONT.	CONT.	66,681	597	550	1,120	CONT.	CONT.
NSWCIHDIV	WR	10/97	CONT.	CONT.	16,848	3,207	4,092	5,639	CONT.	CONT.
Misc	WR	11/97	CONT.	CONT.	14,047	40	135	175	CONT.	CONT.

Support and Management Not Applicable

Test and Evaluation Not Applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: S0363
PROJECT TITLE: Insensitive Munitions Advanced Development

GOVERNMENT FURNISHED PROPERTY Not Applicable

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	174,810	7,803	9,844	12,512	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	CONT.	CONT.
Total Project	174,810	7,803	9,844	12,512	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: K2299 PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K2299 Non-Nuclear Expendable Ordnance (NNEO)	0	1,808	2,296	1,361	902	965	984	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This budget item addresses improvements to Navy surface launched (2T) non-nuclear expendable ordnance (NNEO) outside existing operational requirements. The commodities comprising 2T NNEO are: major and medium caliber gun ammunition, small arms ammunition, other ship gun ammunition, pyrotechnics and demolition items. There are no other R&D budget items supporting the 2T NNEO program. Currently, this project is supporting transition of the Multi-Function Fuze (MFF) from E&MD to production. The MFF will be used on 76mm and 5"/54 gun ammunition and will replace many existing configurations by providing multi-mode functioning (AAW, ASuW, KGFS) in one fuze.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1998 PLAN:

• (U) ($1,808) MULTI-FUNCTION FUZE: Incorporate pre-planned product improvement programs to reduce fuze cost and increase producibility. P3I items include new battery and semiconductor bridgewire.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: R2299
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

3. (U) FY 1999 PLAN:

- (U) ($2,296) MULTI-FUNCTION FUZE: Continue incorporation of product improvement programs into Multi-Function Fuze to reduce cost and increase producibility. P3I items include multi-plexing air mode and initial velocity sensor.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	1,863	2,336
(U) Appropriated Value:			
(U) Adjustments To FY 1997/98 Appropriated Value/ FY 1998 President's Budget	0	-55	-40
(U) FY 1999 President's Budget Submit	0	1,808	2,296

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: FY 1998 and FY 1999 changes are due to Congressional undistributed reductions.
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: PE 0603795N (Naval Surface Fire Support). The 5"/54 Improved Conventional Munition projectile will be qualified with the MFF. MS III scheduled for FY 1999.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: K2299
PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
PROGRAM MILESTONES			1Q MSIII 4Q IOC
ENGINEERING MILESTONES			
T&E MILESTONES		4Q TECHEVAL OPEVAL	1Q TECHEVAL P3I 1Q OPEVAL P3I
CONTRACT MILESTONES		2Q PRODUCTION 2Q P3I	1Q PRODUCTION P3I

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Design and Analysis	0	420	730
b. Hardware Fabrication and Procurement	0	510	893
c. Demonstration Test and Evaluation	0	258	250
d. Operational Test and Evaluation	0	500	123
e. Engineering Support	0	55	200
f. Program Management Support	0	65	100
Total	0	1,808	2,296

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE:Conventional Munitions
PROJECT NUMBER: K2299
PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	208	1,087	CONT.	CONT.
Motorola	CPFF	Various	1,260	1,260	0	0	724	536	0	1,260
Support and Management										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	120	300	CONT.	CONT.
Test and Evaluation										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	208	150	CONT.	CONT.
NAVAIRWARCENWD China Lake, CA	WR	Various	CONT.	CONT.	0	0	150	100	CONT.	CONT.
COMOPTEVFOR Norfolk, VA	WR	Various	CONT.	CONT.	0	0	400	123	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: K2299
PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

GOVERNMENT FURNISHED PROPERTY : Not applicable.

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	0	0	930	1,623	CONT.	CONT.
Subtotal Support and Management	0	0	120	300	CONT.	CONT.
Subtotal Test and Evaluation	0	0	758	373	CONT.	CONT.
Total Project	0	0	1,809	2,296	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: U1821 PROJECT TITLE: Conventional Fuze/ Warhead Package

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U1821 Conventional Fuze and Warhead Package	16,452	21,508	24,967	32,848	24,508	19,012	19,459	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. This is the only Navy 6.3B RDT&E program that addresses improvements in warhead and fuze technology and provides a vehicle for orderly planning and transition of Navy 6.2 and 6.3A investments into E&MD for Navy missile systems. This project addresses increased lethality against current and emerging threats with the development of a mass focusing warhead system, by maturing advanced physical concepts to enhance anti-air kill probability and Over- land Attack Cruise Missile Defense (OCMD)/Direct Hit and Advanced Strike Ordnance Systems development. The project supports the full spectrum of missile advanced development including guidance technology improvements. This project will, in future years, also provide the vehicle to address emergent requirements by transitioning mature development efforts into weapon systems with minimum technical and financial risk.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISMENTS:
   - (U) ($6,337) DIRECTIONAL ORDNANCE SYSTEM: Conducted system level testing. Refined fragmentation method. Optimized ESAD and initiation system.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Conventional Fuze/ Warhead Package

1. (U) FY 1997 ACCOMPLISMENTS (Con't):

- (U) ($205) ADVANCED STRIKE WARHEAD DEVELOPMENT: Assessed and evaluated EFP performance vs subscale concrete targets. Evaluated EFP slug characteristics vs concrete and steel targets to verify/validate hydrocode models.
- (U) ($900) ORDNANCE COMPONENT TECHNOLOGY: Completed effort on initiation system; continued with very high energy density capacitors and high G fiber-optic accelerometer efforts.
- (U) ($2,648) MULTI-FUNCTION FUZE: Performed certification of OPEVAL/TECHEVAL and laboratory testing.
- (U) ($5,049) OVERLAND CRUISE MISSILE DEFENSE/DIRECT HIT FUZE WARHEAD: Continue with warhead optimization end game effectiveness analysis, critical experiments and fabrication studies. Fabricated, tested and evaluated S-A breadboard design. Integrate fuze community inputs.
- (U) ($1,313) Forward financing of FY 1998 requirements due to low execution rates in FY 1996.

2. (U) FY 1998 PLAN:

- (U) ($5,232)DIRECTIONAL ORDNANCE SYSTEM: Assemble demonstration hardware. Conduct system demonstration.
- Develop specifications, drawings, and design and test data reports. Prepare system demonstration report.
- (U) ($410) ADVANCED STRIKE WARFARE HIGH VELOCITY PENETRATOR: Initiate effort to demonstrate penetrating payload (warhead and fuze) for enhancing penetration of deeply buried targets.
- (U) ($849) ORDNANCE COMPONENT TECHNOLOGY: Continue effort with customized S-A components. Continue with very high energy density capacitors and high G fiber optic accelerometer efforts.
- (U) ($8,017) OVERLAND CRUISE MISSILE DEFENSE (OCMD)/DIRECT HIT FUZE WARHEAD: Downselect 1-2 total concepts, and conduct component and system tests.

(U) ($7,000) Advanced Seeker Technology: Initiate advanced seeker technology development effort.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Conventional Fuze/ Warhead Package

3. (U) FY 1999 PLAN:
   - (U) ($360) DIRECTIONAL ORDNANCE SYSTEM: Conduct quick look scaling design/test.
   - (U) ($6,395) ADVANCED STRIKE WARFARE HIGH VELOCITY PENETRATOR: Continue with the effort to demonstrate the penetrating payload (warhead and fuze) for enhancing penetration of deeply buried targets.
   - (U) ($1,100) ORDNANCE COMPONENT TECHNOLOGY: Complete efforts on high energy density capacitors and high G fiber optic accelerometer. Initiate efforts on near field contact sensors and enhanced low energy exploding foil initiator.
   - (U) ($10,112) OVERLAND CRUISE MISSILE DEFENSE (OCMD)/DIRECT HIT FUZE WARHEAD: Initiate concept definition. Conduct component tests and synthesis studies.
   - (U) ($7,000) Advanced Seeker Technology: Continue with advanced seeker technology development effort.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	18,394	22,182	25,166
(U) Appropriated Value:	19,184	22,182	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget	-2,732	-674	-199
(U) FY 1999 President's Budget Submit:	16,452	21,508	24,967

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: U1821
PROJECT TITLE: Conventional Fuze/Warhead Package

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Decrease in FY 1997 Value is due to funding realignments and pricing adjustments. FY 1998/1999 changes are due to Congressional undistributed general reductions and minor pricing adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
PROJECT TITLE: Conventional Fuze/ Warhead Package

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Design and Analysis	5,516	8,774	11,971
b. Hardware Fabrication and Procurement	2,400	4,600	4,800
c.Demonstration Test and Evaluation	5,508	7,934	7,996
d.Operational Test and Evaluation	2,878	0	0
e. Program Management Support	100	150	150
f. Travel	50	50	50
Total	16,452	21,508	24,967

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
PROJECT TITLE: Conventional Fuze/ Warhead Package

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	25,118	3,793	1,739	4,466	CONT.	CONT.
IRISS	CPAF	12/89	82,531	82,531	82,531	0	0	0	0	82,531
Motorola Scottsdale, AZ	CPAF	Various	CONT.	CONT.	1,400	1,800	2,500	3,500	CONT.	CONT.
NAVAIRWARCENWD China Lake, CA	WR	Various	CONT.	CONT.	54,195	4,069	2,009	1,400	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	0	104	5,326	5,605	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE:Conventional Munitions
PROJECT NUMBER: U1821
PROJECT TITLE: Conventional Fuze/ Warhead Package

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program	
Support and Management											
NAVAIRWARCEN / WD China Lake, CA	WR	Various	CONT.	CONT.	2,885	500	500	450	CONT.	CONT.	
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	1,649		500	500	450	CONT.	CONT.
Test and Evaluation											
NAVAIRWARCEN / WD China Lake, CA	WR	Various	CONT.	CONT.	7,482	1,500	3,473	4,396	CONT.	CONT.	
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	7,447		1,242	3,961	3,200	CONT.	CONT.
COMOPTEVFOR Norfolk, VA	WR	Various	CONT.	CONT.	6,940		2,083	0	0	CONT.	CONT.
JHU/APL Laurel, MD	PD	Various	CONT.	CONT.	700		0	0	0	CONT.	CONT.
Motorola	CPAF	Various	CONT.	CONT.	0		0	500	500	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	0		861	1,000	1,000	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT TITLE: Conventional Fuze/ Warhead Package

GOVERNMENT FURNISHED PROPERTY : Not applicable.

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	163,244	9,766	11,574	14,971	CONT.	CONT.
Subtotal Support and Management	4,534	1,000	1,000	900	CONT.	CONT.
Subtotal Test and Evaluation	22,569	5,686	8,934	9,096	CONT.	CONT.
Total Project	190,347	16,452	21,508	24,967	CONT.	CONT.

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Errata Sheet

Research, Development, Test and Evaluation, Navy---BA4

In the R-1 Summary Exhibit for R-1 Line Item #36, PE 0603504N, Advanced Submarine Combat Systems Development, it lists the PE as having R-2 and R-3 materials in the classified book. All exhibits associated with this PE are unclassified. A corrected R-1 Summary Exhibit, which removes the erroneous information, is included.

Also, R-1 Line Item # 53, PE 0603609N, Conventional Munitions, was omitted from the final printed version of the Research, Development, Test and Evaluation, Navy BA-4 book. This item is also enclosed with this errata sheet.

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Department of the Navy
FY 1999 RDT&E,N Program

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 1998

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
29	0603207N	Air/Ocean Tactical Application	4	17.265	15.499	28.824	U
30	0603208N	Training System Aircraft	4	1.963	-	-	U
31	0603216N	Aviation Survivability	4	12.237	16.447	8.164	U
32	0603254N	ASW Systems Development	4	20.682	23.962	20.184	U
		(R2/R3 Materials provided in Classified Budget Book)					
33	0603261N	Tactical Airborne Reconnaissance	4	27.497	10.262	1.479	U
34	0603382N	Adv Combat System Technology	4	3.685	5.077	8.653	U
35	0603502N	Surface & Shallow Water Mine Countermeasures	4	82.210	71.146	73.491	U
36	0603504N	Adv Submarine Combat Systems Dev	4	36.549	60.087	68.402	U
37	0603506N	Surface Ship Torpedo Defense	4	5.107	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
38	0603512N	Carrier Systems Development	4	13.555	19.976	154.307	U
39	0603513N	Shipboard System Component Dev	4	17.404	22.022	27.725	U
40	0603514N	Ship Combat Survivability	4	8.131	6.840	7.595	U
41	0603525N	PILOT FISH	4	89.956	113.659	117.094	U
		(Classified -- Material Not Available)					
42	0603536N	RETRACT JUNIPER	4	9.462	9.388	11.055	U
		(Classified -- Material Not Available)					
43	0603542N	Radiological Control	4	2.729	2.940	3.600	U
44	0603553N	Surface ASW	4	3.453	5.491	11.871	U
45	0603561N	Advanced Submarine System Dev	4	61.679	110.618	60.520	U
46	0603562N	Submarine Tactical Warfare Sys	4	4.296	4.007	4.676	U
47	0603563N	Ship Concept Advanced Design	4	14.356	15.713	14.900	U
48	0603564N	Ship Prelim Design & Feasibility Studies	4	15.761	52.084	42.668	U
49	0603570N	Advanced Nuclear Power Systems	4	129.571	121.639	118.342	U
		(R2/R3 Materials included in Classified Budget Book)					
50	0603573N	Adv Surface Machinery Systems	4	64.459	46.324	58.419	U
51	0603576N	CHALK EAGLE	4	142.165	131.501	122.031	U
		(Classified -- Material Not Available)					
52	0603582N	Combat System Integration	4	5.672	7.379	9.654	U
53	0603609N	Conventional Munitions	4	24.255	37.236	39.775	U

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54	0603610N	Advanced Warhead Dev (MK-50) (Info Contained in R1 Line 114)	4	0.599	-	-	U
55	0603611M	Marine Corps Assault Vehicles	4	36.261	68.186	104.822	U
56	0603612M	MC Mine Countermeasures	4	0.001	-	1.958	U
57	0603635M	MC Ground Combat/Support System	4	40.542	40.357	37.133	U
58	0603654N	Jt Serv Explosive Ordnance Dev	4	6.580	10.301	10.756	U
59	0603658N	Cooperative Engagement Capability	4	-	206.851	131.623	U
60	0603711N	Fleet Tactical Development (Prior Year Only -- R2/R3 Not Required)	4	3.167	-	-	U
61	0603713N	Ocean Engineering Development	4	8.002	10.283	15.257	U
62	0603721N	Environmental Protection	4	47.882	55.685	59.438	U
63	0603724N	Navy Energy Program	4	3.899	4.037	4.592	U
64	0603725N	Facilities Improvement	4	2.124	6.521	1.861	U
65	0603734N	CHALK CORAL (Classified -- Material Not Available)	4	74.293	90.562	97.552	U
66	0603746N	RETRACT MAPLE (Classified -- Material Not Available)	4	79.167	115.179	117.186	U
67	0603748N	LINK PLUMERIA (Classified -- Material Not Available)	4	34.971	28.266	22.123	U
68	0603751N	RETRACT ELM (Classified -- Material Not Available)	4	24.984	23.577	11.665	U
69	0603755N	Ship Self Defense	4	267.344	9.597	12.337	U
70	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.332	-	U
71	0603787N	Special Processes (Classified -- Material Not Available)	4	88.428	78.209	81.743	U
72	0603790N	NATO Research and Development	4	9.381	9.672	11.004	U
73	0603795N	Gun Weapons Systems Technology	4	52.595	58.998	110.104	U
74	0603800N	Joint Adv Strike Technology Program	4	243.286	449.674	463.402	U
75	0603851M	Non -Lethal Warfare Dem/Val	4	-	16.290	22.592	U
76	0603852N	Arsenal Ship DEM/VAL (Info Contained in R1 Line 94) (Prior Year Only -- R2/R3 Not Required)	4	27.317	-	-	U
77	0603860N	JPALS	4	-	2.894	-	U
78	0603889N	Counterdrug RDT&E	4	20.027	-	-	
79	0604327N	Hardened Target Munitions	4	-	4.839	9.827	U
80	0604707N	SEW Architecture/Eng Support	4	6.539	8.395	17.955	U
		Total Demonstration and Validation (Dem/Val)		1,904.375	2,219.002	2,358.359	

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Department of the Navy
FY 1999 RDT&E,N Program
Alphabetic Listing

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 1998

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
34	0603382N	Adv Combat System Technology	4	3.685	5.077	8.653	U
36	0603504N	Adv Submarine Combat Systems Dev	4	36.549	60.087	68.402	U
50	0603573N	Adv Surface Machinery Systems	4	64.459	46.324	58.419	U
49	0603570N	Advanced Nuclear Power Systems (R2/R3 Materials included in Classified Budget Book)	4	129.571	121.639	118.342	U
45	0603561N	Advanced Submarine System Dev	4	61.679	110.618	60.520	U
54	0603610N	Advanced Warhead Dev (MK-50) (Info Contained in R1 Line 114)	4	0.599	-	-	U
29	0603207N	Air/Ocean Tactical Application	4	17.265	15.499	28.824	U
76	0603852N	Arsenal Ship DEM/VAL (Info Contained in R1 Line 94) (Prior Year Only -- R2/R3 Not Required)	4	27.317	-	-	U
32	0603254N	ASW Systems Development (R2/R3 Materials provided in Classified Budget Book)	4	20.682	23.962	20.184	U
31	0603216N	Aviation Survivability	4	12.237	16.447	8.164	U
38	0603512N	Carrier Systems Development	4	13.555	19.976	154.307	U
65	0603734N	CHALK CORAL (Classified -- Material Not Available)	4	74.293	90.562	97.552	U
51	0603576N	CHALK EAGLE (Classified -- Material Not Available)	4	142.165	131.501	122.031	U
52	0603582N	Combat System Integration	4	5.672	7.379	9.654	U
70	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.332	-	U
53	0603609N	Conventional Munitions	4	24.255	37.236	39.775	U
59	0603658N	Cooperative Engagement Capability	4	-	206.851	131.623	U
78	0603889N	Counterdrug RDT&E	4	20.027	-	-	
62	0603721N	Environmental Protection	4	47.882	55.685	59.438	U
64	0603725N	Facilities Improvement	4	2.124	6.521	1.861	U
60	0603711N	Fleet Tactical Development (Prior Year Only -- R2/R3 Not Required)	4	3.167	-	-	U
73	0603795N	Gun Weapons Systems Technology	4	52.595	58.998	110.104	U
79	0604327N	Hardened Target Munitions	4	-	4.839	9.827	U

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Revised

74	0603800N	Joint Adv Strike Technology Program	4	243.286	449.674	463.402	U
58	0603654N	Jt Serv Explosive Ordnance Dev	4	6.580	10.301	10.756	U
77	0603860N	JPALS	4	-	2.894	-	U
67	0603748N	LINK PLUMERIA	4	34.971	28.266	22.123	U
		(Classified -- Material Not Available)					
55	0603611M	Marine Corps Assault Vehicles	4	36.261	68.186	104.822	U
57	0603635M	MC Ground Combat/Support System	4	40.542	40.357	37.133	U
56	0603612M	MC Mine Countermeasures	4	0.001	-	1.958	U
63	0603724N	Navy Energy Program	4	3.899	4.037	4.592	U
72	0603790N	NATO Research and Development	4	9.381	9.672	11.004	U
75	0603851M	Non -Lethal Warfare Dem/Val	4	-	16.290	22.592	U
61	0603713N	Ocean Engineering Development	4	8.002	10.283	15.257	U
41	0603525N	PILOT FISH	4	89.956	113.659	117.094	U
		(Classified -- Material Not Available)					
43	0603542N	Radiological Control	4	2.729	2.940	3.600	U
68	0603751N	RETRACT ELM	4	24.984	23.577	11.665	U
		(Classified -- Material Not Available)					
42	0603536N	RETRACT JUNIPER	4	9.462	9.388	11.055	U
		(Classified -- Material Not Available)					
66	0603746N	RETRACT MAPLE	4	79.167	115.179	117.186	U
		(Classified -- Material Not Available)					
80	0604707N	SEW Architecture/Eng Support	4	6.539	8.395	17.955	U
40	0603514N	Ship Combat Survivability	4	8.131	6.840	7.595	U
47	0603563N	Ship Concept Advanced Design	4	14.356	15.713	14.900	U
48	0603564N	Ship Prelim Design & Feasibility Studies	4	15.761	52.084	42.668	U
69	0603755N	Ship Self Defense	4	267.344	9.597	12.337	U
39	0603513N	Shipboard System Component Dev	4	17.404	22.022	27.725	U
71	0603787N	Special Processes	4	88.428	78.209	81.743	U
		(Classified -- Material Not Available)					
46	0603562N	Submarine Tactical Warfare Sys	4	4.296	4.007	4.676	U
35	0603502N	Surface & Shallow Water Mine Countermeasures	4	82.210	71.146	73.491	U
44	0603553N	Surface ASW	4	3.453	5.491	11.871	U
37	0603506N	Surface Ship Torpedo Defense	4	5.107	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
33	0603261N	Tactical Airborne Reconnaissance	4	27.497	10.262	1.479	U
30	0603208N	Training System Aircraft	4	1.963	-	-	U
		Total Demonstration and Validation (Dem/Val)		1,904.375	2,219.002	2,358.359	

Revised

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0363 Insensitive Munitions Advanced Development	7,803	9,844	12,512	14,557	14,717	16,689	18,967	CONT.	CONT.
K2299 Non-Nuclear Expendable Ordnance (NNEO)	0	1,808	2,296	1,361	902	965	984	CONT.	CONT.
U1821 Conventional Fuze/Warhead Package	16,452	21,508	24,967	32,848	24,508	19,012	19,459	CONT.	CONT.
U2393 Optical Fuze Correlator	0	4,076	0	0	0	0	0	0	4,076
TOTAL	24,255	37,236	39,775	48,766	40,127	36,666	39,410	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: **INSENSITIVE MUNITIONS ADVANCED DEVELOPMENT (IMAD) (Project S0363):** Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft, and personnel. This IMAD program will provide, validate and transition technology for explosives, propellants and ordnance to enable production of munitions insensitive to unplanned stimuli with no reduction to combat performance.

NON-NUCLEAR EXPENDABLE ORDNANCE (NNEO) (Project K2299): This item addresses improvements to Navy surface launched (2T) non-nuclear expendable ordnance. It supports transition of the Multi-Function Fuze from Engineering and Manufacturing Development (E&MD) to production.

CONVENTIONAL FUZE/WARHEAD PACKAGE (Project U1821): The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. Current specific requirements and initiatives to address them include: the ability to defeat anti-ship missiles attacking at extremely low altitudes by improving SPARROW Missile through the Missile Homing Improvement Program (MHIP) to counter deceptive countermeasures; demonstrate advance missile fuzing systems to defeat extremely low-altitude and low

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

observable targets with the Advance Threat Fuze; develop advanced integrated guidance/fuzing and warhead mass-focusing systems to increase lethality against current and emerging threats. This project will, in future years, also provide the vehicle to address emergent requirements by transitioning mature fuze and warhead technology from conceptual developments to engineering development with minimum technical and financial risk.

OPTICAL FUZE CORRELATOR (U2393): The purpose of this effort is to enhance next generation Target Descrimination and Aimpoint selection performance.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0363 Insensitive Munitions Advanced Development	7,803	9,844	12,512	14,557	14,717	16,689	18,967	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:
Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft and personnel. This program will provide, validate and transition technology to all new weapon developments and priority weapon systems and enable production of munitions insensitive to these stimuli with no reduction in combat performance. The Insensitive Munitions (IM) Advanced Development Program is the Navy's focused effort on propellants, propulsion units, explosives, warheads, fuzes and pyrotechnics to reduce the severity of cook-off and bullet/fragment impact reactions, minimizing the probability for sympathetic detonation, both in normal storage and in use, increasing ship survivability and satisfying performance and readiness requirements. Each technology area is divided into subtasks addressing specific munition/munition class IM deficiencies. Energetic materials producibility is demonstrated to assure national capability to produce and load munitions systems. The program is being closely coordinated with other Military Departments, NATO and allied countries to eliminate redundant efforts and maximize efficiency. A joint service IM requirement has been developed. Insensitive munitions are identified as a DoD critical technology requirement and considered as part of a weapon design per DoD 5000.2R.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($817) Validated and analyzed weapon systems POA&Ms for IM compliance. Analyzed the availability of critical chemicals.

- (U) ($2,292) Demonstrated high explosives which show improved IM characteristics while maintaining or improving operational performance. Demonstrated an energy-managed IM compliant booster explosive for VLS missiles. Completed scale-up, performance and vulnerability testing of a castable CL-20 based explosive and qualify if warranted. Completed qualification of improved underwater explosives.

- (U) ($3,459) Evaluated and demonstrated IM propellants and propulsion systems which provided improved or comparable performance to in-service systems and better IM characteristics. Combined candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Initiated formulation evaluation of ADN based propellant. Demonstrated high stiffness composite and injection molded motor cases. Completed demonstration and evaluation of prototype IM advanced booster propulsion systems for large diameter, 13-inch or greater, rocket motors for surface missile systems (SMS).

- (U) ($290) Forward financing FY98 requirements for low execution rate.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: S0363
PROJECT TITLE: Insensitive Munitions Advanced Development

2. (U) FY 1998 PLAN:

- (U) ($1,078) Continue validation and analysis of weapon systems POA&Ms for IM compliance. Analyze the availability of critical chemicals.

- (U) ($2,953) Demonstrate high explosives which show improved IM characteristics while maintaining or improving operational performance. Demonstrate deformable high explosives for new Anti-Air-Warfare Warheads. Demonstrate internal blast explosive, high performance pressed metal accelerating explosive and deformable explosive. Qualify an insensitive high bubble energy underwater explosive. Complete qualification of a castable CL-20 based explosive.

- (U) ($995) Evaluate IM ordnance concepts. Conduct system demonstrations of new high explosives combined with improved warhead and booster designed to support technology transitions. Continue data base applications that reduce and enhance IM warhead design and test effort.

- (U) ($4,818) Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Continue scale-up, performance and vulnerability testing of ADN based propellant. Demonstrate performance of super high pressure composite case motor. Demonstrate insensitive high energy booster propellants and motors.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: S0363 PROJECT TITLE: Insensitive Munitions Advanced Development

3. (U) FY 1999 PLAN:

- (U) ($1,200) Continue validation and analysis of weapon systems POA&Ms for IM compliance. Analyze the availability of critical chemicals.

- (U) ($4,081) Demonstrate high explosives which show improved IM characteristics while maintaining or improving operational performance. Demonstrate high performance cast explosive. Qualify internal blast explosive, high performance pressed metal accelerating explosive and deformable explosive.

- ((U) ($1,645) Evaluate IM ordnance concepts. Conduct system demonstrations of new high explosives combined with improved warhead and booster designed to support technology transitions. Continue data base applications that reduce and enhance IM warhead design and test efforts.

- ($5,586) Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Complete scale-up, performance and vulnerability testing of ADN based propellant. Demonstrate an insensitive, multi-mission, high performance rocket motor. Evaluate and demonstrate hybrid rocket motor concepts for IM compliance. Demonstrate high pressure propellants in high pressure composite motor cases.

FY1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: S0363 PROJECT TITLE: Insensitive Munitions Advanced Development

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	9,884	10,145	12,715
(U) Appropriated Value	10,306	10,145	0
(U) Adjustments to FY 1997/98 Appropriated Value/FY1998 President's Budget			
(a) Undistrib adjust and funding realignments-2,503	-301	-203	
(U) FY 1999 President's Budget Submit	7,803	9,844	12,512

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 decrease results from undistributed adjustments and funding realignments (-$2,503K).
(U) Funding: FY 1998 decrease results from undistributed reductions (-$301K).
(U) Funding: FY1999 decrease results from undistributed reductions (-$203K).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: S0363 PROJECT TITLE: Insensitive Munitions Advanced Development

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) Not applicable.

(U) RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602111N (Surface/Aerospace Surveillance and Weapons Technology)
(U) PE 0602314N (Undersea Surveillance and Weapons Technology)
(U) PE 0602315N (MCM, Mining and Special Warfare Technology)
(U) PE 0603216N (Aviation Survivability)
(U) PE 0604603N (Unguided Conventional Air-launched Weapons)
(U) Cooperative technology transfer efforts with all weapons project offices are in progress. Close liaison is maintained with PE 0603514N (Ship Combat Survivability).

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: CONVENTIONAL MUNITIONS

PROJECT NUMBER: S0363
PROJECT TITLE: Insensitive Munitions Advanced Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Technology Optimization & Characterization	2,276	2,679	3,366
b. Technology Development & Demonstration	3,104	4,640	6,275
c. Technology Transition	670	740	950
d. Technical Coordination	1,038	1,050	1,161
e. Program Management	690	700	725
f. Travel	25	35	35
TOTAL	7,803	9,844	12,512

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: S0363
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Insensitive Munitions Advanced Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
NAWCWPNDIV China Lake	WR	10/97	CONT.	CONT.	77,234	3,959	5,067	5,578	CONT.	CONT.
NSWCDD	WR	10/97	CONT.	CONT.	66,681	597	550	1,120	CONT.	CONT.
NSWCIHDIV	WR	10/97	CONT.	CONT.	16,848	3,207	4,092	5,639	CONT.	CONT.
Misc	WR	11/97	CONT.	CONT.	14,047	40	135	175	CONT.	CONT.

Support and Management Not Applicable

Test and Evaluation Not Applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: S0363
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Insensitive Munitions Advanced Development

GOVERNMENT FURNISHED PROPERTY Not Applicable

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	174,810	7,803	9,844	12,512	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	CONT.	CONT.
Total Project	174,810	7,803	9,844	12,512	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: K2299 PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K2299 Non-Nuclear Expendable Ordnance (NNEO)	0	1,808	2,296	1,361	902	965	984	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This budget item addresses improvements to Navy surface launched (2T) non-nuclear expendable ordnance (NNEO) outside existing operational requirements. The commodities comprising 2T NNEO are: major and medium caliber gun ammunition, small arms ammunition, other ship gun ammunition, pyrotechnics and demolition items. There are no other R&D budget items supporting the 2T NNEO program. Currently, this project is supporting transition of the Multi-Function Fuze (MFF) from E&MD to production. The MFF will be used on 76mm and 5"/54 gun ammunition and will replace many existing configurations by providing multi-mode functioning (AAW, ASuW, KGFS) in one fuze.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1998 PLAN:

- (U) ($1,808) MULTI-FUNCTION FUZE: Incorporate pre-planned product improvement programs to reduce fuze cost and increase producibility. P3I items include new battery and semiconductor bridgewire.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

3. (U) FY 1999 PLAN:

- (U) ($2,296) MULTI-FUNCTION FUZE: Continue incorporation of product improvement programs into Multi-Function Fuze to reduce cost and increase producibility. P3I items include multi-plexing air mode and initial velocity sensor.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	1,863	2,336
(U) Appropriated Value:			
(U) Adjustments To FY 1997/98 Appropriated Value/ FY 1998 President's Budget	0	-55	-40
(U) FY 1999 President's Budget Submit	0	1,808	2,296

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: FY 1998 and FY 1999 changes are due to Congressional undistributed reductions.
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: PE 0603795N (Naval Surface Fire Support). The 5"/54 Improved Conventional Munition projectile will be qualified with the MFF. MS III scheduled for FY 1999.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: K2299
PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
PROGRAM MILESTONES			1Q MSIII 4Q IOC
ENGINEERING MILESTONES			
T&E MILESTONES		4Q TECHEVAL OPEVAL	1Q TECHEVAL P3I 1Q OPEVAL P3I
CONTRACT MILESTONES		2Q PRODUCTION 2Q P3I	1Q PRODUCTION P3I

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Design and Analysis	0	420	730
b. Hardware Fabrication and Procurement	0	510	893
c. Demonstration Test and Evaluation	0	258	250
d. Operational Test and Evaluation	0	500	123
e. Engineering Support	0	55	200
f. Program Management Support	0	65	100
Total	0	1,808	2,296

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT NUMBER: K2299 PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	208	1,087	CONT.	CONT.
Motorola	CPFF	Various	1,260	1,260	0	0	724	536	0	1,260
Support and Management										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	120	300	CONT.	CONT.
Test and Evaluation										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	208	150	CONT.	CONT.
NAVAIRWARCENWD China Lake, CA	WR	Various	CONT.	CONT.	0	0	150	100	CONT.	CONT.
COMOPTEVFOR Norfolk, VA	WR	Various	CONT.	CONT.	0	0	400	123	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Non-Nuclear Expendable Ordnance (NNEO)

GOVERNMENT FURNISHED PROPERTY : Not applicable.

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	0	0	930	1,623	CONT.	CONT.
Subtotal Support and Management	0	0	120	300	CONT.	CONT.
Subtotal Test and Evaluation	0	0	758	373	CONT.	CONT.
Total Project	0	0	1,809	2,296	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: U1821 PROJECT TITLE: Conventional Fuze/ Warhead Package

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U1821 Conventional Fuze and Warhead Package	16,452	21,508	24,967	32,848	24,508	19,012	19,459	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. This is the only Navy 6.3B RDT&E program that addresses improvements in warhead and fuze technology and provides a vehicle for orderly planning and transition of Navy 6.2 and 6.3A investments into E&MD for Navy missile systems. This project addresses increased lethality against current and emerging threats with the development of a mass focusing warhead system, by maturing advanced physical concepts to enhance anti-air kill probability and Over- land Attack Cruise Missile Defense (OCMD)/Direct Hit and Advanced Strike Ordnance Systems development. The project supports the full spectrum of missile advanced development including guidance technology improvements. This project will, in future years, also provide the vehicle to address emergent requirements by transitioning mature development efforts into weapon systems with minimum technical and financial risk.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISMENTS:
   - (U) ($6,337) DIRECTIONAL ORDNANCE SYSTEM: Conducted system level testing. Refined fragmentation method. Optimized ESAD and initiation system.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT NUMBER: U1821 PROJECT TITLE: Conventional Fuze/ Warhead Package

1. (U) FY 1997 ACCOMPLISMENTS (Con't):

- (U) ($205) ADVANCED STRIKE WARHEAD DEVELOPMENT: Assessed and evaluated EFP performance vs subscale concrete targets. Evaluated EFP slug characteristics vs concrete and steel targets to verify/validate hydrocode models.
- (U) ($900) ORDNANCE COMPONENT TECHNOLOGY: Completed effort on initiation system; continued with very high energy density capacitors and high G fiber-optic accelerometer efforts.
- (U) ($2,648) MULTI-FUNCTION FUZE: Performed certification of OPEVAL/TECHEVAL and laboratory testing.
- (U) ($5,049) OVERLAND CRUISE MISSILE DEFENSE/DIRECT HIT FUZE WARHEAD: Continue with warhead optimization end game effectiveness analysis, critical experiments and fabrication studies. Fabricated, tested and evaluated S-A breadboard design. Integrate fuze community inputs.
- (U) ($1,313) Forward financing of FY 1998 requirements due to low execution rates in FY 1996.

2. (U) FY 1998 PLAN:

- (U) ($5,232)DIRECTIONAL ORDNANCE SYSTEM: Assemble demonstration hardware. Conduct system demonstration.
- Develop specifications, drawings, and design and test data reports. Prepare system demonstration report.
- (U) ($410) ADVANCED STRIKE WARFARE HIGH VELOCITY PENETRATOR: Initiate effort to demonstrate penetrating payload (warhead and fuze) for enhancing penetration of deeply buried targets.
- (U) ($849) ORDNANCE COMPONENT TECHNOLOGY: Continue effort with customized S-A components. Continue with very high energy density capacitors and high G fiber optic accelerometer efforts.
- (U) ($8,017) OVERLAND CRUISE MISSILE DEFENSE (OCMD)/DIRECT HIT FUZE WARHEAD: Downselect 1-2 total concepts, and conduct component and system tests.

  (U) ($7,000) Advanced Seeker Technology: Initiate advanced seeker technology development effort.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Conventional Fuze/ Warhead Package

3. (U) FY 1999 PLAN:
   - (U) ($360) DIRECTIONAL ORDNANCE SYSTEM: Conduct quick look scaling design/test.
   - (U) ($6,395) ADVANCED STRIKE WARFARE HIGH VELOCITY PENETRATOR: Continue with the effort to demonstrate the penetrating payload (warhead and fuze) for enhancing penetration of deeply buried targets.
   - (U) ($1,100) ORDNANCE COMPONENT TECHNOLOGY: Complete efforts on high energy density capacitors and high G fiber optic accelerometer. Initiate efforts on near field contact sensors and enhanced low energy exploding foil initiator.
   - (U) ($10,112) OVERLAND CRUISE MISSILE DEFENSE (OCMD)/DIRECT HIT FUZE WARHEAD: Initiate concept definition. Conduct component tests and synthesis studies.
   - (U) ($7,000) Advanced Seeker Technology: Continue with advanced seeker technology development effort.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	18,394	22,182	25,166
(U) Appropriated Value:	19,184	22,182	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget	-2,732	-674	-199
(U) FY 1999 President's Budget Submit:	16,452	21,508	24,967

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
PROJECT TITLE: Conventional Fuze/Warhead Package

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Decrease in FY 1997 Value is due to funding realignments and pricing adjustments. FY 1998/1999 changes are due to Congressional undistributed general reductions and minor pricing adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
PROJECT TITLE: Conventional Fuze/ Warhead Package

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Design and Analysis	5,516	8,774	11,971
b. Hardware Fabrication and Procurement	2,400	4,600	4,800
c.Demonstration Test and Evaluation	5,508	7,934	7,996
d.Operational Test and Evaluation	2,878	0	0
e. Program Management Support	100	150	150
f. Travel	50	50	50
Total	16,452	21,508	24,967

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE: Conventional Munitions PROJECT TITLE: Conventional Fuze/ Warhead Package

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	25,118	3,793	1,739	4,466	CONT.	CONT.
IRISS	CPAF	12/89	82,531	82,531	82,531	0	0	0	0	82,531
Motorola Scottsdale, AZ	CPAF	Various	CONT.	CONT.	1,400	1,800	2,500	3,500	CONT.	CONT.
NAVAIRWARCENWD China Lake, CA	WR	Various	CONT.	CONT.	54,195	4,069	2,009	1,400	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	0	104	5,326	5,605	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT NUMBER: U1821 PROJECT TITLE: Conventional Fuze/ Warhead Package

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program	
Support and Management											
NAVAIRWARCEN / WD China Lake, CA	WR	Various	CONT.	CONT.	2,885	500	500	450	CONT.	CONT.	
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	1,649		500	500	450	CONT.	CONT.
Test and Evaluation											
NAVAIRWARCEN / WD China Lake, CA	WR	Various	CONT.	CONT.	7,482	1,500	3,473	4,396	CONT.	CONT.	
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	7,447		1,242	3,961	3,200	CONT.	CONT.
COMOPTEVFOR Norfolk, VA	WR	Various	CONT.	CONT.	6,940		2,083	0	0	CONT.	CONT.
JHU/APL Laurel, MD	PD	Various	CONT.	CONT.	700		0	0	0	CONT.	CONT.
Motorola	CPAF	Various	CONT.	CONT.	0		0	500	500	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	0		861	1,000	1,000	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT TITLE: Conventional Fuze/ Warhead Package

GOVERNMENT FURNISHED PROPERTY : Not applicable.

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	163,244	9,766	11,574	14,971	CONT.	CONT.
Subtotal Support and Management	4,534	1,000	1,000	900	CONT.	CONT.
Subtotal Test and Evaluation	22,569	5,686	8,934	9,096	CONT.	CONT.
Total Project	190,347	16,452	21,508	24,967	CONT.	CONT.

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Department of the Navy
FY 1999 RDT&E,N Program

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 1998

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
29	0603207N	Air/Ocean Tactical Application	4	17.265	15.499	28.824	U
30	0603208N	Training System Aircraft	4	1.963	-	-	U
31	0603216N	Aviation Survivability	4	12.237	16.447	8.164	U
32	0603254N	ASW Systems Development (R2/R3 Materials provided in Classified Budget Book)	4	20.682	23.962	20.184	U
33	0603261N	Tactical Airborne Reconnaissance	4	27.497	10.262	1.479	U
34	0603382N	Adv Combat System Technology	4	3.685	5.077	8.653	U
35	0603502N	Surface & Shallow Water Mine Countermeasures	4	82.210	71.146	73.491	U
36	0603504N	Adv Submarine Combat Systems Dev (R2/R3 Materials included in Classified Budget Book)	4	36.549	60.087	68.402	U
37	0603506N	Surface Ship Torpedo Defense (Prior Year Only -- R2/R3 Not Required)	4	5.107	-	-	U
38	0603512N	Carrier Systems Development	4	13.555	19.976	154.307	U
39	0603513N	Shipboard System Component Dev	4	17.404	22.022	27.725	U
40	0603514N	Ship Combat Survivability	4	8.131	6.840	7.595	U
41	0603525N	PILOT FISH (Classified -- Material Not Available)	4	89.956	113.659	117.094	U
42	0603536N	RETRACT JUNIPER (Classified -- Material Not Available)	4	9.462	9.388	11.055	U
43	0603542N	Radiological Control	4	2.729	2.940	3.600	U
44	0603553N	Surface ASW	4	3.453	5.491	11.871	U
45	0603561N	Advanced Submarine System Dev	4	61.679	110.618	60.520	U
46	0603562N	Submarine Tactical Warfare Sys	4	4.296	4.007	4.676	U
47	0603563N	Ship Concept Advanced Design	4	14.356	15.713	14.900	U
48	0603564N	Ship Prelim Design & Feasibility Studies	4	15.761	52.084	42.668	U
49	0603570N	Advanced Nuclear Power Systems (R2/R3 Materials included in Classified Budget Book)	4	129.571	121.639	118.342	U
50	0603573N	Adv Surface Machinery Systems	4	64.459	46.324	58.419	U
51	0603576N	CHALK EAGLE (Classified -- Material Not Available)	4	142.165	131.501	122.031	U
52	0603582N	Combat System Integration	4	5.672	7.379	9.654	U
53	0603609N	Conventional Munitions	4	24.255	37.236	39.775	U

54	0603610N	Advanced Warhead Dev (MK-50) (Info Contained in R1 Line 114)	4	0.599	-	-	U
55	0603611M	Marine Corps Assault Vehicles	4	36.261	68.186	104.822	U
56	0603612M	MC Mine Countermeasures	4	0.001	-	1.958	U
57	0603635M	MC Ground Combat/Support System	4	40.542	40.357	37.133	U
58	0603654N	Jt Serv Explosive Ordnance Dev	4	6.580	10.301	10.756	U
59	0603658N	Cooperative Engagement Capability	4	-	206.851	131.623	U
60	0603711N	Fleet Tactical Development (Prior Year Only -- R2/R3 Not Required)	4	3.167	-	-	U
61	0603713N	Ocean Engineering Development	4	8.002	10.283	15.257	U
62	0603721N	Environmental Protection	4	47.882	55.685	59.438	U
63	0603724N	Navy Energy Program	4	3.899	4.037	4.592	U
64	0603725N	Facilities Improvement	4	2.124	6.521	1.861	U
65	0603734N	CHALK CORAL (Classified -- Material Not Available)	4	74.293	90.562	97.552	U
66	0603746N	RETRACT MAPLE (Classified -- Material Not Available)	4	79.167	115.179	117.186	U
67	0603748N	LINK PLUMERIA (Classified -- Material Not Available)	4	34.971	28.266	22.123	U
68	0603751N	RETRACT ELM (Classified -- Material Not Available)	4	24.984	23.577	11.665	U
69	0603755N	Ship Self Defense	4	267.344	9.597	12.337	U
70	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.332	-	U
71	0603787N	Special Processes (Classified -- Material Not Available)	4	88.428	78.209	81.743	U
72	0603790N	NATO Research and Development	4	9.381	9.672	11.004	U
73	0603795N	Gun Weapons Systems Technology	4	52.595	58.998	110.104	U
74	0603800N	Joint Adv Strike Technology Program	4	243.286	449.674	463.402	U
75	0603851M	Non -Lethal Warfare Dem/Val	4	-	16.290	22.592	U
76	0603852N	Arsenal Ship DEM/VAL (Info Contained in R1 Line 94) (Prior Year Only -- R2/R3 Not Required)	4	27.317	-	-	U
77	0603860N	JPALS	4	-	2.894	-	U
78	0603889N	Counterdrug RDT&E	4	20.027	-	-	
79	0604327N	Hardened Target Munitions	4	-	4.839	9.827	U
80	0604707N	SEW Architecture/Eng Support	4	6.539	8.395	17.955	U
		Total Demonstration and Validation (Dem/Val)		1,904.375	2,219.002	2,358.359	

Department of the Navy
FY 1999 RDT&E,N Program
Alphabetic Listing

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 1998

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
34	0603382N	Adv Combat System Technology	4	3.685	5.077	8.653	U
36	0603504N	Adv Submarine Combat Systems Dev	4	36.549	60.087	68.402	U
		(R2/R3 Materials included in Classified Budget Book)					
50	0603573N	Adv Surface Machinery Systems	4	64.459	46.324	58.419	U
49	0603570N	Advanced Nuclear Power Systems	4	129.571	121.639	118.342	U
		(R2/R3 Materials included in Classified Budget Book)					
45	0603561N	Advanced Submarine System Dev	4	61.679	110.618	60.520	U
54	0603610N	Advanced Warhead Dev (MK-50)	4	0.599	-	-	U
		(Info Contained in R1 Line 114)					
29	0603207N	Air/Ocean Tactical Application	4	17.265	15.499	28.824	U
76	0603852N	Arsenal Ship DEM/VAL	4	27.317	-	-	U
		(Info Contained in R1 Line 94)					
		(Prior Year Only -- R2/R3 Not Required)					
32	0603254N	ASW Systems Development	4	20.682	23.962	20.184	U
		(R2/R3 Materials provided in Classified Budget Book)					
31	0603216N	Aviation Survivability	4	12.237	16.447	8.164	U
38	0603512N	Carrier Systems Development	4	13.555	19.976	154.307	U
65	0603734N	CHALK CORAL	4	74.293	90.562	97.552	U
		(Classified -- Material Not Available)					
51	0603576N	CHALK EAGLE	4	142.165	131.501	122.031	U
		(Classified -- Material Not Available)					
52	0603582N	Combat System Integration	4	5.672	7.379	9.654	U
70	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.332	-	U
53	0603609N	Conventional Munitions	4	24.255	37.236	39.775	U
59	0603658N	Cooperative Engagement Capability	4	-	206.851	131.623	U
78	0603889N	Counterdrug RDT&E	4	20.027	-	-	
62	0603721N	Environmental Protection	4	47.882	55.685	59.438	U
64	0603725N	Facilities Improvement	4	2.124	6.521	1.861	U
60	0603711N	Fleet Tactical Development	4	3.167	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
73	0603795N	Gun Weapons Systems Technology	4	52.595	58.998	110.104	U

79	0604327N	Hardened Target Munitions	4	-	4.839	9.827	U
74	0603800N	Joint Adv Strike Technology Program	4	243.286	449.674	463.402	U
58	0603654N	Jt Serv Explosive Ordnance Dev	4	6.580	10.301	10.756	U
77	0603860N	JPALS	4	-	2.894	-	U
67	0603748N	LINK PLUMERIA	4	34.971	28.266	22.123	U
		(Classified -- Material Not Available)					
55	0603611M	Marine Corps Assault Vehicles	4	36.261	68.186	104.822	U
57	0603635M	MC Ground Combat/Support System	4	40.542	40.357	37.133	U
56	0603612M	MC Mine Countermeasures	4	0.001	-	1.958	U
63	0603724N	Navy Energy Program	4	3.899	4.037	4.592	U
72	0603790N	NATO Research and Development	4	9.381	9.672	11.004	U
75	0603851M	Non -Lethal Warfare Dem/Val	4	-	16.290	22.592	U
61	0603713N	Ocean Engineering Development	4	8.002	10.283	15.257	U
41	0603525N	PILOT FISH	4	89.956	113.659	117.094	U
		(Classified -- Material Not Available)					
43	0603542N	Radiological Control	4	2.729	2.940	3.600	U
68	0603751N	RETRACT ELM	4	24.984	23.577	11.665	U
		(Classified -- Material Not Available)					
42	0603536N	RETRACT JUNIPER	4	9.462	9.388	11.055	U
		(Classified -- Material Not Available)					
66	0603746N	RETRACT MAPLE	4	79.167	115.179	117.186	U
		(Classified -- Material Not Available)					
80	0604707N	SEW Architecture/Eng Support	4	6.539	8.395	17.955	U
40	0603514N	Ship Combat Survivability	4	8.131	6.840	7.595	U
47	0603563N	Ship Concept Advanced Design	4	14.356	15.713	14.900	U
48	0603564N	Ship Prelim Design & Feasibility Studies	4	15.761	52.084	42.668	U
69	0603755N	Ship Self Defense	4	267.344	9.597	12.337	U
39	0603513N	Shipboard System Component Dev	4	17.404	22.022	27.725	U
71	0603787N	Special Processes	4	88.428	78.209	81.743	U
		(Classified -- Material Not Available)					
46	0603562N	Submarine Tactical Warfare Sys	4	4.296	4.007	4.676	U
35	0603502N	Surface & Shallow Water Mine Countermeasures	4	82.210	71.146	73.491	U
44	0603553N	Surface ASW	4	3.453	5.491	11.871	U
37	0603506N	Surface Ship Torpedo Defense	4	5.107	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
33	0603261N	Tactical Airborne Reconnaissance	4	27.497	10.262	1.479	U
30	0603208N	Training System Aircraft	4	1.963	-	-	U
		Total Demonstration and Validation (Dem/Val)		1,904.375	2,219.002	2,358.359	

RDT&E, Navy
Program and Financing (in Thousands of dollars)

Identification code 17-1319-0-1-051	Budget Plan (amounts for RESEARCH, DEV, TEST & EVAL actions programed)			Obligations		
	1997 actual	1998 est.	1999 est.	1997 actual	1998 est.	1999 est.
Program by activities:						
Direct program:						
00.0101 Basic research	345,606	338,743	362,679	347,232	321,791	361,241
00.0201 Applied Research	514,282	493,622	524,723	538,520	510,049	522,858
00.0301 Advanced technology development	462,002	514,781	460,725	526,719	488,623	463,967
00.0401 Demonstration/validation	1,904,375	2,219,002	2,358,359	1,948,060	2,132,484	2,350,003
00.0501 Engineering and manufacturing development	2,153,911	2,227,348	2,063,281	2,121,481	2,232,406	2,073,125
00.0601 Management support	681,340	551,033	616,973	707,119	555,438	613,016
00.0701 Operational system development	1,822,845	1,535,383	1,722,183	1,843,010	1,630,193	1,710,973
00.9101 Total direct program	7,884,361	7,879,912	8,108,923	8,032,141	7,870,984	8,095,183
01.0101 Reimbursable program	121,287	110,000	110,000	132,938	112,515	110,000
10.0001 Total	8,005,648	7,989,912	8,218,923	8,165,079	7,983,499	8,205,183
Financing:						
Offsetting collections from:						
11.0001 Federal funds(-)	-113,073	-110,000	-110,000	-110,978	-110,000	-110,000
14.0001 Non-Federal sources(-)	-8,214			-16,820		
17.0001 Recovery of prior year obligations				-33,145		
Unobligated balance available, start of year:						
21.4002 For completion of prior year budget plans				-605,401	-472,982	-479,395
21.4003 Available to finance new budget plans	-4,500	-53,879		-4,500	-53,879	
21.4009 Reprograming from/to prior year budget plan	-12,643					
22.1001 Unobligated balance transferred to other acco		13,879			13,879	
22.2001 Unobligated balance transferred from other ac	-4,590			-4,590		
Unobligated balance available, end of year:						
24.4002 For completion of prior year budget plans				472,982	479,395	493,135
24.4003 Available to finance subsequent year budget	53,879			53,879		
25.0001 Unobligated balance expiring	355			355		
39.0001 Budget authority	7,916,862	7,839,912	8,108,923	7,916,862	7,839,912	8,108,923
Budget authority:						
40.0001 Appropriation	7,993,455	8,115,686	8,108,923	7,993,455	8,115,686	8,108,923
40.3601 Appropriation rescinded (unob bal)	-4,500	-40,000		-4,500	-40,000	
40.7601 Reduction pursuant to P.L. 105-56 (-), 8035		-251,265			-251,265	
40.7901 Line item veto cancellation (-)		-6,000			-6,000	
41.0001 Transferred to other accounts (-)	-182,207	-43,160		-182,207	-43,160	
42.0001 Transferred from other accounts	110,114	64,651		110,114	64,651	
43.0001 Appropriation (adjusted)	7,916,862	7,839,912	8,108,923	7,916,862	7,839,912	8,108,923

RDT&E, Navy
Program and Financing (in Thousands of dollars)

Identification code 17-1319-0-1-051	Budget Plan (amounts for RESEARCH, DEV, TEST & EVAL actions programed)			Obligations		
	1997 actual	1998 est.	1999 est.	1997 actual	1998 est.	1999 est.
Relation of obligations to outlays:						
71.0001 Obligations incurred				8,037,281	7,873,499	8,095,183
72.1001 Orders on hand, SOY				-156,141	-146,613	-146,613
72.4001 Obligated balance, start of year				4,310,635	4,003,286	4,251,788
74.1001 Orders on hand, EOY				146,613	146,613	146,613
74.4001 Obligated balance, end of year				-4,003,286	-4,251,788	-4,372,794
77.0001 Adjustments in expired accounts (net)				-82,345		
78.0001 Adjustments in unexpired accounts				-33,145		
90.0001 Outlays (net)				8,219,612	7,624,997	7,974,177

RDT&E, Navy
Object Classification (in Thousands of dollars)

Identification code 17-1319-0-1-051		1997 actual	1998 est.	1999 est.
	Direct obligations:			
	Personnel compensation:			
111.101	Full-time permanent	43,779	44,428	43,112
111.301	Other than full-time permanent	2,923	2,625	2,469
111.501	Other personnel compensation	1,494	1,563	1,527
111.801	Special personal services payments	27	27	28
111.901	Total personnel compensation	48,223	48,643	47,136
112.101	Personnel Benefits: Civilian personnel	10,194	10,653	10,207
113.001	Benefits for former personnel	522	484	441
121.001	Travel and transportation of persons	27,419	27,995	28,583
122.001	Transportation of things	544	556	567
123.201	Rental payments to others	3,256	3,324	3,394
123.301	Communications, utilities, and miscellaneous charges	4,895	4,998	5,103
124.001	Printing and reproduction	391	399	408
125.101	Advisory and assistance services	247,090	223,455	225,165
125.201	Other services with the private sector	11,212	235,465	95,918
	Purchases goods/services (inter/intra) Fed accounts			
125.301	Purchase of goods/services from other Fed agencies	650,577	664,239	678,188
125.303	Purchases from revolving funds	2,385,085	2,077,579	2,183,869
125.401	Contract O&M of facilites including GOCOS	168	172	176
125.501	Research & Development Contracts	4,622,015	4,552,040	4,794,605
125.701	Contract O&M of equip. including ADP hard/software	1,706	1,742	1,779
126.001	Supplies and materials	7,767	7,930	8,097
131.001	Equipment	10,693	10,918	11,147
132.001	Land and structures	384	392	400
199.001	Total Direct obligations	8,032,141	7,870,984	8,095,183
	Reimbursable obligations:			
	Personnel Compensation:			
211.101	Full-time permanent	36,444	40,327	41,966
211.301	Other than full-time permanent	2,440	2,534	2,553
211.501	Other personnel compensation	977	899	937
211.901	Total personnel compensation	39,861	43,760	45,456
212.101	Personnel Benefits: Civilian Personnel	7,611	8,554	8,801
213.001	Benefits for former personnel	15		
221.001	Travel and transportation of persons	4,248	4,300	4,350
222.001	Transportation of things	227	240	251
223.201	Rental payments to others	1,647	1,702	1,735
223.301	Communications, utilities, and miscellaneous charges	1,826	1,880	1,890
224.001	Printing and reproduction	269	280	291

RDT&E, Navy
Object Classification (in Thousands of dollars)

Identification code 17-1319-0-1-051		1997 actual	1998 est.	1999 est.
225.201	Other services with the private sector		2,515	
	Purchases goods/services (inter/intra) Fed accounts			
225.301	Purchase of goods/services from other Fed agencies	263	270	278
225.501	Research & Development Contracts	62,207	33,789	31,603
226.001	Supplies and materials	10,586	10,945	11,030
231.001	Equipment	4,178	4,280	4,315
299.001	Total Reimbursable obligations	132,938	112,515	110,000
999.901	Total obligations	8,165,079	7,983,499	8,205,183

Comparison of FY 1997 Financing as reflected in FY 1998 Budget with 1997 Financing as Shown in the FY 1999 Budget

($ in Thousands)

	Financing per FY 1998 Budget	Financing Per FY 1999 Budget	Increase (+) or Decrease (-)
Program Requirements (Total)	7,855,754	7,884,361	+28,607
Program Requirements (Service Account)	(7,855,754)	(7,884,361)	(+28,607)
Program Requirements (Reimbursable)	121,831	121,287	-544
Appropriation (Adjusted)	7,977,585	7,916,862	+28,063

Explanation of Changes in Financing
($ in Thousands)

The Fiscal Year 1997 program has changed since the presentation of the FY 1998 budget as noted below:

1. Program Requirements (Total). There has been a net increase to the appropriation (adjusted) of +$28,063, as a result of changes in program requirements as noted below.

2. Program Requirements (Service Account). There has been a net increase to the appropriation (adjusted) of +$28,607. These changes included: a rescission to the FY 1997 program approved in the FY 1998 DoD Appropriations Act (-$40,000); an Emergency Supplemental Appropriation based on reduced inflation rates to finance Bosnia contingency costs (-$9,600); reductions reflected on the FY 1997 DoD Omnibus Reprogramming Action to specific programs (-$1,232); reductions to finance Military Personnel, Navy (MPN) shortfalls (-$10,270); and three transfers into the appropriation from a DoD central transfer account to support the RDT&E Counter Drug program (+$23,774). Additionally, a number of Internal Reprogrammings were effected which reclassified funding between DoD and DoN appropriations to more properly align it into the correct programs for execution: (1) V-22 EMD ($68,400--from APN); (2) Defense Finance and Accounting Service (DFAS)($9,240--from O&MN); (3) Large Area Tracking Radar (LATR) (-$4,226--to OPN); (4) F-14 TARPS (+$4,887--from APN); (5) Environmental Test Bed (+$3,813--from Army); (6) Southeast Regional Network (SRN)(-$2,300--to O&MN); (7) DDG-51 TBMD/CEC (-$13,879).

3. Program Requirements (Reimbursable). There has been a net decrease to the appropriation of -$544, as a result of changes in reimbursable program requirements (-$544).

Comparison of FY 1997 Program Requirements as reflected in the FY 1998 Budget with FY 1997 Program Requirements as shown in the FY 1999 Budget

Summary of Requirements ($ In Thousands)

	Total Program Requirements per FY 1998 Budget	Total Program Requirements per FY 1999 Budget	Increase (+) or Decrease (-)
01 - Basic Research	352,102	345,606	-6,496
02 - Applied Research	534,593	514,282	-20,311
03 - Advanced Technology Development	492,863	462,002	-30,861
04 - Demonstration and Validation (DEM/VAL)	1,937,283	1,904,375	-32,908
05 - Engineering and Manufacturing Development (EMD)	2,143,579	2,153,911	+10,332
06 - RDTE Management Support	540,473	681,340	+140,867
07 - Operational Systems Development	1,854,861	1,822,845	-32,016
Total Fiscal Year Program	**7,855,754**	**7,884,361**	**+28,607**

Explanation by Budget Activity

($ In Thousands)

01. Basic Research (-$6,496) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$430) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (-$5,884), and other changes in program requirements which required minor reprogrammings (-$182).

02. Applied Research (-$20,311) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$654) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (-$7,186), and other changes in program requirements which required minor reprogrammings (-$12,471).

03. Advanced Technology Development (-$30,861) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$609) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (-$8,200), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (-$21,872).

04. Demonstration and Validation (DEM/VAL) (-$32,908) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$2,358) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (-$25,625), reductions to finance MPN shortfalls (-$270), a reduction reflected on the FY 1997 DoD Omnibus Reprogramming Action (-$1,232), a transfer from the Army for Environmental Test Bed at Puget Sound (+$3,813) and from APN for the F-14 TARPS program (+$4,887), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (-$12,123).

05. Engineering and Manufacturing Development (EMD) (+$10,332) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$2,633) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (-$45,752), reductions to finance MPN shortfalls (-$500), transfers from APN for the V-22 (EMD) program (+$68,400) and to SCN for the DDG-51 TBMD/CEC program (-$13,879), three transfers into the appropriation from a DoD central transfer account to support the RDT&E Counter Drug program (+$23,774), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (-$19,078).

06. RDTE Management Support (+$140,867) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$658) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (+$118,218), reductions to finance MPN shortfalls (-$1,000), transfers from O&MN to properly fund the Defense Finance and Accounting Service (DFAS) program in RDT&E (+$9,240), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (+$15,067).

07. Operational Systems Development (-$32,016) - Changes to this budget activity resulted from an Emergency Supplemental Appropriation rescission to finance Bosnia contingency costs (-$2,258) based on reduced inflation rates, a transfer to support the Small Business Innovative Research (SBIR) program (-$25,571), reductions to finance MPN shortfalls (-$8,500), transfers to OPN for the Large Area Tracking Radar (LATR) program (-$4,226) and to O&MN for the Southeast Regional Network (SRN) program (-$2,300), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (+$10,839).

Comparison of FY 1998 Financing as reflected in FY 1998 Budget with 1998 Financing as Shown in the FY 1999 Budget

($ In Thousands)

	Financing per FY 1998 Budget	Financing Per FY 1999 Budget	Increase (+) or Decrease (-)
Program Requirements (Total)	7,611,022	7,879,912	+268,890
Program Requirements (Service Account)	(7,611,022)	(7,879,912)	(+268,890)
Program Requirements (Reimbursable)	125,000	110,000	-15,000
Appropriation (Adjusted)	**7,736,022**	**7,989,912**	**+253,890**

Explanation of Changes in Financing
($ in Thousands)

The Fiscal Year 1998 program has changed since the presentation of the FY 1998 budget as noted below:

1. Program Requirements (Total). There has been a net increase to the appropriation (adjusted) of +$268,890, as a result of changes in program requirements as noted below.

2. Program Requirements (Service Account). There has been a net increase to the appropriation (adjusted) of +$268,890, resulting from changes in program requirements as a result of Congressional appropriation changes in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$4,607)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$23,400)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$121,735)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$101,523) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$18,000). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 148 specific initiatives) resulted in a net increase of +$517,064. Congress also transferred +$9,500 from SCN for Fast Patrol Boats and +$45,000 for a SWATH Ship. Also, appropriation changes include: a correction from APN for +$5,600 for the H-1 helicopter program (which was not effected); transfers from APN for the F/A-18 E/F program (+$26,000); to Military Personnel, Navy (MPN) to fund program shortfalls (-$28,700); a transfer to Ballistic Missile Defense Organization (BMDO) for Theater Missile Defense (-$25,000); a reprogramming to fully fund minimum Major

Ranges and Test Facilities Base (MRTFB) costs (+$16,000)(only +$3,851 is transferring into RDT&E,N--the balance is from sources within RDT&E,N); and a transfer for the Chemical-Biological Defense program (-$4,160).

3. Program Requirements (Reimbursable). There has been a net decrease to the appropriation of -$15,000, as a result of changes in reimbursable program requirements (-$15,000).

Comparison of FY 1998 Program Requirements as reflected in the FY 1998 Budget with FY 1998 Program Requirements as shown in the FY 1999 Budget

Summary of Requirements ($ in Thousands)

	Total Program Requirements per FY 1998 Budget	Total Program Requirements per FY 1999 Budget	Increase (+) or Decrease (-)
01 - Basic Research	382,117	338,743	-43,374
02 - Applied Research	490,273	493,622	+3,349
03 - Advanced Technology Development	433,305	514,781	+81,476
04 - Demonstration and Validation (DEM/VAL)	2,135,069	2,219,002	+83,933
05 - Engineering and Manufacturing Development (EMD)	2,085,768	2,227,348	+141,580
06 - RDTE Management Support	595,265	551,033	-44,232
07 - Operational Systems Development	1,489,225	1,535,383	+46,158
Total Fiscal Year Program	**7,611,022**	**7,879,912**	**+268,890**

Explanation by Budget Activity
($ in Thousands)

01. Basic Research (-$43,374) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$15)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$32)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$5,226)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$4,358) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$772). Specific FY 1998 Congressional adjustments resulted in a net reduction of -$32,971.

02. Applied Research (+$3,349) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$192)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$430)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$7,670)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$6,395) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$1,134). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 19 specific initiatives) resulted in a net increase of +$18,250. Additionally, changes in program requirements required minor reprogrammings (+$920).

03. Advanced Technology Development (+$81,476) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$463)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$693)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$7,862)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$6,552) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$1,163). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 30 specific initiatives) resulted in a net increase of +$89,640. Congress also transferred +$9,500 from SCN for Fast Patrol Boats. Additionally, changes in program requirements required minor reprogrammings (-$931).

04. Demonstration and Validation (DEM/VAL) (+$83,933) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$1,258)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$2,211)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$34,422)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$28,699) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$5,092). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 35 specific initiatives) resulted in a net increase of +$160,391. Also included is a transfer to MPN (-$2,000). Additionally, changes in program requirements required minor reprogrammings (-$2,776).

05. Engineering and Manufacturing Development (EMD) (+$141,580) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$129)

(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$9,239)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$34,619)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$28,866) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate) (-$5,111). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 41 specific initiatives) resulted in a net increase of +$222,586. Congress also transferred +$45,000 from SCN for a SWATH Ship. Also included are transfers to MPN (-$22,700) and to BMDO for TBMD (-$25,000), as well as a correction from APN for +$5,600 for the H-1 helicopter program (which was not effected). Additionally, changes in program requirements required minor reprogrammings (-$5,942).

06. RDTE Management Support (-$44,232) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$2,362)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$6,547)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$8,491)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$7,077) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$1,258). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 8 specific initiatives) resulted in a net decrease of -$26,606. Also included are a reprogramming to fully fund minimum Major Ranges and Test Facilities Base (MRTFB) costs (+$16,000)(only +$3,851 is transferring into RDT&E,N--the balance is from sources within RDT&E,N) and a transfer for the Chemical-Biological Defense program (-$4,160). Additionally, changes in program requirements required minor reprogrammings (-$3,731).

07. Operational Systems Development (+$46,158) - Changes to this budget activity resulted from the following Congressional undistributed reductions reflected in the FY 1998 DoD Appropriations Act. These changes included: an undistributed reduction for Federally Financed Research and Development Centers (FFRDC)(-$188)(Section 8035), an undistributed reduction for Contract Advisory and Assistance Services (CAAS)(-$4,248)(Section 8041), a general undistributed RDT&E and procurement reduction of 1.5 percent (-$23,445)(Section 8043) to finance flying hours and readiness, a general undistributed RDT&E reduction of 1.25 percent (-$19,576) to finance National Missile Defense (NMD)(Section 8048), and a general reduction for revised economic assumptions (lower inflation rate)(-$3,470). Specific FY 1998 Congressional adjustments (to start, continue or discontinue 13 specific initiatives) resulted in a net increase of +$79,774. Also included is a transfer from APN for the F/A-18 program (+$26,000). Additionally, changes in program requirements required minor reprogrammings (-$8,689).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & Title	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	To Complete	Total Program
R/X0118 Ocean Measurement Sensors (Beginning in FY 1998 claimancy shifts from ONR to SPAWAR)	3,017	3,057	0	0	0	0	0	0	17,210
X0513 Air/Ocean Prediction	1,629	1,594	0	0	0	0	0	0	9,351
X0514 Air/Ocean Shipboard Measurements	1,412	1,694	0	0	0	0	0	0	9,964
X0523 Air/Ocean Data Assimilation	694	714	0	0	0	0	0	0	4,395
X0948 Precise Timing and Astrometry	1,150	1,204	0	0	0	0	0	0	7,209
X1596 Satellite Ocean Tactical Applications	3,547	3,400	0	0	0	0	0	0	21,872

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER & Title	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	To Complete	Total Program
R/X1987 Mapping, Charting and Geodesy Techniques (Beginning in FY 1998 claimancy shifts from ONR to SPAWAR)	3,904	1,976	0	0	0	0	0	0	26,770
X2008 Tactical Ocean Data Assimilation and Prediction	1,912	1,860	0	0	0	0	0	0	11,848
Note: Beginning in FY99 Projects R0120, R2017 and V0823 are transferred to SPAWAR and merged with existing Projects in Program Element 0603207N Air/Ocean Tactical Applications as noted below.									
X2341 METOC Data Acquisition	0	0	8,526	8,760	8,983	9,187	10,378	CONT.	CONT.
X2342 METOC Data Assimilation and Modeling	0	0	11,534	12,272	12,650	13,000	12,403	CONT.	CONT.
X2343 Tactical METOC Applications	0	0	7,299	7,740	7,835	7,974	8,443	CONT.	CONT.
X2344 Precise Timing and Astrometry	0	0	1,465	1,466	1,497	1,522	1,551	CONT.	CONT.
TOTAL	17,265	15,499	28,824	30,238	30,965	31,683	32,775	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Air Ocean Tactical Applications (AOTA) Program Element is specifically tailored to emphasize techniques which expand knowledge and improve understanding of the meteorological and oceanographic (METOC) environment and its impact on combat systems performance. AOTA focuses on shallow water and other harsh environments, and regional conflict and crisis response scenarios. Projects in this program element develop atmospheric and oceanographic data assimilation techniques, forecast models, data base management systems and associated software for use in both mainframe and tactical scale computers. Global Geospatial Information and Services efforts within this program address the bathymetric and gravimetric needs of the Navy. Also developed are algorithms to process remotely sensed satellite data for integration into other systems and tactical applications. In addition, the projects provide for demonstration and validation of specialized METOC instrumentation and measurement techniques, new sensors, communications and interfaces. Included are techniques to assess, predict and enhance the performance of current and proposed undersea surveillance, tactical and mine warfare and weapons systems. AOTA METOC products are tailored for, and will be incorporated into the Joint Maritime Command Information System and/or onboard combat systems to provide accurate operational system performance predictions. These METOC products will also be incorporated into fleet trainers to provide realistic environments in support of warfare simulations. Finally, this project upgrades the accuracy of the U.S. Naval Observatory's Master Clock system, develops near-real-time earth orientation predictions, develops very precise determination of positions of both faint and bright stars, and supports satellite tracking and space debris studies.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

PROJECT NUMBER & Title	FY 1996 Actual	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	To Complete	Total Program
X2341 METOC Data Acquisition	0	0	0	8,526	8,760	8,983	9,187	10,378	CONT.	CONT.

Note: Beginning in FY99 this project is the consolidation of projects R0118, R1987, X0514 and the Data Collection/Inversion portion of R0120.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The objectives of this project are to develop meteorology and oceanography (METOC) data collection methods and sensors to 1) rapidly and automatically acquire a broad array of METOC data using both off- and on-board sensors, 2) provide an on-scene assessment capability for the tactical commander, 3) provide the tactical commander with real-time METOC data and products for operational use, 4) demonstrate and validate the use of tactical workstations, data compression, connectivity and interface technologies to ingest, store, process, distribute and display these METOC data and products, 5) develop new charting and bathymetric survey techniques necessary to reduce the existing 300 ship year shortfall in coastal hydrographic survey requirements, and 6) develop an expanded database for predictive models in areas of potential interest. The major challenge is the collection and dissemination of data in highly variable environmental conditions in denied or inaccessible areas over extended periods of time.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

From Project R0118:

- (U) ($805) Initiated Airborne Combat Data Collection Tactical Dropsonde (TDrop) capability to support Battlespace METOC data acquisition via fleet assets.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2341
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Acquisition

- (U) ($350) Continued sensor development for Remotely Operated Vehicles (ROV) and Autonomous Underwater Vehicles (AUV).
- (U) ($875) Transitioned sensor integration and development of Unmanned Air Vehicle (UAV) sensors for joint littoral operations to the Predator UAV program. Initiated sensor integration and development of UAV sensors in Pioneer Vehicle.
- (U) ($375) Continued dem/val of hinterland clandestine micro system for METOC monitoring for joint operations.
- (U) ($373) Transferred funding support to National Imagery and Mapping Agency (NIMA) and other agencies for joint R&D as directed by CNO (N096).
- (U) ($239) Continued A-sized expendable mooring development.

From Project R1987:

- (U) ($2,000) Completed development/acquisition of oceanographic/bathymetric (NAVSEA PMS 407/CNO(N096) dual mission RMS.
- (U) ($470) Transitioned Oceanographic Remotely Controlled Automation (ORCA) demonstration and evaluations, completed automated vehicle controls, continued map generation project, and integration of OMS transitioned sensors.
- (U) ($200) Obtained oceanographic version of joint Remote Minehunting System (RMS) through Naval Sea Systems Command. Began critical design reviews and instrumentation design for RMS vehicle in conjunction with Naval Coastal System Center.
- (U) ($715) Completed tide algorithm, continued multispectral scanner, and added interferometric GPS (3D position) capability for the Airborne Laser project.

- (U) ($519) Continued information management and continue DMAP functions. DMAP is the clearing house for reviewing Digital Mapping, Charting and Geodesy requirements.

From Project X0514:

- (U) ($315) Continued development of data connectivity with the AEGIS and Joint Standoff Weapon (JSOW) C2 systems. Completed development of data connectivity with the Tactical Air Mission Planning System.
- (U) ($300) Continued Test and Evaluation of Non-developmental items in support of data connectivity, visualization, interfaces and C2 systems.
- (U) ($150) Completed dem/val of aerosol measurement techniques.
- (U) ($603) Completed dem/val of the baseline Shipboard METOC Observing System replacement - SMOOS(R) sensors.
- (U) ($44) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

2.(U) FY 1998 PLAN:

From Project R0118:

- (U) ($950) Continue Airborne Combat Data Collection via fleet assets.
- (U) ($857) Continue sensor developments for ROV/AUV assume incremental vehicle size reductions requiring yearly sensor miniaturization.
- (U) ($346) Complete sensor integration and development of UAV sensors in Pioneer Vehicle.
- (U) ($600) Continue hinterland clandestine micro sensor.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

- (U) ($304) Complete A-sized self mooring clandestine buoy.

From Project R1987

- (U) ($574) Take delivery of RMS vehicle. Continue instrumentation design and begin demonstration and validation of joint RMS vehicle for remote littoral bathymetry/mine hunting.

- (U) ($785) Continue development of airborne laser bathymetry techniques from fixed wing aircraft for crisis response.

- (U) ($617) Continue information management and DMAP functions.

From Project X0514:

- (U) ($611) Complete data connectivity with JSOW. Continue development of data connectivity with the Aegis C2 systems. Begin data connectivity with next-generation Tomahawk and Mine Countermeasures mission planning systems.

- (U) ($300) Continue test and evaluation of non-developmental items in support of data connectivity visualization, interfaces and C2 systems.

- (U) ($750) Begin development of next-generation SMOOS(R) sensors.

- (U) ($33) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

3. (U) FY 1999 PLAN:

- (U) ($900) Continue Airborne Combat Data Collection via fleet assets.
- (U) ($875) Continue sensor developments for ROV/AUV assume incremental vehicle size reductions requiring yearly sensor miniaturization.
- (U) ($400) Initiate sensor integration and development of UAV sensors in Tier II Plus Vehicles.
- (U) ($527) Complete hinterland clandestine micro sensors.
- (U) ($447) Initiate development of small bottom crawling expendable littoral survey systems.
- (U) ($1,054) Continue assessments of temporal and spatial variability of littoral environments for acoustic data inversion.
- (U) ($425) Initiate dem/val of METOC Air, Surface, Undersea Reconnaissance Equipment (MEASURE).
- (U) ($340) Complete data connectivity with the Aegis C2 system and the Mine Countermeasures mission planning system. Continue development of data connectivity with the next generation Tomahawk mission planning system.
- (U) ($375) Complete test and evaluation of non-developmental items in support of data connectivity visualization, interfaces and C2 systems.
- (U) ($350) Continue development of next-generation sensors for SMOOS(R).
- (U) ($500) Begin development of data connectivity with the Global Command and Control Systems (GCCS).
- (U) ($375) Begin development of advanced aerosol measurement techniques.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

- (U) ($492) Continue instrumentation demonstration and validation of joint RMS vehicle for remote littoral bathymetry/mine hunting.
- (U) ($627) Continue development of airborne laser bathymetry techniques from fixed wing aircraft for crisis response.
- (U) ($641) Continue information management and DMAP functions.
- (U) ($198) Develop and update overarching C4ISR mission requirements and conduct associated analysis and studies.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	0
(U) Adjustments from FY 1998 PRESBUDG:	0	0	+8,526
(U) FY 1999 President's Budget Submit:	0	0	8,526

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$8,672) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture. Project X2341 supports the METOC Data Acquisition portion of $BMDA^3$ and merges the demonstration and validation (dem/val) of sensors and data collection techniques previously conducted under Projects R0118, X0514, R1987 and R0120. The funding profile also reflects the reprogramming of a portion of FY 1999 and out-year RDT&E funds to OPN. (-$150) Commercial purchases inflation adjustment. (+$4) Minor Navy adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: PE 0604218N, Air/Ocean Equipment Engineering - AN/SMQ-11 satellite receiver/recorder system engineering to receive data from DMSP onboard selected ships and shore sites.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	0	0	6,851
b. Travel	0	0	100
c. Software Development	0	0	1,575
Total	0	0	8,526

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development											
NRL	WX	N/A	CONT.	CONT.	0	0	0	0	8,526	CONT.	CONT.
Support and Management											
Test and Evaluation											

GOVERNMENT FURNISHED PROPERTY: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Support and Management										
Test and Evaluation										
Subtotal Product Development				0	0	0	0	8,526	CONT.	CONT.
Subtotal Support and Management										
Subtotal Test and Evaluation										
Total Project				0	0	0	0	8,526	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

(U) COST (Dollars in thousands)

PROJECT NUMBER & Title	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	To Complete	Total Program
X2342 METOC Data Assimilation and Modeling.	0	0	11,534	12,272	12,650	13,000	12,403	CONT.	CONT.

Note: Beginning in FY99 this project is the consolidation of X0513, X0523, X1596, R2017 and the Modeling and Assimilation portion of projects X2008 and R0120.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project develops atmospheric and oceanographic data assimilation techniques, forecast models, database management systems and associated software for use in both mainframe and tactical scale computers. Included are numerical oceanographic and atmospheric models for the Navy's Large Scale Computers at the Fleet Numerical Meteorology and Oceanography Center, Monterey, CA and the Naval Oceanographic Office, Stennis Space Center, MS. Other models under development in this project focus on ocean thermal structure and circulation, surf and tide prediction. This project also develops techniques to process and manage remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder. These techniques allow for the integration and tactical application of significant oceanographic and atmospheric data derived from satellite-borne sensors. Included are techniques and algorithms for the processing of sensor measurements, conversion of raw signal data to geophysical information, analysis schemes encompassing Artificial Intelligence and Expert Systems, and other satellite data applications and field validation of end products. This project also develops a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

From Project X0513:

- (U) ($395) Began Massively Parallel Processor (MPP) version of NOGAPS.
- (U) ($227) Continued development of advanced aerosol model.
- (U) ($535) Began development of shipboard version of tactical scale nested model.
- (U) ($422) Continued development of global coupled air-ocean-ice model for operational use.
- (U) ($50) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

From Project X0523:

- (U) ($673) Continued development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 3D variational techniques.
- (U) ($21) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

From Project X1596:

- (U) ($1,310) Completed Expert System for atmospheric fronts and cumulus cloud analysis. Continued development of additional expert systems for satellite oceanographic and atmospheric feature analyses.
- (U) ($1,293) Continued transition of ocean color sensor and scatterometer data operational capability. Continued development of new algorithms for SAR, Altimeters, Ocean Color sensors and scatterometers.
- (U) ($370) Continued development of advanced littoral zone analysis software.
- (U) ($165) Began airborne vs. satellite validation of SAR ocean feature analysis.
- (U) ($300) Continued fleet exercise participation for validation of algorithms.
- (U) ($109) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

From Project X2008: (Note: Balance of X2008 funding ($524) is identified in Project X2343.)

- (U) ($744) Completed development of the Arabian Sea model. Continued development of surf/tide models and coastal and enclosed basin tactical scale oceanographic models for the Sea of Okhotsk, Sea of Japan and other selected geographical locations such as the Persian Gulf and the Gulf of Oman in response to requirements.
- (U) ($604) Completed incorporation of expert system/artificial intelligence techniques in the 4D assimilation of tactical scale data.

- (U) ($40) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

2. (U) FY 1998 PLAN:

From Project X0513:

- (U) ($445) Continue development of MPP version of NOGAPS.
- (U) ($200) Continue development of advanced aerosol model.
- (U) ($475) Continue development of shipboard version of tactical scale nested model.
- (U) ($194) Begin development of next-generation tropical cyclone forecast system.
- (U) ($250) Begin development of Arabian Gulf/Arabian Sea ocean model.
- (U) ($30) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

From Project X0523:

- (U) ($701) Complete development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 3D variational techniques. Begin to apply 4D variational techniques.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

- (U) ($13) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

From Project X1596:

- (U) ($1,038) Complete development of expert systems for satellite oceanographic and atmospheric feature analysis.
- (U) ($307) Begin development of SSM/IS atmospheric algorithms.
- (U) ($1,266) Complete transition of Ocean Color sensor and scatterometer data operational capability. Complete development and begin transition of new algorithms for SAR and altimetry data. Continue development and transition of new algorithms for Ocean Color sensors and scatterometers.
- (U) ($175) Begin evaluation of aviation impact variables satellite product.
- (U) ($225) Complete airborne vs. satellite validation of SAR ocean feature analysis.
- (U) ($325) Continue fleet exercise participation for validation of algorithms.
- (U) ($64) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

From Project X2008: (Note: Balance of X2008 funding ($598) is identified in Project X2343.)

- (U) ($737) Complete development of surf/tide models. Continue development of coastal and enclosed basin tactical scale oceanographic models for selected geographical locations in response to emergent requirements.

- (U) ($310) Begin development of shipboard shallow water ocean circulation model.
- (U) ($190) Begin development of automated graphical applications for tactical data visualization.
- (U) ($25) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

3. (U) FY 1999 PLAN:

- (U) ($1,200) Continue modeling and simulation of atmosphere and ocean environmental effects on Navy systems.
- (U) ($750) Begin dem/val of techniques for coupled air/ocean data assimilation.
- (U) ($400) Participate in fleet exercises and demonstrations.
- (U) ($600) Deliver MPP version of NOGAPS for operational use.
- (U) ($250) Complete development of advanced aerosol model.
- (U) ($550) Deliver shipboard version of tactical scale nested model.
- (U) ($360) Continue development of next-generation tropical cyclone forecast model.
- (U) ($257) Continue development of Arabian Gulf/Arabian ocean model.
- (U) ($753) Continue development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 4D variational techniques.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

- (U) ($411) Complete development of SSM/IS atmospheric algorithms.
- (U) ($643) Complete transition of new algorithms for SAR and altimetry data.
- (U) ($250) Continue evaluation of aviation impact variables satellite product.
- (U) ($600) Begin development of automated objective processing in the littoral.
- (U) ($724) Begin development of techniques for bathymetry and surf zone and high resolution micro-topography algorithms.
- (U) ($350) Continue fleet exercise participation for validation of algorithms.
- (U) ($581) Continue development of coastal and enclosed basin tactical scale oceanographic models for selected geographical locations in response to emergent requirements.
- (U) ($325) Continue development of shipboard shallow water ocean circulation model.
- (U) ($225) Continue development of automated graphical applications for tactical data visualization.
- (U) ($263) Begin development of next generation tide model.
- (U) ($375) Begin development of next generation surf model.
- (U) ($685) Continue the development of mid-frequency bottom loss/bottom scatter models and databases for shallow water environments.
- (U) ($748) Continue the verification and validation of products and data assimilation techniques developed for fleet applications. Continue fleet support through participation in fleet exercises.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

- (U) ($234) Develop and update overarching C4ISR mission requirements and conduct associated C4ISR analyses and studies.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	-
(U) Adjustments from FY 1998 PRESBUDG:	0	0	+11,534
(U) FY 1999 President's Budget Submit:	0	0	11,534

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$11,829) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture. Project X2342 supports the METOC Data Assimilation portion of $BMDA^3$ and merges the demonstration and validation (dem/val) of modeling and data assimilation techniques previously conducted under Projects X0513, X0523, X1596, X2008, R0120 and R2017. The funding profile also reflects the reprogramming of a portion of FY 1999 and out-year RDT&E funds to OPN. (-$205) Commercial purchases inflation adjustment. (-$90) Minor Navy adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1996	FY 1997	FY 1998	FY 1999
a. Software Development	0	0	0	11,409
b. Travel	0	0	0	125
Total	0	0	0	11,534

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development											
NRL	WX	N/A	CONT.	CONT.	0	0	0	0	11,534	CONT.	CONT.
Support and Management											
Test and Evaluation											

GOVERNMENT FURNISHED PROPERTY: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2342
PROJECT TITLE: METOC Data Assimilation and Modeling

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Support and Management										
Test and Evaluation										
Subtotal Product Development				0	0	0	0	11,534	CONT.	CONT.
Subtotal Support and Management										
Subtotal Test and Evaluation										
Total Project				0	0	0	0	11,534	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

(U) COST (Dollars in thousands)

PROJECT NUMBER & Title	FY 1996 Actual	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	To Complete	Total Program
X2343 Tactical METOC Applications	0	0	0	7,299	7,740	7,835	7,974	8,443	CONT.	CONT.

Note: Beginning in FY99 this project is the consolidation of the METOC Decision Aids portion of X2008 and project V0823.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The major thrust of the METOC Applications project is to provide software capabilities that allow systems performance assessments within all operating environments. This is accomplished through the development of METOC Decision Aids (MDA) which characterize the electromagnetic (EM), electro-optical (EO) and acoustical properties of the battlespace. Tactical Decision Aids (TDA), also developed under this project, then permit the optimization of weapons and sensors operating within this battlespace by improving their detection, tracking and lock-on performance. These MDAs and TDAs utilize data obtained by sensors developed in Project X0118 and assimilated by software produced by Project X0523, described above. A current emphasis area of the project is the development of new combat system and mine warfare performance prediction and MDA/TDA capabilities for highly complex littoral environments to support regional conflict scenarios. It addresses multi-warfare areas, particularly Mine Warfare, shallow water ASW and missile and air defense/strike capabilities.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

From Project X2008: (Note: Balance of X2008 funding ($1,406) is identified in Project X2342.)

- (U) ($270) Completed incorporation of Expert Systems' applications in the EO and VLSTrack area.
- (U) ($235) Began development of surface-to-air and surface-to-surface EO model.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

- (U) ($19) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

2. (U) FY 1998 PLAN:

From Project X2008: (Note: Balance of X2008 funding ($1,262) is identified in Project X2342.)

- (U) ($588) Continue development of surface to air and surface to surface EO model. Begin development of advanced refractive effects model.

- (U) ($10) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

3. (U) FY 1999 PLAN:

- (U) ($815) Complete development of surface to air and surface to surface EO model. Continue development of advanced refractive effects model.

- (U) ($2,719) Incorporate prototype Mine Warfare tactical decision aids in baseline surface ship, air and submarine performance prediction systems. Maximize littoral operation support by ensuring interoperability of system via existing Fleet communication mechanisms.

- (U) ($1,513) Complete development of initial sensor prediction capabilities for acoustic and non-acoustic sensors scheduled to be installed on Fleet combatants. Apply advanced COTS visualization techniques to facilitate operator understanding of complex littoral environmental effects on sensor performance. Integrate into appropriate platform ADM's. Perform at-sea evaluation of new capabilities.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

- (U) ($1,200) Integrate platform vulnerability assessment TDA into surface ship, submarine and air ADM's to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluate functionality during at-sea tests.

- (U) ($900) Incorporate additional environmental sensor interface capabilities to allow for real time monitoring and measurement of key environmental parameters in support of the Oceanographer of the Navy's Battlespace METOC Data Acquisition, Assimilation and Applications strategy. Implement in the platform ADM's and evaluate at-sea.

- (U) ($152) Develop and update overarching C4ISR mission requirements.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	0
(U) Adjustments from FY 1998 PRESBUDG:	0	0	+7,299
(U) FY 1999 President's Budget Submit:	0	0	7,299

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$7,448) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture. Project X2343 supports the METOC Data Applications portion of $BMDA^3$ and merges the demonstration and validation (dem/val) of applications techniques previously conducted under Projects X2008 and V0823. The funding profile also reflects the reprogramming of a portion of FY 1999 and out-year RDT&E funds to OPN. (-$129) Commercial purchases inflation adjustment. (-$20) Minor Navy adjustments.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: PE 0604218N (Air/Ocean Equipment Engineering). TESS/NITES will incorporate METOC data applications.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1996	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	0	0	0	1,358
b. Travel	0	0	0	75
c. Software Development	0	0	0	5,866
Total	0	0	0	7,299

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development											
NRL	WX	N/A	CONT.	CONT.	0	0	0	0	7,299	CONT.	CONT.
Support and Management											
Test and Evaluation											

GOVERNMENT FURNISHED PROPERTY: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Support and Management										
Test and Evaluation										
Subtotal Product Development				0	0	0	0	7,299	CONT.	CONT.
Subtotal Support and Management										
Subtotal Test and Evaluation										
Total Project				0	0	0	0	7,299	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2344
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Precise Timing and Astrometry

(U) COST (Dollars in thousands)

PROJECT NUMBER & Title	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	To Complete	Total Program
X2344 Precise Timing and Astrometry (Beginning in FY99, project X0948 becomes project X2344 in its entirety).	0	0	1,465	1,466	1,497	1,522	1,551	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project upgrades the accuracy of the U.S. Naval Observatory's Master Clock System (MCS) for DOD surface, subsurface, air and shore communications, navigation and time dissemination systems. It also develops near-real-time Earth orientation predictions through use of tape recording satellite or fiber optic transmission of Very Long Baseline Interferometer (VLBI) data for DOD navigation and positioning systems. It also develops advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of the positions of both faint and bright stars, satellite tracking, and space debris studies.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

From Project X0948:

- (U) ($100) Began evaluation of time transfer capabilities via fiber optic network.
- (U) ($150) Began demonstration of capabilities of the Global Positioning System (GPS) for UTI/Polar Motion determination.
- (U) ($565) Continued demonstration of prototype optical interferometer for astrometry.
- (U) ($300) Continued demonstration of large scale CCD arrays for electronic astrography.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2344
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Precise Timing and Astrometry

- (U) ($35) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Developed and updated Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C4ISR analyses and studies.

1. (U) FY 1998 PLAN:

From Project X0948:

- (U) ($126) Continue evaluation of time transfer capabilities via fiber optic network.
- (U) ($150) Complete demonstration of GPS for UTI/Polar Motion.
- (U) ($335) Continue demonstration of large scale CCD array for electronic astrography.
- (U) ($400) Complete prototype optical interferometer astrometry demonstration.
- (U) ($170) Begin 2 micron measurement capability demonstration for the interferometer.
- (U) ($23) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C4ISR analyses and studies.

3. (U) FY 1999 PLAN:

- (U) ($150) Complete evaluation of time transfer capabilities via fiber optic network.
- (U) ($300) Initiate evaluation of cesium fountain clock.
- (U) ($250) Initiate VLBI/GPS demonstration for earth orientation parameters.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2344
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Precise Timing and Astrometry

- (U) ($249) Complete 2 micron measurement capability demonstration over large angles.
- (U) ($240) Initiate InSb (Indium-Antimony) detector survey.
- (U) ($252) Complete demonstration of large scale CCD arrays.
- (U) ($24) Develop and update overarching C4ISR mission requirements.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	-
(U) Adjustments from FY 1998 PRESBUDG:	0	0	+1,465
(U) FY 1999 President's Budget Submit:	0	0	1,465

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$1,491) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager. Other than the number modification from X0948 to X2344, this project remains unchanged. (-$26) Commercial purchases inflation adjustment.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2344
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Precise Timing and Astrometry

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: PE 0604218N (Air/Ocean Equipment Engineering). Provides for transition to engineering development.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1142 T-45 Improvements	129	0	0	0	0	0	0	0	879,853
H1150 Joint Primary Aircraft Trainer	1,834	0	0	0	0	0	0	0	10,229
TOTAL	1,963	0	0	0	0	0	0	0	890,082

Note: The JPATS program transfers to Budget Activity 5 in FY98 and out.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The T45TS mission is to provide undergraduate jet pilot training for prospective carrier-based Navy and Marine Corps pilots, and selected international students, to meet aircrew requirements through 1990's and beyond. T45TS is a total training system concept which includes aircraft, simulators, academics and contractor logistics support. RDT&E efforts include evaluation of the Cockpit-21 digital display upgrade and continued flight envelope expansion.

(U) The Joint Primary Aircraft Training System (JPATS) is an ACAT 1C, non-developmental item (NDI), commercial off-the-shelf (COTS) pilot program initiated to provide a high degree of commonality between the flight training programs of the United States Navy (USN) and United States Air Force (USAF). The JPATS is to replace the T-34 and T-37 for the USN and USAF, respectively. JPATS shall employ a common primary training system consisting of aircraft, aircrew training devices (simulators, computer-aided instruction terminals, etc.), syllabus, courseware, and logistics support. The JPATS mission will be to train entry-level USN/USAF student pilots and navigators. The U.S. Air Force is the executive service. This element funds Navy participation in the joint program and Navy unique requirements.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1150 Joint Primary Aircraft Trainer System	1,834	0	0	0	0	0	0	0	10,229

Note: The JPATS program transfers to Budget Activity 5 in FY98 and out.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Joint Primary Aircraft Training System (JPATS) is an ACAT 1C, non-developmental item (NDI), commercial off-the-shelf (COTS) pilot program initiated to provide a high degree of commonality between the flight training programs of the United States Navy (USN) and United States Air Force (USAF). The JPATS is to replace the T-34 and T-37 for the USN and USAF, respectively. JPATS shall employ a common primary training system, consisting of aircraft, aircrew training devices (simulators, computer-aided instruction terminals, etc.), syllabus, courseware, and logistics support. The JPATS mission will be to train entry-level USN/USAF student pilots and navigators. The U.S. Air Force is the executive service. This element funds Navy participation in the joint program and Navy unique requirements.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603208N PROJECT NUMBER: H1150
PROGRAM ELEMENT TITLE: Training System Aircraft PROJECT TITLE: Joint Primary Aircraft Trainer

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($265) Provide manufacturing and quality assurance analysis support.
- (U) ($316) Complete joint qualification test of aircraft and maintain USN test pilot proficiency.
- (U) ($639) Provide engineering and logistics support for Ground Based Training System (GBTS) development, review, test, data analysis, and system deployment.
- (U) ($340) Provide specific engineering and logistics support in structures, crew and escape systems.
- (U) ($139) Complete Navy specific logistics analysis for contractor logistics support.
- (U) ($135) Complete program technical reviews analysis in support of USN requirements.

2. (U) FY 1998 PLAN: NOT APPLICABLE

3. (U) FY 1999 PLAN: NOT APPLICABLE

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603208N PROJECT NUMBER: H1150
PROGRAM ELEMENT TITLE: Training System Aircraft PROJECT TITLE: Joint Primary Aircraft Trainer

B. (U) PROGRAM CHANGE SUMMARY

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,952	0	0
(U) Appropriated Value:			
(U) Adjustments from Pres Budget:	-118		
(U) FY 1999 President's Budget:	1,834	0	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY97 decrease of $118 thousand reflects -$21 thousand for Small Business Innovative Research (SBIR), -$97 for various Congressional adjustments.

(U) Schedule: No change.

(U) Technical: Not Applicable

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
NOT APPLICABLE								

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603208N PROJECT NUMBER: H1150
PROGRAM ELEMENT TITLE: Training System Aircraft PROJECT TITLE: Joint Primary Aircraft Trainer

(U) RELATED RDT&E:

(U) PE 0603208N (Joint Primary Aircraft Trainer-Budget Activity 5)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999	TO COMPLETE	
Program Milestones			N/A	N/A	N/A
Engineering Milestones	1Q A/C CDR				
T&E Milestones					
Contract Milestones	3Q LOT 4 AWD*				

* US Air Force manufacturing development contract.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0097	Aircrew Impact Injury Prevention								
	1	0	0	0	0	0	0	0	0
W0584 & W2385	Aircrew Protective Clothing & Devices								
	9,571	11,981	4,077	2,881	2,944	2,996	3,067	CONT.	CONT.
W0591	Aircraft Survivability, Vulnerability & Safety								
	887	2,118	1,509	1,909	1,953	1,987	2,036	CONT.	CONT.
W0592	Aircraft & Ordnance Safety								
	817	1,252	1,732	1,759	1,802	1,838	1,885	CONT.	CONT.
W1819	Carrier Aircraft Fire Suppression System								
	961	1,096	846	987	1,014	1,037	1,067	CONT.	CONT.
TOTAL	12,237	16,447	8,164	7,536	7,713	7,858	8,055	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Aviation Survivability addresses the issues of aircrew and platform survivability, focusing on enhancing overall opportunity for aircrew and platform protection and enhanced performance. The capabilities addressed under this program element counter emerging threats of next generation operational weapons systems and enhance combat effectiveness in future operational mission scenarios.

(U) Two of the projects address aircrew requirements. Aircrew Impact Injury Prevention develops human dynamic and injury response models to impact acceleration and determines the correlation of these dynamic responses with physiological effects and injuries. Aircrew Protective Clothing and Devices develops, demonstrates and validates technology options that enhance aircrew capability to perform assigned missions. In addition, this project ensures aircrew protection against natural and induced environmental or physiological hazards encountered during routine, combat and emergency flight operations as well as during escape, survival and rescue, following loss of aircraft.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) The three remaining projects focus on platform survivability, addressing the reductions in aircraft susceptibility to enemy and non-combat threats, as well as aircraft vulnerabilities to conventional, nuclear, chemical, biological, radiological and directed energy weapons. The Aircraft Survivability, Vulnerability and Safety project expands the survivability technology base and develops prototype hardware which is required to improve the survivability of Naval aircraft. Aircraft and Ordnance Safety transitions generic insensitive munitions technology to Navy and Marine Corps air weapons, ensuring that they are insensitive to fast cook-off, slow cook-off, bullet and fragment impact and sympathetic detonation. Carrier Aircraft Fire Suppression Systems develop improved firefighting systems and fire protective measures for aircraft carriers.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION and VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0584 & W2385 Aircrew Protective Clothing and Devices	9,571	11,981	4,077	2,881	2,944	2,996	3,067	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project develops, demonstrates, and validates technology options for functionally integrated aircrew emergency and life support systems designed to enhance mission effectiveness, in-flight protection and survivability. The project covers fixed and rotary wing life support and advanced helmet vision systems, and includes escape systems technology, crew centered cockpit design, and cockpit integration programs. It responds to a number of operational requirements documents, including OR# 210-05-88 for Chemical and Biological (CB) Protection, OR# 099-05-087 for Laser Eye Protection, and the joint Air Force/Navy (CAF 208-93) for an Aerospace Control Helmet Mounted Cueing System. In 1996, the various sub-projects were restructured into a combined Advanced Technology Escape System (ATES) and Advanced Integrated Life Support System (AILSS) program. This project is validated by two Non-Acquisition Program Development Documents(NAPPDs), one for an Advanced Technology Crew Station (ATCS), and the other for AILSS.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($2,227) Continued Navy's task for joint development of Helicopter AILSS (HAILSS)/AILSS and Air Warrior (AW) system.
- (U) ($926) Continued Advanced Helmet Vision System (AHVS) day targeting Development Testing (DT)-1 evaluation of CRUSADER AHVS.
- (U) ($109) Integrated Joint Affordable Cockpit Integration Program (JACIP) designs in ATCS mockups.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT NUMBER: W0584 PROJECT TITLE: Aircrew Protective Clothing and Devices

1. (U) FY 1997 ACCOMPLISHMENTS (CONT):

- (U) ($950) Completed assessment of K36/AES controllable propulsion systems for ejection seats.
- (U) ($1,537) Continued development of the Fourth Generation Escape System .
- (U) ($1,821) Continued workload and mission performance evaluation of contractor ATCS designs.
- (U) ($2,001) Developed and demonstrated 3D visualization architectures.

2. (U) FY 1998 PLAN:

- (U) ($2,216) Initiate Advance Technology Escape System using controllable propulsion (Fourth Generation Escape System).
- (U) ($ 485) Initiate demonstration and validation of Russian K-36 ejection and automatic escape technologies.
- (U) ($ 450) Flight test of HAILSS/AILSS/AW system.
- (U) ($5,918) Complete integration and flight test of the Navy's day/night all-weather display helmet (CRUSADER). Begin camera upgrade and research directed towards risk mitigation (i.e., head/neck moment of inertia, etc.).
- (U) ($2,912) Develop/extend baseline 3D visualization architecture to smaller groups, begin interactive visualization networking.

3. (U) FY 1999 PLAN:

- (U) ($2,104) Continue ATES using controllable propulsion (Fourth Generation Escape System).
- (U) ($481) Begin Smart Adaptive Mission Support System (SAMSS) (follow-on to HAILSS/AILSS).

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0584
PROJECT TITLE: Aircrew Protective Clothing & Devices

3. (U) FY 1999 PLAN: (CONT)

- (U) ($866) Continue development of frequency agile laser eye protection.
- (U) ($626) Begin AHVS day/night targeting system. Initiate upgrade to CRUSADER day targeting system.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	11,059	3,256	4,301
(U) Appropriated Value			
(U) Adjustments from PRESBUDG:	-1,488	+8,725	-224
(U) FY 1999 PRESBUDG Budget:	9,571	11,981	4,077

(U) Funding: FY97 decrease reflects -$241 thousand for SBIR assessment, -$1,232 thousand for below threshold reprogrammings, and -$15 thousand for minor economic adjustments. The FY-98 net increase of $8,725 thousand reflects Congressional add of $9,100 thousand. This increase was partially offset by a decrease of -$375 thousand for Congressional undistributed reductions. FY99 reflects a decrease of -$213 thousand for program adjustments; and -$12 thousand for Navy Working Capital Fund (NWCF) rate adjustments.

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0584
PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT TITLE: Aircrew Protective Clothing and Devices

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not Applicable

(U) RELATED RDT&E:
- (U) PE 0602201F (Aerospace Flight Dynamics)
- (U) PE 0602233N (Mission Support Equipment)
- (U) PE 0604264N (Aircrew Systems Development)
- (U) PE 0604706F (Life Support Systems)
- (U) PE 0603231F (Crew Systems and Personal Protection Technology)

D. (U) SCHEDULE PROFILE:

PROJECT MILESTONES	FY 1997	FY 1998	FY 1999	TO COMPLETE
	4TH GEN ESCAPE (ATES): CONTINUE 1Q	4TH GEN ESCAPE (ATES) & CONTROLLABLE PROPULSION INTEGRATION: INITIATE 1Q	4TH GEN ESCAPE (ATES) & CONTROLLABLE PROPULSION INTEGRATION: COMPLETE 1Q02	4TH GEN ESCAPE (ATES) TRANS 2002
	K36/AES COMPLETE 4Q			
	CONTROLLABLE PROPULSION: INITIATE 1Q COMPLETE 4Q	CRUSADER HIGH RESOLUTION CAMERA AND RISK MITIGATION INITIATE 2Q	AILSS FREQUENCY AGILE LASER EYE PROTECTION: INITIATE 1Q	
	VISUAL ARCHITECTURE INITIATE 2Q97-2Q98	VISUAL ARCHITECTURE INITIATE NETWORKING 2Q98-2Q99	CRUSADER DAY/NIGHT SYSTEM: INITIATE 1Q	

Exhibit R-2

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0584
PROJECT TITLE: Aircrew Protective Clothing & Devices

D. (U) SCHEDULE PROFILE: (CONTINUED)

	FY 1997	FY 1998	FY 1999	TO COMPLETE
ENGINEERING MILESTONES	HAILSS/AILSS/AW SYSTEM DESIGN: COMPLETE 1Q98 ATCS/WORKLOAD: ASSESSMENT:COMPLETE 4Q98 ATCS/JACIP INEGRATION: COMPLETE 4Q	K36/AES: DEM VAL BEGIN 1Q98-1Q99		
T&E MILESTONES	CRUSADER DAY SYSTEM DT-1: INITIATE 4Q	CRUSADER DAY ONLY SYSTEM DT-1: COMPLETE 4Q HAILSS/AILSS/AW FLIGHT TEST: INITIATE 1Q COMPLETE 4Q		
CONTRACT MILESTONES				

Exhibit R-2

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0584
PROJECT TITLE: Aircrew Protective Clothing & Devices

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. System Engineering	873	775	861
b. Primary Hardware Development	1,402	2,988	1,246
c. Developmental Test & Evaluation	795	1,943	1,420
d. Contractor Engineering	4,851	2,485	200
e. Government Engineering	1,600	3,740	300
f. Travel	50	50	50
Total	9,571	11,981	4,077

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0584
PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT TITLE: Aircrew Protective Clothing & Devices

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Actual	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
McDonnell Douglas St. Louis, MO		08/96			1,325	0	0	0	0	1,325
Boeing Seattle, WA		10/97	TBD	TBD	0	1,660	0	0	0	1,660
Miscellaneous		10/98	TBD	TBD	3,568	5,145	5,406	3,267	CONT	CONT
Various Field Activities (Aggregate Total)					3,668	1,730	5,522	700	CONT	CONT
Support and Management					102	110	110	110	CONT	CONT
Test and Evaluation:					0	926	943	0	CONT	CONT

GOVERNMENT FURNISHED PROPERTY: N/A

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0584
PROJECT TITLE: Aircrew Protective Clothing & Devices

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	8,561	8,535	10,928	3,967	CONT	CONT
Subtotal Support and Management	102	110	110	110	CONT	CONT
Subtotal Test and Evaluation	0	926	943	0	0	0
Total	8,663	9,571	11,981	4,077	CONT	CONT

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO ESTIMATE	TOTAL COMPLETE	PROGRAM
WO591 A/C Survivability Vulnerability & Safety	887	2,118	1,509	1,909	1,953	1,987	2,036	CONT.	CONT.	

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Aircraft Survivability, Vulnerability and Safety. This project develops prototype hardware to improve the survivability of Navy and Marine Corps aircraft. This project addresses the likelihood of an aircraft being hit (susceptibility) and the probability of a kill if the aircraft is hit (vulnerability). Types of programs funded under this project include signature reduction efforts, subsystem and component hardening and development of fire and explosion suppression techniques for fuel systems. Beginning in fiscal year 1996 Chemical and Biological efforts were consolidated under OSD program element 0603384D (Chemical and Biological Defense (Advanced Development)).

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($334) Initiated the development of a rotary wing Infrared (IR) survivability signature suppression program.
- (U) ($224) Continued the development of RDT&E master plan update.
- (U) ($329) Continued the development of Aircraft Survivability Database.

2. (U) FY 1998 PLAN:
- (U) ($1,777) Continue the development of a rotary wing IR signature suppression program.
- (U) ($131) Continue the development of RDT&E master plan update.

Exhibit R-2

- (U) ($70) Initiate data population of the Aircraft Survivability Database.
- (U) ($140) Continue the development of Survivability Analysis Methodology.

4. (U) FY 1999 PLAN:

- (U) ($1,124) Continue the development of a rotary wing IR survivability signature suppression program.
- (U) ($80) Continue the development of RDT&E master plan update.
- (U) ($105) Continue data population of Aircraft Survivability Database.
- (U) ($200) Continue the development of Survivability Analysis Methodology.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,727	2,183	2,861
(U) Appropriated Value			
(U) Adjustments from PRESBUDG:	-840	-65	-1,352
(U) FY 1999 PRESBUDG:	887	2,118	1,509

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT NUMBER: W0591 PROJECT TITLE: Aircraft Survivability Vulnerability & Safety

(U) Funding: The FY 1997 decrease reflects -$22 thousand for the Small Business Innovation Research assessment, -$2 thousand for revised economic adjustments, and -$816 thousand reprogramming for higher DON priorities. The FY 1998 decrease reflects Congressional undistributed reductions. The FY 1999 decrease of -$1,352 thousand consists of -$943 thousand for program adjustments; -$183 thousand for low expenditure rates; -$219 thousand for contract restructuring (IR Suppression); and - $7 thousand for miscellaneous rate and economic adjustments.

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

C. (U) OTHER PROGRAM FUNDING SUMMARY:

(U) RELATED RDT&E:

(U) PE: 0605132D (Joint Technical Coordinating Group on Aircraft Survivability)
0603384D (Chemical/Biological Defense (Advanced Development))

D. (U) SCHEDULE PROFILE: Not Applicable

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0591
PROJECT TITLE: Aircraft Survivability Vulnerability & Safety

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	0	1,370	1,035
b. Systems Engineering	510	528	154
c. Hardware Test	0	0	0
d. Software Development	327	205	305
e. Travel	50	15	15
Total	887	2,118	1,509

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0591
PROJECT TITLE: Aircraft Survivability Vulnerability & Safety

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Actual	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Bell Helicopter Fort Worth, TX	CPFF	6/95	1,307	1,307	1,307	0	0	0	0	1,307
Sikorsky Corp. Stratford, CT	C/CPIF	2/98					639	939	CONT.	CONT.
Various field activities	(Aggregate Total)				3,202	837	1,064	555	CONT.	CONT.
Support and Management										
Travel					100	50	15	15	CONT.	CONT.
Test and Evaluation					370	0	400	0	CONT.	CONT.

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0591 PROJECT TITLE: Aircraft Survivability Vulnerability & Safety

GOVERNMENT FURNISHED PROPERTY Not Applicable

	Total FY 1996 & Prior	FY 1997 Actual	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	4,509	837	1,703	1,494	CONT.	CONT.
Subtotal Support and Management	100	50	15	15	CONT.	CONT.
Subtotal Test and Evaluation	370	0	400	0	CONT.	CONT.
Total Project	4,979	887	2,118	1,509	CONT.	CONT.

Exhibit R-3

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0592	817	1,252	1,732	1,759	1,802	1,838	1,885	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project transitions Insensitive Munitions (IM) technology from IM Advanced Development (generic technology) to Air Weapon Systems to comply with Chief of Naval Operations direction that all munitions carried aboard Navy ships be insensitive to fast cook-off (FCO), slow cook-off (SCO), bullet and fragment impact (BI and FI), and sympathetic detonation (SD).

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($120) Completed SCO studies of Air-to-Air Missile (AMRAAM) rocket motor.
- (U) ($387) Demonstrated IM propellant and composite rocket motor case technologies for High Performance Air-to-Air Missile (HPAAM).
- (U) ($310) Investigated IM technologies for the 2.75-inch rocket motor for HYDRA XXI and demonstrated the lowest risk technology.

3. (U) FY 1998 PLAN:

- (U) ($426) Conduct demonstration of rocket motor IM technology for HYDRA.
- (U) ($418) Initiate evaluation of IM technology for Joint Standoff Weapon (JSOW) and Advanced Anti-Radiation Missile (ARM).
- (U) ($408) Conduct demonstration of IM propellant and composite motor case technology for HPAAM.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0592
PROJECT TITLE: A/C Ordnance Safety

4. (U) FY 1999 PLAN:

- (U) ($504) Continue demonstration of rocket motor IM technology for HYDRA.
- (U) ($722) Continue evaluation of IM technology for JSOW and Advanced ARM.
- (U) ($506) Continue demonstration of IM propellant and composite motor case technology for HPAAM.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	819	1,290	1,718
(U) Appropriated Value			
(U) Adjustments from PRESBUDG:	-2	-38	+14
(U) FY 1999 President's Budget:	817	1,252	1,732

(U) FY 1997 reflects a decrease of -$2 thousand for revised economic adjustments. FY 1998 reflects a decrease of -$38 thousand for undistributed Congressional reductions. FY 1999 reflects an increase of +$76 thousand for NWCF rate adjustments, and decreases of -$60 thousand for minor pricing adjustments and -$2 thousand for program adjustments.

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not Applicable

D. (U) SCHEDULE PROFILE: Not Applicable

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1819 Carrier Aircraft Fire Suppression System	961	1,096	846	987	1,014	1,037	1,067	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project develops improved firefighting systems and fire protective measures for aircraft related fires on aircraft carriers, including assessment of fire properties, the development of the P-25 shipboard firefighting vehicle, improvements to firefighting agents and delivery systems, and firefighter training improvements.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($335) Continued development of ordnance cooling requirements.
- (U) ($396) Continued development of environmentally safe test and training simulator.
- (U) ($230) Continued fire testing of agents, equipment, and aircraft and ordnance materials.

2. (U) FY 1998 PLAN:

- (U) ($302) Continue development of ordnance cooling requirements: establish updated ordnance inventory, incorporate ordnance evaluation provisions in fire testing, develop instrumentation requirements, and evaluate relative effect of varying cooling techniques.

Exhibit R-2

- (U) ($390) Finalize overhaul of environmentally safe fire testing facility: finish test site refurbishment, maintain compliant permit status, incorporate water and fuel delivery systems and conduct operational tests, optimize instrumentation provisions and ensure functionality, design and construct simulated engine test article, conduct baseline fire testing to qualify facility.

- (U) ($228) Continue fire testing of agents, equipment, aircraft and ordnance materials: evaluate performance of compressed nitrogen foam system, conduct OPEVAL of modified twin agent unit, conduct full scale aircraft engine fire testing (damage assessment, test standard, operational methodologies, handheld performance, flight line extinguishers).

- (U) ($176) Initiate development of flight deck imaging system: evaluate need for enhancement, and formulate preliminary system requirements.

3. (U) FY 1999 PLAN:

- (U) ($89) Complete evaluation of ordnance cooling requirements: remain current on ordnance inventory, conduct full scale fire testing of dummy ordnance (assess defined threat to individual components, and evaluate impact of various fire fighting techniques and equipment).

- (U) ($412) Upgrade capabilities of environmentally safe fire test facility: maintain compliant permit status, and design and construct test article provisions for conducting wheel/brake, electrical, 2D/3D, spill, and mass conflagration evaluations.

- (U) ($100) Continue fire testing of agents, equipment, aircraft and ordnance materials: finalize engine fire testing, commence full scale wheel/brake and electrical testing (assess collateral damage, conduct comparative systems testing, develop test standards, and optimize operational methodologies).

- (U) ($245) Continue development of flight deck imaging system: develop system designs for comparative testing, secure test articles, and develop pass/fail criteria.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W1819
PROJECT TITLE: Carrier Aircraft Fire Suppression System

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	962	1,130	1,443
(U) Appropriated Value			
(U) Adjustments from PRESBUDG:	-1	-34	-597
(U) FY 1999 President's Budget:	961	1,096	846

(U) Funding: FY 1997 decrease reflects -$1K for revised economic adjustments. FY 1998 decrease of -$34K results from Congressional undistributed reductions. FY 1999 decrease of $597K consists of program adjustments (-$478), Navy Working Capital Fund (NWCF) adjustments (-$18K), and low expenditure rates (-$101K).

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W1819
PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT TITLE: Carrier Aircraft Fire Suppression System

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) Not Applicable

(U) RELATED RDT&E:

(U) PE: 0603514N (Ship Combat Survivability)

	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	Video Trainer Mods for P25 Complete	Complete Video Trainer Mods 4Q	Complete Fab of Fire Test Simulator 4Q	
Engineering Milestones				
T&E Milestone				

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

(U) Cost (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
E0534 Tactical Reconnaissance System									
	27,497	10,262	1,479	0	0	0	0	0	220,857

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Tactical Airborne Reconnaissance Program develops systems to provide timely and accurate imagery intelligence for the U.S. Marine Corps. The F/A-18D tactical Reconnaissance System replaces the RF-4B which was phased out in 1990. Electro-Optical, Infrared and Synthetic Aperture Radar (SAR) sensors will provide high resolution imagery in all weather conditions,day or night at low, medium or high altitude over flight or stand off ranges. Imagery data is digitally recorded and can be data linked in near real-time and/or returned to base for playback, analysis, processing, and storage.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance PROJECT NUMBER: E0534 PROJECT TITLE: Tactical Reconnaissance System

A. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($17,811) Continued development of F/A-18 ATARS Tactical Reconnaissance System. Conducted software development testing for incorporation into Operational Flight Plan (OFP) 13C. Commenced Tactical Reconnaissance (TAC RECCE) system unique integration efforts into Radar Upgrade (RUG) phase II. Conducted minipod flight test.

- (U) ($4,887) Identify, assess, and demonstrate electronic imaging technologies for future Navy tactical reconnaissance. The study will evaluate cameras, digital recorders, data links, and management systems with actual test flights. The end result will be an assessment of optimal configurations performance and cost tradeoffs.

- (U) ($3,987) Continued testing of ATARS and RUG II Radar with data link. Continued in-house technical support.

- (U) ($812) Continued in-house engineering support.

2. (U) FY 1998 PLAN:

- (U) ($6,306) Complete development and integration of F/A-18 Tactical Reconnaissance System.

- (U) ($3,230) Complete ATARS and RUG II development testing with data link and Operational Flight Program (OFP) 13C. Initiate system operational evaluation. Continue in-house technical support.

- (U) ($726) Continue in-house engineering support.

3. (U) FY 1999 PLAN:

- (U) ($1,232) Complete system Operational Evaluation. Conduct program review for full production decision. Award full rate production contract. Achieve Initial Operational Capability with limited production systems. Continue in-house technical support.

  (U) ($247) Continue in-house engineering support.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance
PROJECT NUMBER: E0534
PROJECT TITLE: Tactical Reconnaissance System

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget	23,082	10,607	1,458
(U) Appropriated Value		10,607	
(U) Adjustments from President's Budget:	+4,415	-345	+21
(U) FY 1999 President's Budget Submit:	27,497	10,262	1,479

Funding: The net increase of +$4,415 thousand in FY 1997 consists of a +$4,887 thousand internal reprogramming action for TARPS C/D that was Congressionally added in APN,-$440 thousand reduction for Small Business Innovation Research (SBIR), -$32 thousand for minor pricing adjustments. The decrease of -$345 thousand in FY 1998 consists of -$23 thousand for Economic Adjustments and -$322 thousand for undistributed Congressional reductions. The net increase of +$21 thousand in FY 1999 consists of minor pricing and inflation adjustments.

(U) Schedule: LRIP II contract award was delayed from 1Q/98 to 2Q/98 due to a later than expected Program Review.

(U) Technical: Not Applicable.

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603261N**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance
PROJECT NUMBER: E0534
PROJECT TITLE: Tactical Reconnaissance System

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

(U) PROCUREMENT: Included in the F/A-18 E/F funding.

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT:									
F/A-18									
(U) APN-5 C/D	60,965	58,900	42,134	58,208	25,180	0	0	0	245,387

(U) RELATED RDT&E:

(U) PE 0204136N (F/A-18 Squadrons (Project E2065 F/A-18 Radar Upgrade Phase II)): Adds all weather reconnaissance capability to multi-mission aircraft; adds SAR imagery mode provisions to radar upgrade.

(U) PE 0204136N (F/A-18 Squadrons (Project E2350 F/A-18E/F TAC RECCE)): Develops a tactical reconnaissance system for the F/A-18E/F.

(U) PE 0206625M (Marine Corps Intelligence/Electronic Warfare System): Receives EO/IR/SAR imagery.

(U) SBIR: Common Aperture Multi-Spectral Sensor and Night IR and Day EO in one sensor.

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: E0534
PROJECT TITLE: Tactical Reconnaissance System

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999	TO COMPLETE
Program Milestones	1Q/PROGRAM REVIEW FOR LRIP I	1Q/PROGRAM REVIEW FOR LRIP II	2Q/FULL RATE PRODUCTION DECISION	
Engineering Milestones	3Q/MINI-POD DELIVERY	3Q/COMPLETE SOFTWARE ENHANCEMENTS		
T&E Milestones	4Q97-1Q98/MINI-POD DT	4Q/PRODUCTION VERIFICATION FLIGHT TEST	1Q-2Q/OPEVAL	
Contract Milestones	2Q/LRIP I CONTRACT AWARD	2Q/LRIP II CONTRACT AWARD	3Q/FRP CONTRACT AWARD	

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance
PROJECT NUMBER: E0534
PROJECT TITLE: Tactical Reconnaissance System

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Contract	19,300	5,896	0
b. Support Contract	276	284	238
c. In-House Support	5,839	1,947	421
d. Test and Evaluation	2,082	2,135	820
Total	27,497	10,262	1,479

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance PROJECT NUMBER: E0534 PROJECT TITLE: Tactical Reconnaissance System

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Loral Fairchild Syosset, NY	S-CPFF	Dec 92	20,579	20,579	20,579	0	0	0	0	20,579
Boeing (MDA) St. Louis, MO	S-CPFF	Nov 95	45,386	45,386	23,990	15,500	5,896	0	0	45,386
Boeing (MDA) St. Louis, MO	Var	Var	26,676	26,676	26,676	0	0	0	0	26,676
Naval Research Labs Washington, DC	WX	Oct 97	4,887	4,887	0	4,887	0	0	0	4,887
Misc Field Activities	Var	Var	70,551	70,551	70,551	0	0	0	0	70,551
Support and Management										
Rail	T&M	Oct 94	TBD	2,043	1,245	276	284	238	0	2,043
Field Activities	Var	Oct 98	27,348	27,348	26,393	457	468	30	0	27,348
NAWC China Lake	Var	Oct 98	9,965	9,965	3,800	4,295	1,479	391	0	9,965
Test & Evaluation										
Field Activities	WX	Oct 98	5,383	5,383	5,226	45	97	15	0	5,383
NAWC PAX River	WX	Oct 98	8,040	8,040	3,160	2,037	2,038	805	0	8,040

GOVERNMENT FURNISHED PROPERTY: Not Applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance
PROJECT NUMBER: E0534
PROJECT TITLE: Tactical Reconnaissance System

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) (cont.)

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	141,796	20,387	5,896	0	0	168,079
Subtotal Support and Management	31,438	5,028	2,231	659	0	39,356
Subtotal Test and Evaluation	8,386	2,082	2,135	820	0	13,423
Total Project	181,619	27,497	10,262	1,479	0	220,858

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N
PROGRAM ELEMENT TITLE: Advanced Combat Sys Engineering
PROJECT NUMBER: K0324
PROJECT TITLE: Adv Combat Sys Tech

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K0324 Advanced Combat System Technology	3,685	5,077	8,653	8,152	14,571	14,821	15,114	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Program Element is an FY 1995 new start. Studies and experiments will be conducted in distributed computer architecture, radar technology, and Tactical Informational Management Concepts to mature them to transition candidates for introduction into the AEGIS Weapon System. This program will take a disciplined systems engineering approach to find how these advances can be integrated into the AEGIS system and subsequent combat systems, and to plan combat system baseline upgrade schedules. Fully Distributed Computing Architecture is the first advanced development effort, leveraging the joint AEGIS/Defense Advanced Research Projects Agency (DARPA) High Performance Distributive Computing (Hiper-D) technology effort. It implements the results of distributed processing advances to replace the current AEGIS Combat System architecture with an open, distributed architecture. Radar studies are also being conducted to identify state-of-the-art technology options for the next generation radar. Complex Tactical Information Management of the flow and display of tactical information through the "detect-control-engage" process to better support the operator/decision maker will be a significant priority of this task. These advanced technologies are candidate systems for future baseline upgrades. Specifically, the Surface Combatant Twenty-first Century (SC-21) program will leverage the results of these studies and experiments into SC-21 combat system development. In addition, AEGIS advance computer architecture will potentially leverage into other new ship classes including CVX and LX.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($250) Continued system engineering to transition open system computing designs and Commercial-Off-the COTS/DARPA computer technologies into AEGIS Combat System production baselines.

- (U) ($2,327) Continued prototyping and re-engineering activities of AEGIS Weapon System computer programs focusing on the Baseline 7 computer architecture.

- (U) ($1,108) Derived total ship computing requirements from individual requirements for shipboard information systems. Assessed the state of computing technology with respect to information transfer, open system design, processing, support software, and other related areas. Reviewed existing commercial standards for information transfer, computing, etc. Developed a standards and design guidance document.

2. (U) FY 1998 PLAN:

- (U) ($250) Continue system engineering to transition open system computing designs and COTS/DARPA computer technologies into AEGIS Combat System production baselines.

- (U) ($2,645) Complete prototyping and re-engineering activities of AEGIS Weapon System computer programs focusing on the Baseline 7 computer architecture.

- (U) ($1,657) Continue to derive total ship computing requirements from individual requirements for shipboard information systems. Continue to assess the state of computing technology with respect to information transfer, open system design, processing, support software and other related areas. Develop an early engineering design for a total ship information transfer capability. Perform a proof of concept demonstration at a land base test site of an Anti-Air Warfare capability with an additional warfighting system.
- (U) ($525) Continue development of AEGIS Weapon System architecture and performance models using prototype modeling tools, multi-sensor coordination and advanced tactical information management.

3. (U) FY 1999 PLAN:

- (U) ($250) Complete system engineering to transition open system computing designs and COTS/DARPA computer technologies into AEGIS Combat System production baselines.

- (U) ($5,982) Develop and validate a common, total ship, information system infrastructure that will facilitate the timely exchange of data among various tactical, C4I, ship control administrative, and other

shipboard information systems. Study and evaluate candidate commercial intercomputer and interprocess communication tools, protocols and support software capabilities. Evaluate these against performance and reliability criteria resulting from earlier design studies. Perform a demonstration of an initial integrated set of common engineering services for the information system infrastructure, including the addition of another warfighting or other shipboard information/control system.

- (U) ($2,421) Continue development of AEGIS Weapon System architecture and performance models using prototype modeling tools, multi-sensor coordination and advanced tactical information management concepts.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,700	5,232	8,823
(U) Appropriated Value:	3,858	5,232	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
a. Adjustments	-173	-155	-170
(U) FY 1999 PRESBUD Submit:	3,685	5,077	8,653

(U) PROGRAM CHANGE SUMMARY EXPLANATION:

(U) Funding: FY1997 change due to Congressional Undistributed Reductions and minor pricing adjustments. FY1998 change due to Congressional Undistributed Adjustments and economic assumptions. FY1999 change due to minor pricing adjustments and inflation adjustments.

(U) Schedule: Not applicable.

(U) Technical: Increased emphasis will be placed on total ship information system infrastructure, including system demonstration.

C. (U) OTHER PROGRAM FUNDING SUMMARY: NONE

(U) RELATED RDT&E: PE 0604307N (AEGIS Combat System Engineering)

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N
PROGRAM ELEMENT TITLE: Advanced Combat Sys Engineering
PROJECT NUMBER: K0324
PROJECT TITLE: Adv Combat Sys Tech

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. System Engineering	350	600	1,200
b. Gov. Engineering Support	3,285	4,377	7,203
c. Program Management Support	50	100	250
Total	3,685	5,077	8,653

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N
PROGRAM ELEMENT TITLE: Advanced Combat Sys Engineering

PROJECT NUMBER: K0324
PROJECT TITLE: Adv Combat Sys Tech

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Applied Physics Lab. (APL), Baltimore, MD	SS/CPFF	02/95	5,798	5,798	1,750	1,000	1,000	2,048	CONT.	CONT.
Navy Surface Warfare Center, Dahlgren, VA	WR	10/94	11,829	11,829	2,961	2,127	3,136	3,605	CONT.	CONT.
Miscellaneous			4,849	4,849	750	508	841	2,750	CONT.	CONT.
Support and Management Miscellaneous			400	400	0	50	100	250	CONT.	CONT.
GOVERNMENT FURNISHED PROPERTY: Not applicable.										
Subtotal Product Development					5,461	3,635	4,977	8,403	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N
PROGRAM ELEMENT TITLE: Advanced Combat Sys Engineering
PROJECT NUMBER: K0324
PROJECT TITLE: Adv Combat Sys Tech

Subtotal Support and Management	0	50	100	250	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	CONT.	CONT.
Total Program	5,461	3,685	5,077	8,653	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0260 Remote Minehunting Systems	24,579	14,331	10,961	21,474	18,640	18,954	19,326	CONT.	CONT.
Q1233 Integrated Combat Weapons Systems	6,502	12,305	11,801	8,529	4,400	5,352	0	0	192,214
Q2131 Assault Breaching Systems	27,191	24,786	28,963	16,466	17,483	18,738	14,506	CONT.	CONT.
V2094 Unmanned Undersea Vehicle	23,938	19,724	21,766	29,640	26,681	24,715	16,940	CONT.	CONT.
Quantity of RDT&E Articles/NMRS			1						
TOTAL	82,210	71,146	73,491	76,109	67,204	67,759	50,772	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The program provides for developments to combat the threat of known and projected foreign mines against U.S. Naval and merchant shipping in harbors, channels, choke points, sea lines of communications and amphibious and other fleet operating areas. It develops: (1) systems and support for systems which will detect, localize and classify moored, bottom, and close-tethered mines for use in Mine Countermeasure (MCM) MCM-1 Class, Mine Hunter Coastal (MHC) MHC-51 Class, and other surface ships; (2) systems for detection, neutralizing and sweeping mines from shallow water, very shallow water, surf zones, and beach landing craft zones in support of amphibious operations; (3) the integration and improvement of the combat system suite on MCM and MHC ships; (4) near-term and long-term Unmanned Undersea Vehicle (UUV) systems for clandestine mine reconnaissance.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0260 Remote Minehunting System (RMS)	24,579	14,331	10,961	21,474	18,640	18,954	19,326	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Remote Minehunting System (RMS): Program develops a new remotely operated minehunting system for surface ships based on a three-fold strategy: develop new vehicle; upgrade with state of the art mine-hunting sensors; and provide a supportable, incremental operational contingency to the fleet during the development process. The RMS program has been identified as a FY 1999 Risk Reserve Pilot Program and $700 thousand has been identified for Risk Reserve.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) Remote Minehunting:
  - (U) ($429) System engineering (New Sensors).
  - (U) ($6,559) Continued development of RMS system (V)3 including requisite logistics support for the additional contingency systems.
  - (U) ($17,591) Awarded contract to procure two Engineering Development Models (EDMs) as contingency systems to accelerate fleet introduction per the CNO directed and approved Near Term Mine Warfare Campaign Plan.

2. (U) FY 1998 PLAN:

- (U) Remote Minehunting:
  - (U) ($6,665) Continue development and testing (DT/OT) of RMS system (V)3 including requisite logistics support for the additional contingency systems.
  - (U) ($7,666) Complete 2nd EDM and accelerate DDG-51 flight IIA integration.

3. (U) FY 1999 PLAN:

- (U) Remote Minehunting:
- (U) ($9,141) Complete development of RMS (V)3.
- (U) ($1,820) Continue fabrication of 2nd EDM.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q0260
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT TITLE: RMS

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	25,188	6,895	11,495
(U) Appropriated Value:	26,308	14,561	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. General Reductions	-1,729	-230	-7,185
b. RMS Realignment			+6,651
(U) FY 1999 President's Budget:	24,579	14,331	10,961

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: Remote Minehunting: FY97 changes due to general adjustments (-$1,729). FY98 general adjustments and revised economic assumptions (-$230). FY99 changes due to RMS OPN re-alignment and revised economic assumptions (-$534).
(U) Schedule: Based upon current estimates, the RMS(v)3 MSIII slips to 3Q/99 and the RMS(v)4 MSII slips one year to 1Q/00.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

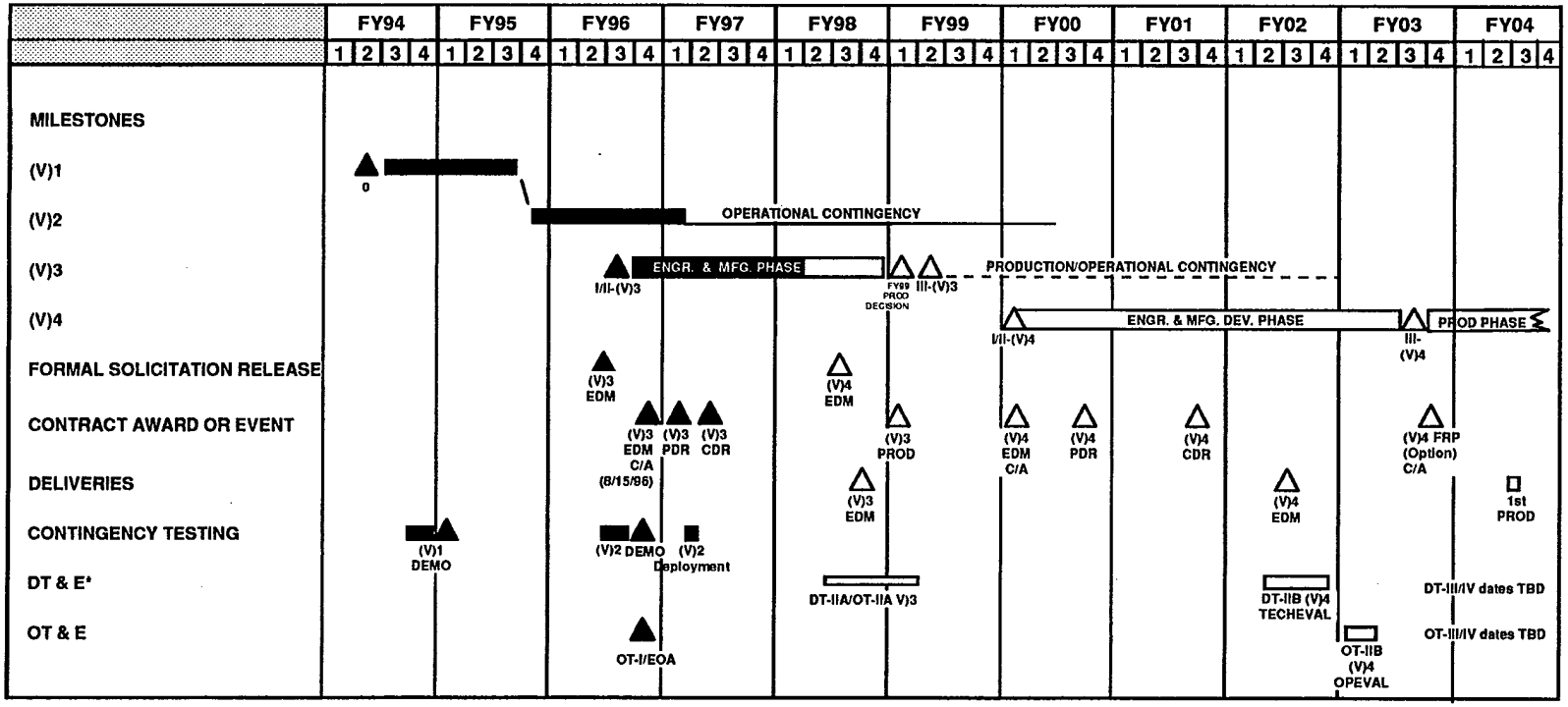
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RMS Contingency Systems OPN line items# 262200	0	0	15,895	15,850	15,964	18,738	19,276	CONT.	CONT.

(U) RELATED RDT&E:

(U) PE 0604373N (Airborne Mine Countermeasures)

D. (U) SCHEDULE PROFILE: See next page.

RMS PROGRAM SCHEDULE
P.E. 0603502N/Q0260



* (U) DT&E test durations include contractor system qualification tests, environmental qualification tests, Navy acceptance tests onboard a commercial vessel, and the final phase of DT testing onboard a combatant. Transportation, installation, training, and ship restoration times are included.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q0260
PROJECT TITLE: RMS

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. System Development	16,563	11,009	3,294
b. System Testing	1,549	1,699	2,664
c. System Engineering Development	950	367	2,243
d. SW Support	0	0	235
e. Logistics	1,137	329	1,240
f. Procurement Support	0	0	0
g. Program Management	4,322	874	1,231
h. Travel	58	53	54
TOTAL	24,579	14,331	10,961

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q0260
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT TITLE: RMS

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Lockheed Martin	C/CPAF	08/96	Cont.	Cont.	3,757	18,120	10,059	5,650	Cont.	Cont.
TBD	C/CPAF	TBD	Cont.	Cont.	0	0	0	0	Cont.	Cont.
Raytheon	SS/BOA	06/92	2,136	2,136	2,136	0	0	0	Cont.	2,136
NSWC CSS	WR	10/96	Cont.	Cont.	75,973	3,721	1,392	2,151	Cont.	Cont.
NUWC Keyport	WR	10/96	505	505	505	0	0	0	0	505
ARL UT	SS/PR	04/96	N/A	2,158	2,158	0	0	0	0	2,158
Support and Management										
NSWC CSS	WR	10/96	Cont.	Cont.	15,286	1,827	950	1,109	Cont.	Cont.
Misc	Various	Various	Cont.	Cont.	13,523	772	241	945	Cont.	Cont.
Test and Evaluation										
ARL UT	SS/PR	04/96	N/A	70	70	0	0	0	0	70
NSWC CSS	WR	10/96	Cont.	Cont.	10,365	139	1,689	1,106	Cont.	Cont.
Misc	Various	Various	142	142	142	0	0	0	0	142

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q0260
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT TITLE: RMS

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
Support and Management									
Test and Evaluation									

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	84,529	21,841	11,451	7,801	Cont.	Cont.
Subtotal Support and Management	28,809	2,599	1,191	2,054	Cont.	Cont.
Subtotal Test and Evaluation	10,577	139	1,689	1,106	Cont.	Cont.
Total Project	123,915	24,579	14,331	10,961	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q1233 Integrated Contract Weapons System (ICWS)	6,502	12,305	11,801	8,524	4,400	5,352	0	0	192,214

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: (1) Closed Loop Degaussing (CLDG) to improve survivability of mine countermeasures ships; (2) Mission Package 3 (MP3) upgrade to the AN/SLQ-48 to provide destruction of moored mines in place; ICWS is a series of major, incremental block upgrades to the current combat systems. It provides the MCM/MHC Class Ships an affordable and fully integrated combat weapons system which will improve mission execution efficiency, dramatically reduce life-cycle costs, and facilitate changes to meet future mission requirements. Medal is a software application program, which will become a Mine Warfare Joint Maritime Command Information Strategy (JMCIS) segment. It will provide the MCM Commander with Automated Data Processing (ADP) support for his mission planning and evaluation.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) CLDG:
  - (U) ($1,410) TECHEVAL.
- (U) MP3 for AN/SLQ-48:
  - (U) ($0) Milestone III decision.
- (U) ICWS
  - (U) ($5,092) Architecture definition study, life cycle cost model, Functional requirements document and began the preliminary design.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
PROJECT TITLE: ICWS

2. (U) FY 1998 PLAN:

- (U) CLDG:
  - (U) ($800) Complete TECHEVAL.
  - (U) ($200) Conduct OPEVAL.
  - (U) ($295) Prepare for Milestone III.

- (U) ICWS:
  - (U) ($3,056) Complete architecture study, life cycle cost model, and preliminary design.
  - (U) ($7,277) Accelerate development program and restore reconfigurability feature.

- (U) MEDAL:
  - (U) ($677) Software development of Build 6, conduct T&E, and documentation for introduction to the Fleet.

3. (U) FY 1999 PLAN:

- (U) CLDG:
  - (U) ($1,592) Techeval and Opeval have been extended to accommodate ship schedule and ascertain whether range frequency theshold and goal have been met.
  - (U) ($100) Complete all documentation required for MSII.
  - (U) ($103) Conduct MSIII.

- (U) ICWS:
  - (U) ($7,360) Award development contract for ICWS Block 1 design, build, rehost of system.
  - (U) ($170) Develop in-depth MNV signature knowledge and begin development of silencing modifications.

- (U) MEDAL:
  - (U) ($2,476) Software development of Build 7, conduct T&E, and documentation for introduction to the Fleet.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q1233
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT TITLE: ICWS

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	7,411	5,202	1,931
(U) Appropriated Value:	1,726	12,479	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. Adjustments:	+4,776	-174	+9,870
(U) FY 1999 President's Budget:	6,502	12,305	11,801

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: FY 97 changes due to acceleration of the ICWS and miscellaneous adjustments ($4,776). FY 98 general adjustments (-$174). FY 99 changes due to program realignments and general adjustments of ICWS Block 1 ($9,870).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
PROJECT TITLE: ICWS

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

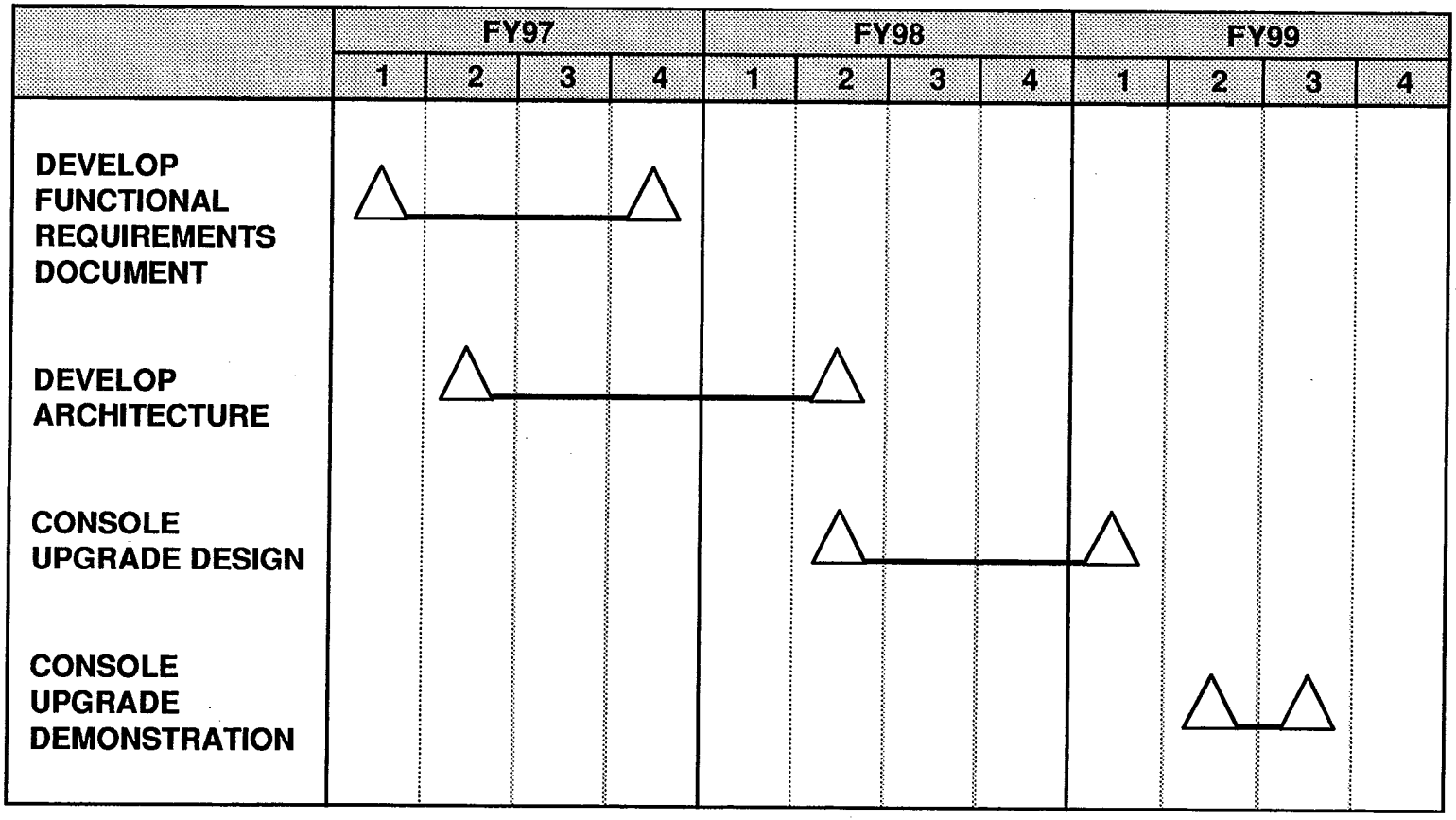
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PANMCX (MP-3) Line 535000	5,717	6,184	7,884	9,289	9,625	9,331	9,485	CONT.	CONT.
(U) OPN (CLDG) Line 262200	0	0	2,904	3,109	5,084	5,557	5,535	CONT.	CONT.
(U) OPN (ICWS) Line 262200	17,075	0	9,641	8,175	2,737	4,061	10,824	CONT.	CONT.

(U) RELATED RDT&E: Not Applicable.

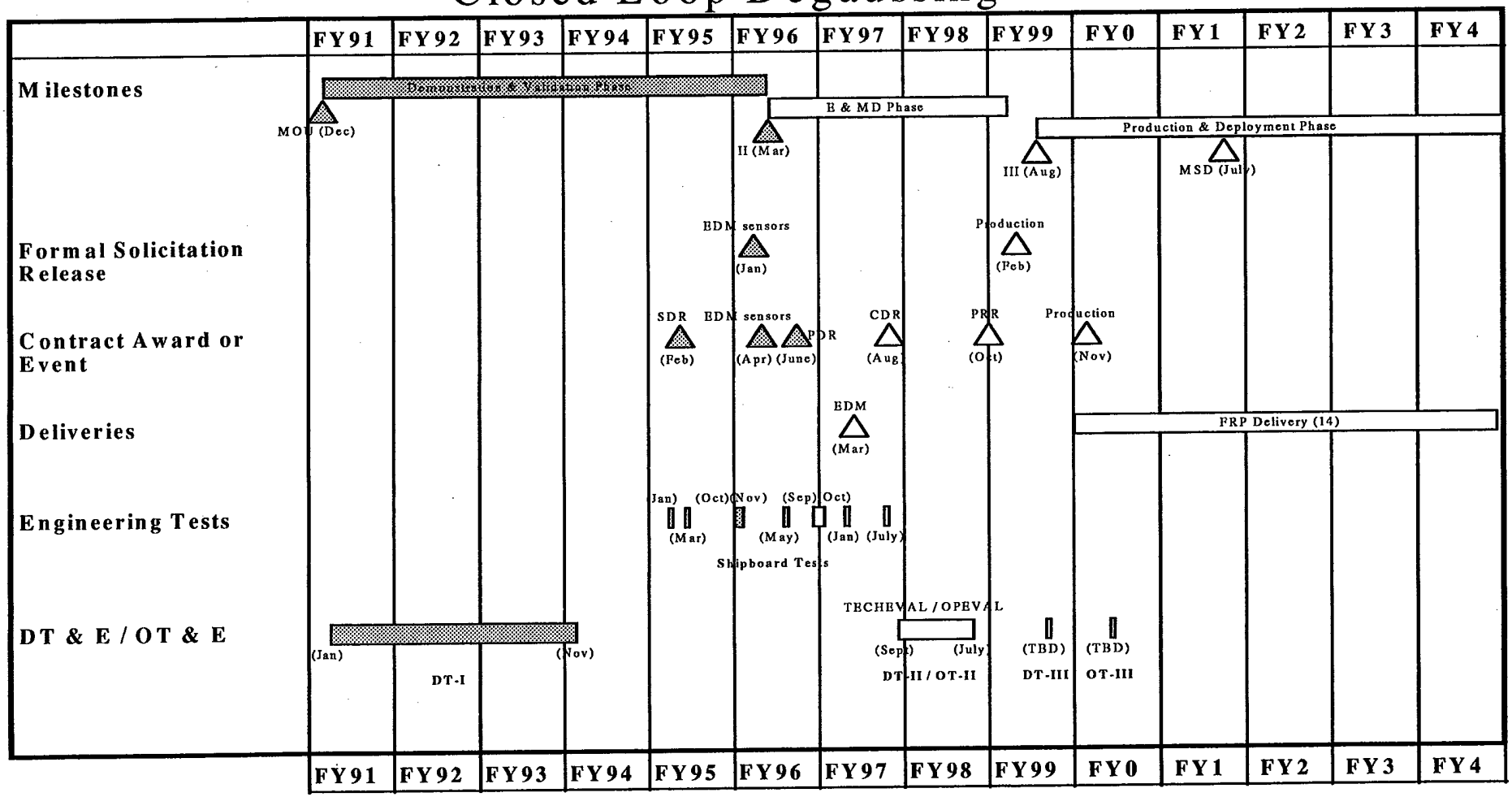
D. (U) SCHEDULE PROFILE: See next page.

INTEGRATED COMBAT WEAPON SYSTEM

P.E. 0603502N/Q1233



Closed Loop Degaussing



NOTES:

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
PROJECT TITLE: ICWS

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. System Development	4,057	10,158	6,138
b. System Testing	1,410	240	1,552
c. SW Support	0	700	2,479
d. Logistics	800	625	790
e. Program Management	0	245	390
f. Travel	55	40	60
g. Misc	180	297	392
TOTAL	6,502	12,305	11,801

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
PROJECT TITLE: ICWS

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NUWC Keyport	WR	10/95	954	954	554	100	0	300	0.	954
NSWC CSS	WR	10/96	Cont.	Cont.	66,888	566	2,686	292	Cont.	Cont.
NSWC Carderock	WR	10/96	52,027	52,027	47,629	1,385	1,218	1,795	0	52,027
ONR	PD	12/96	N/A	Cont.	0	0	468	2,185	Cont.	Cont.
TBD	C/PR	06/98	Cont.	Cont.	0	0	6,529	5,919	Cont.	Cont.
Misc	Various	Various	4,200	4,200	0	4,200	0	0	4,200	4,200
Support and Management										
Misc	Various	Various	Cont.	Cont.	5,549	151	364	601	Cont.	Cont.
NSWC CSS	WR	10/96	Cont.	Cont.	2,431	0	625	209	Cont.	Cont.
Test and Evaluation										
NSWC CSS	WR	10/96	Cont.	Cont.	43,358	100	250	200	Cont.	Cont.
ONR	PD	12/96	Cont.	Cont.	0	0	165	300	Cont.	Cont.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q1233
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT TITLE: ICWS

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
Support and Management									
Test and Evaluation									

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	115,071	6,251	10,901	10,491	Cont.	Cont.
Subtotal Support and Management	7,980	151	989	810	Cont.	Cont.
Subtotal Test and Evaluation	43,358	100	415	500	Cont.	Cont.
Total Project	166,409	6,502	12,305	11,801	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM Countermeasures

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q2131 Assault Breaching Systems (ABS)	27,191	24,786	28,963	16,466	17,483	18,738	14,506	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides for a combination of joint US Marine Corps and US Navy projects planned to counter the threat to amphibious landing forces from known and projected foreign land and sea mines and obstacles in the shallow water, very shallow water and surf zone approaches to amphibious assault areas. It develops systems for mine sweeping and explosive mine clearance. Included are the Distributed Explosives Technology (DET), Shallow Water Assault Breach System (SABRE) and follow-on P3I efforts. Beginning FY98, includes transition of an ongoing Advanced Technology Demonstration Systems (ATDS) - Explosive Neutralization (EN) to an acquisition programs.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) DET:
  - (U) ($8,248) Fabrication of DT-IIB/OT-II hardware.
  - (U) ($1,900) Conducted DT-IIA and DET/SABRE LCAC interoperability tests.
  - (U) ($1,450) Updated documentation package.
  - (U) ($1,500) Began LCAC integration.

- (U) SABRE:
  - (U) ($4,700) Fabrication of DT-II hardware.
  - (U) ($2,448) DT-II.
  - (U) ($300) Procured test targets.
  - (U) ($990) LCAC integration test hardware.
  - (U) ($2,145) LCAC integration tests.
  - (U) ($3,510) Procured long-lead OT-II hardware.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM

PROJECT NUMBER: Q2131
PROJECT TITLE: Assault Breaching Systems

2. (U) FY 1998 PLAN:

- (U) DET:
  - (U) ($5,349) Complete fabrication of DT-IIB/OT-II systems.
  - (U) ($2,513) Begin DT-IIB.
  - (U) ($893) Complete LCAC integration.
  - (U) ($4,043) Safety tests.
- (U) SABRE:
  - (U) ($1,600) Complete fabrication of DT-IIB/OT-II systems.
  - (U) ($2,650) Conduct DT-IIB.
  - (U) ($1,900) Begin OT-II.
  - (U) ($685) LCAC integration.
  - (U) ($800) Safety tests.
- (U) EN:
  - (U) ($250) Prepare for P3I Cost analysis.
  - (U) ($1,117) LCAC integration tests.
  - (U) ($2,986) Autonomous craft controller component procurement.

3. (U) FY 1999 PLAN:

- (U) DET:
  - (U) ($3,500) Complete DT-IIB.
  - (U) ($2,299) Conduct OT-II.
  - (U) ($1,488) MSIII.
- (U) SABRE:
  - (U) ($1,475) Complete OT-II.
  - (U) ($1,593) MSIII.
  - (U) ($525) Procurement package prep.
- (U) EN:
  - (U) ($707) P3I Cost Analysis.
  - (U) ($8,716) Procure P3I RDT&E hardware.
  - (U) ($450) BZA Cost Analysis.
  - (U) ($488) BZA MSI.
  - (U) ($5,513) LCAC/airframe integration.
  - (U) ($2,209) Autonomous craft controller integration tests.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q2131
PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM PROJECT TITLE: Assault Breaching Systems

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	27,525	25,665	29,486
(U) Appropriated Value:	28,757	25,665	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget: a. Adjustments:	-1,566	-879	-523
(U) FY 1999 President's Budget:	27,191	24,786	28,963

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97 general adjustments (-$1,566). FY98 changes due to general adjustments and revised economic assumptions (-$879). FY99 changes due to general adjustments and revised economic assumptions (-$52 3).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

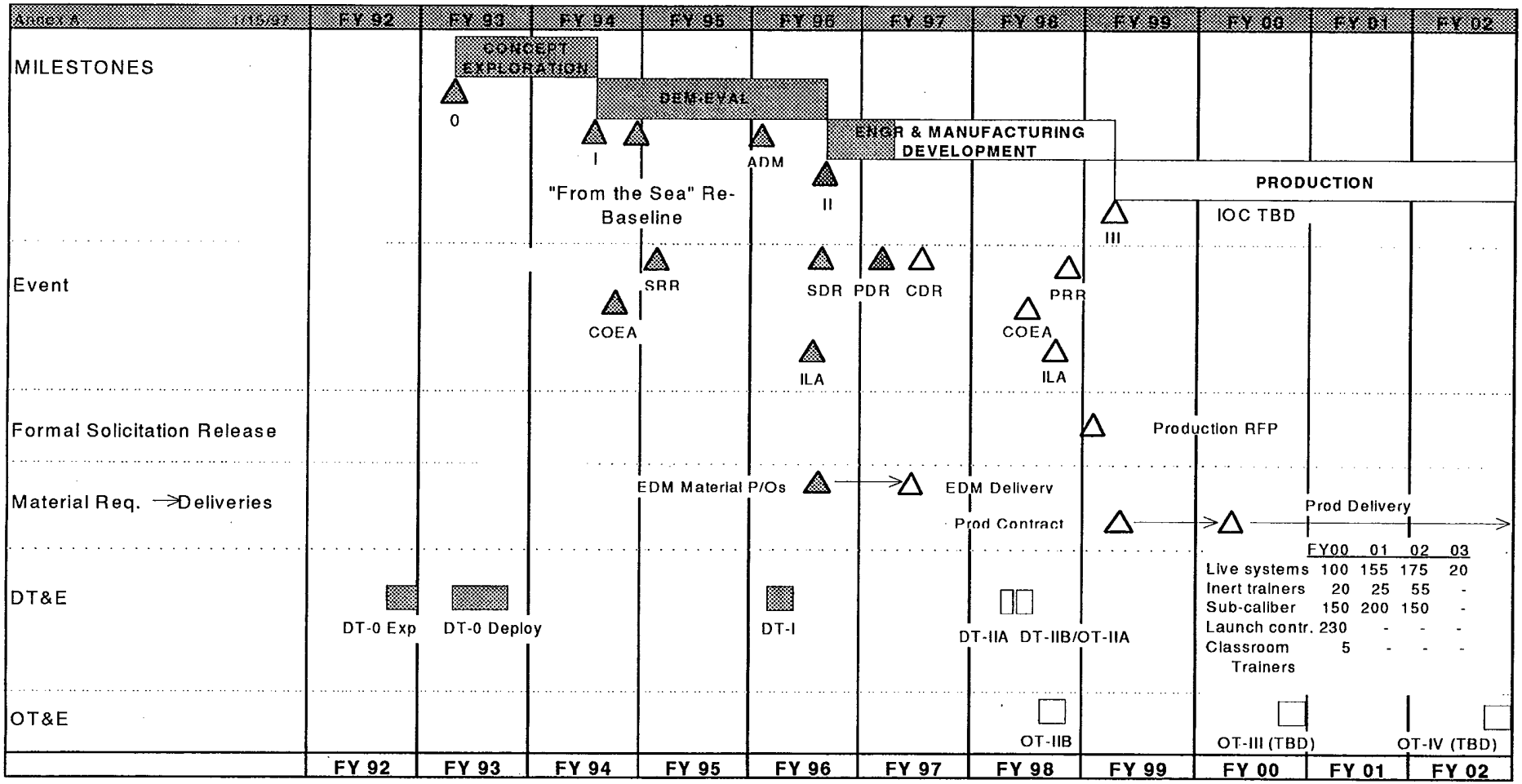
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN line item # 262400	942	0	8,913	22,234	23,627	39,870	33,689	Cont.	Cont.

(U) RELATED RDT&E:

(U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration).
PE 0603640M and 0602131M (Advanced Countermine System (ACS); USMC M58 line charges).

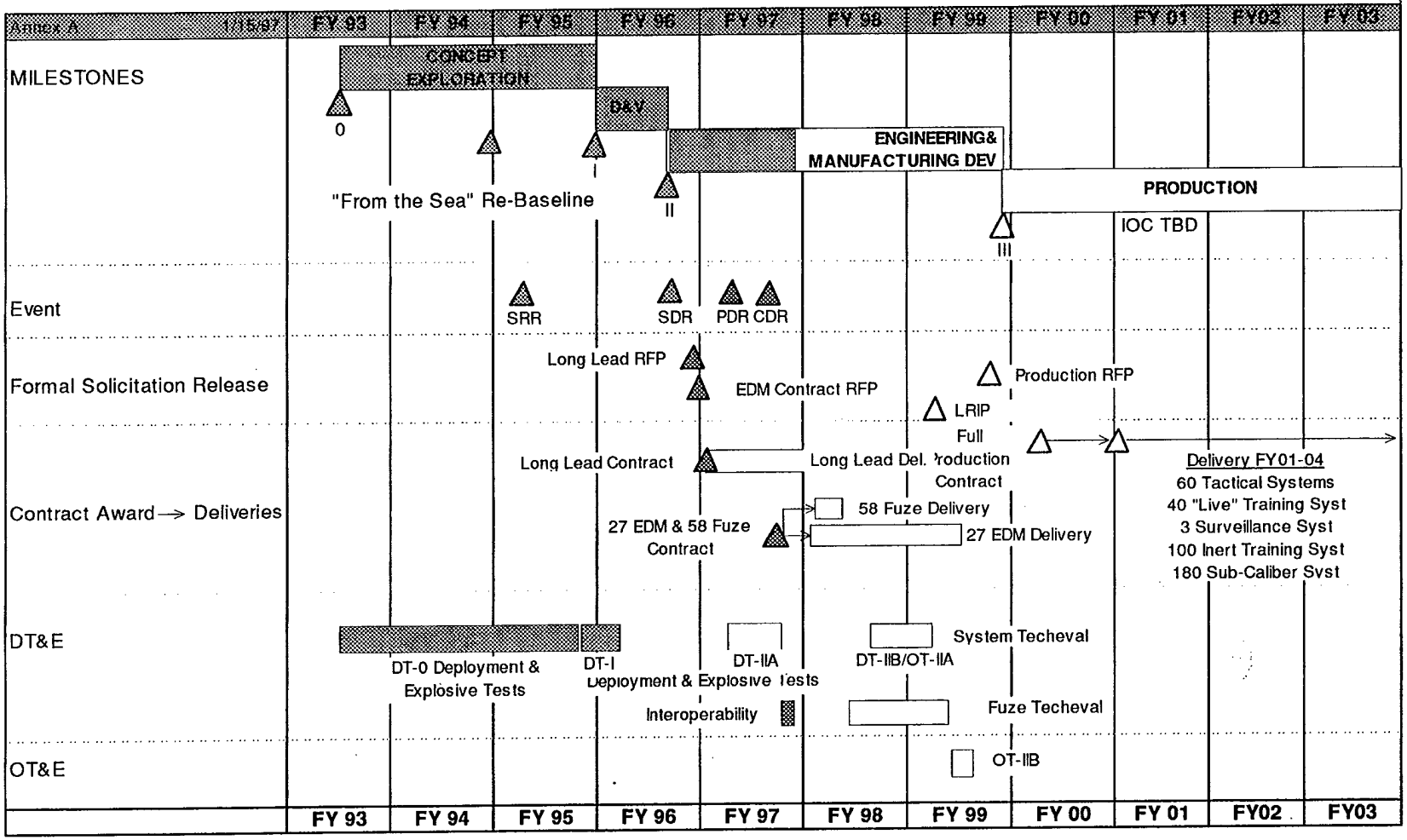
D. (U) SCHEDULE PROFILE: See next page.

ANNEX A - PROGRAM STRUCTURE
SHALLOW WATER ASSAULT BREACHING SYSTEM
SABRE EX 9 MOD 0

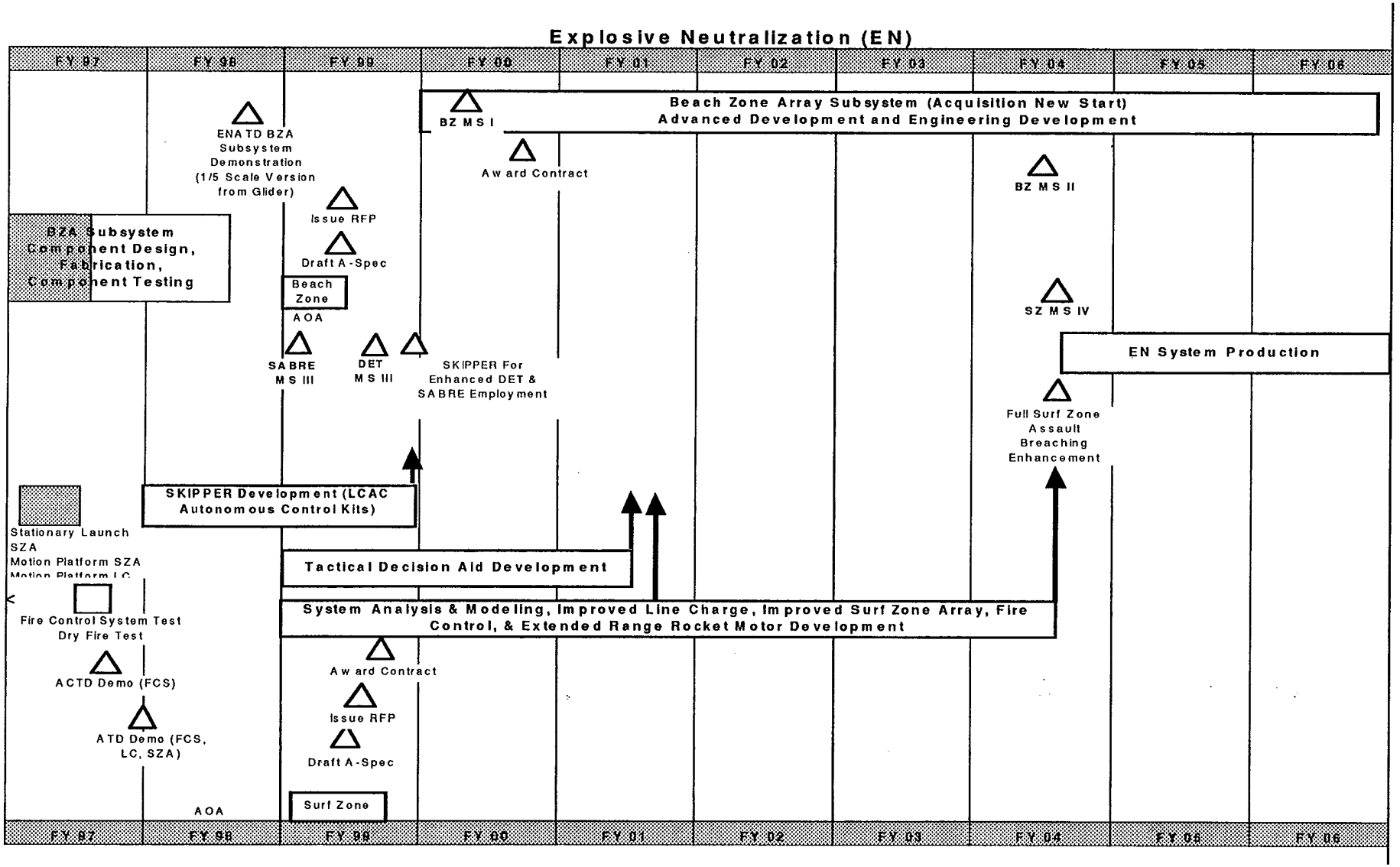


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ANNEX A - PROGRAM STRUCTURE
DISTRIBUTED EXPLOSIVE TECHNOLOGY



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FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N

PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM

PROJECT NUMBER: Q2131

PROJECT TITLE: Assault Breaching Systems

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. System Development	15,561	6,161	10,670
b. System Testing	2,886	7,761	2,697
c. System Engineering Development	5,048	6,819	7,678
d. Logistics Support	915	789	1,074
e. Procurement Support	760	100	2,515
f. Technical Management	1,030	1,247	1,788
g. Program Management	906	1,829	2,451
h. Travel	85	80	90
TOTAL	27,191	24,786	28,963

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q2131
PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM PROJECT TITLE: Assault Breaching Systems

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NSWC/CSS	WR	10/96	Cont.	Cont.	20,614	2,088	3,859	14,746	Cont.	Cont.
NSWC/IH	WR	10/96	Cont.	Cont.	29,762	16,901	9,550	7,301	Cont.	Cont.
Misc	Various	Various	2,175	2,175	2,175	0	0	0	0	2,175
Support and Management										
NSWC/CSS	WR	10/96	Cont.	Cont.	2,284	602	1,849	1,555	Cont.	Cont.
NSWC/IH	WR	10/96	Cont.	Cont.	810	1,268	100	0	Cont.	Cont.
Misc	Various	Various	Cont.	Cont.	3,013	991	1,228	2,664	Cont.	Cont.
Test and Evaluation										
NSWC/CSS	WR	10/96	Cont.	Cont.	4,239	1,322	2,897	499	Cont.	Cont.
NSWC/IH	WR	10/96	Cont.	Cont.	7,905	3,829	4,393	1,862	Cont.	Cont.
Misc (PMS-377)	Various	Various	2,203	2,203	767	190	910	336	0	2,203

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM
PROJECT NUMBER: Q2131
PROJECT TITLE: Assault Breaching Systems

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
Support and Management									
Test and Evaluation									

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	52,551	18,989	13,409	22,047	Cont.	Cont.
Subtotal Support and Management	6,107	2,861	3,177	4,219	Cont.	Cont.
Subtotal Test and Evaluation	12,911	5,341	8,200	2,697	Cont.	Cont.
Total Project	71,569	27,191	24,786	28,963	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V2094 Unmanned Underwater Vehicle (UUV)	23,938	19,724	21,766	29,640	26,681	24,715	16,940	CONT.	CONT.

Quantity of RDT&E Articles/NMRS 1

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project was completely restructured in FY 1994 in response to Congressional direction provided in the FY 1994 DOD Appropriations Act. Specifically, the Office of the Secretary of Defense and the Navy were directed to (1) establish priorities among various proposed UUV programs, (2) focus on near-term mine countermeasures issues, and (3) establish affordable, cost-effective programs. The Navy developed an overall UUV Program Plan, which was approved by ASN(RD&A) June 1994, endorsed by USD(A&T) and forwarded to Congress to support FY 1995 budget deliberations.

(U) The UUV Program Plan establishes a clandestine, near-term mine reconnaissance capability as the Navy's top UUV priority; a long-term mine reconnaissance system as priority two; the conduct of surveillance, intelligence and tactical oceanography missions as priority three; and exploring advanced UUV designs for the future as priority four. FY 1995 Congressional language complimented the Navy Plan and fully supported priorities one and two starting in FY 1995.

(U) The UUV project funds development of a clandestine Near-Term Mine Reconnaissance System (NMRS) and a Long-Term Mine Reconnaissance System (LMRS), the Navy's two highest UUV priorities. The NMRS will be a minehunting UUV system launched and recovered from an SSN-688 class submarine and will be capable of mine detection, classification, and localization. In accordance with the UUV Program Plan, one NMRS Operational Prototype (OP) system will be delivered to the Fleet in FY 1998. No further production of the NMRS is planned. Since the NMRS is viewed as a stop-gap capability with a life expectancy of approximately 6 years, the LMRS will be developed to provide a robust, long-term, Fleet capability to conduct clandestine minefield reconnaissance. The first LMRS will replace the NMRS as the NMRS is retired and several Long Term Mine Reconnaissance Systems will be procured beginning in FY 2003.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: V2094
PROJECT TITLE: Unmanned Underwater Vehicle

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($8,707) Priority 1 (NMRS): Completed system fabrication and most of factory testing and system integration. Developed Request for Proposal (RFP) for NMRS Operation and Support (O&S). Conducted contracting activities and awarded NMRS O&S long lead contract.
- (U) ($15,231) Priority 2 (LMRS): Continued execution of and completed LMRS Preliminary Design contracts. Conducted LMRS Preliminary Design Review (PDR). Commenced preparation for award of Detailed Design contract(s) in FY 1998.

2. (U) FY 1998 PLAN:

- (U) ($9,159) Priority 1 (NMRS): Complete factory testing and system integration. Conduct at-sea testing of NMRS and achieve Initial Operational Capability (IOC). Deliver NMRS to Fleet and begin operational use. Begin NMRS Operation and Support activities of the Prototype system.
- (U) ($10,565) Priority 2 (LMRS): Award and execute two Detailed Design contracts. Conduct product development risk mitigation.

3. (U) FY 1999 PLAN:

- (U) ($5,191) Priority 1 (NMRS): Continue Operation and Support of the Prototype System.
- (U) ($16,575) Priority 2 (LMRS): Complete LMRS Detailed Design and conduct the LMRS Critical Design Review. Commence preparations for award of the LMRS Development Phase contract. Conduct product development risk mitigation.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT NUMBER: V2094 PROJECT TITLE: Unmanned Underwater Vehicle

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	24,727	20,469	25,010
(U) Appropriated Value:	25,960	20,469	
(U) Adjustments from FY 1997/98 Appropriated Value/FY 1998 PRESBUDG:			
a. Adjustments:	-2,022	-745	-3,244
(U) FY 1999 PRESBUDG Submit:	23,938	19,724	21,766

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 reduction due to general adjustments (-$2,022). FY 1998 changes due to Congressional undistributed adjustments (-$745). FY 1999 changes are due to funding realignment for Unmanned Underwater Vehicle and minor pricing adjustments (-$3,244).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: V2094
PROJECT TITLE: Unmanned Underwater Vehicle

C. (U) OTHER PROGRAM FUNDING SUMMARY:

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	Total PROGRAM
(U) OPN PE 0204281; Line Item Number 217100	0	0	0	0	0	0	28,783	CONT.	CONT.

(U) The $28,783K in FY 2003 provides funding to begin LMRS production.

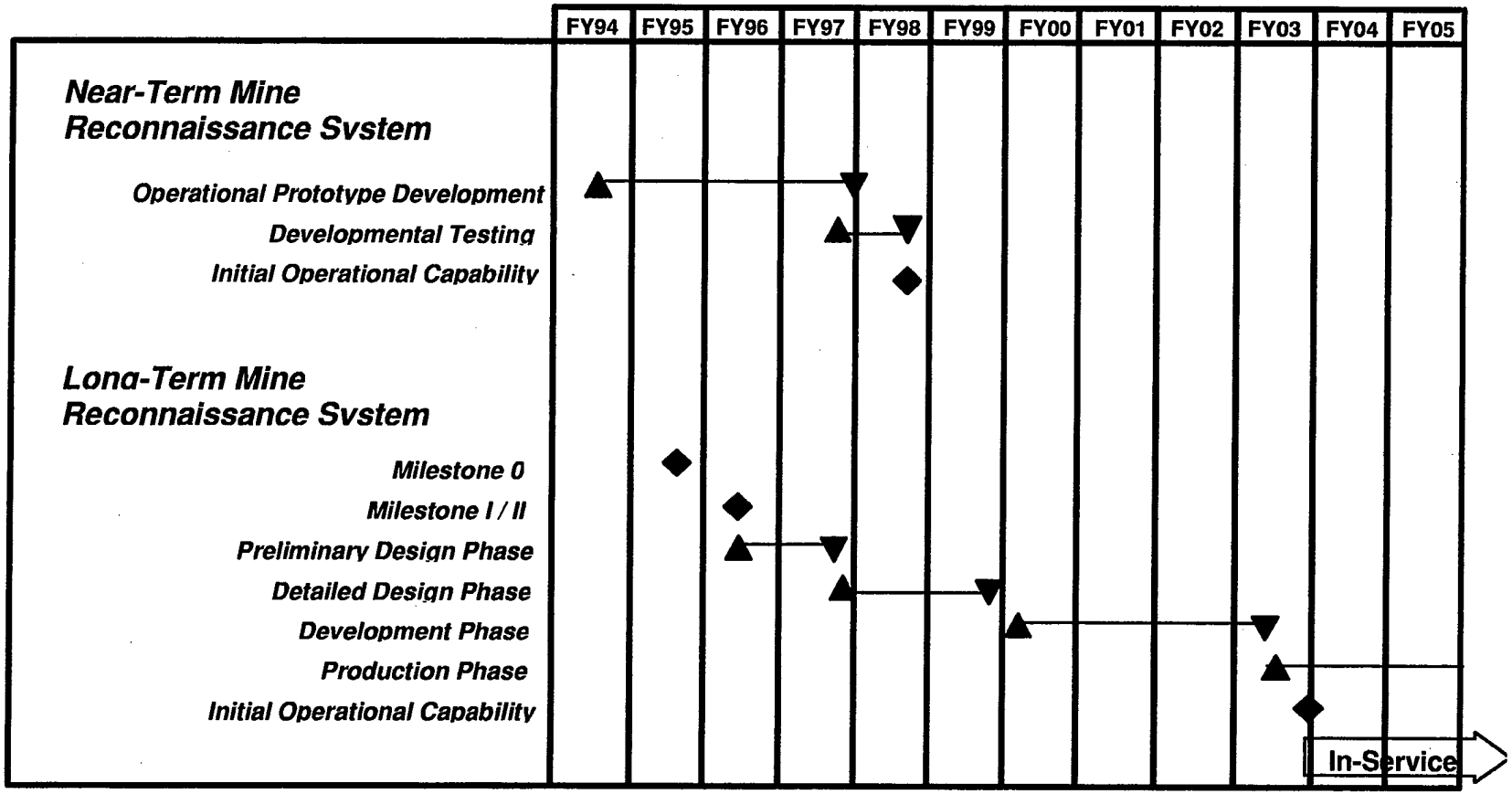
(U) RELATED RDT&E:

(U) PE 0602314N (ONR UUV Technology Efforts)
(U) PE 0602315N (ONR UUV Technology Efforts)

D. (U) SCHEDULE PROFILE: See next page.

Unmanned Underwater Vehicle Program
Milestone Schedule

PE: 0603502N Proj: V2094



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: V2094
PROJECT TITLE: Unmanned Underwater Vehicle

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	18,056	12,664	14,234
b. System Maintenance and Support	475	3,563	4,135
c. Contractor Engineering Support	885	535	540
d. Government Engineering Support	3,261	1,936	2,127
e. Program Management Support	669	681	600
f. Govt. Developmental Test and Evaluation	592	345	130
Total	23,938	19,724	21,766

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: V2094
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures PROJECT TITLE: Unmanned Underwater Vehicle

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/Contract Government Performing Activity	Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NGC/NMRS	SS/CPAF	08/94	41,686*	41,686*	31,324	6,292	4,070	0	0	41,686*
NGC/NMRS O&S	SS/CP	09/97	TBD	TBD	0	475	3,563	4,135	CONT.	CONT.
NGC - Northrop Grumman Corporation, Electronic Sensors and Systems Division, Annapolis MD										
LMC/LMRS	C/FFP	08/96	TBD	TBD	470	3,998	0	0	CONT.	CONT.
LMC - Lockheed Martin Corporation, Lockheed Martin Government Electronics System, Moorestown, NJ										
NGC/LMRS	C/FFP	08/96	TBD	TBD	470	3,906	4,297	7,117	CONT.	CONT.
NGC - Northrop Grumman Corporation, Electronic Sensors and Systems Division, Annapolis MD										
BNA/LMRS	C/FFP	08/96	TBD	TBD	470	3,860	4,297	7,117	CONT.	CONT.
BNA - Boeing North America, Anaheim, CA										
APL/ARL	SS/CPFF	01/98	CONT.	CONT.	3,388	885	535	540	CONT.	CONT.
NUWC	WR	11/97	CONT.	CONT.	3,821	1,886	1,636	1,740	CONT.	CONT.
Miscellaneous	WR	11/97	CONT.	CONT.	0	1,375	300	387	CONT.	CONT.
Support and Management										
Miscellaneous	various	various			1,110	669	681	600	CONT.	CONT.
Test and Evaluation										
Misc	WR	11/97	CONT.	CONT.	122	592	345	130	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY - Not applicable.
*Note - $3,500K from P.E. 0603555N provided to NMRS contract in FY 94. Total contract EAC is $45,186K.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: V2094
PROJECT TITLE: Unmanned Underwater Vehicle

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) (Cont.)

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	39,943	22,677	18,698	21,036	CONT.	CONT.
Subtotal Support and Management	1,110	669	681	600	CONT.	CONT.
Subtotal Test and Evaluation	122	592	345	130	CONT.	CONT.
Total Project	41,175	23,938	19,724	21,766	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development

(U) COST (Dollars in thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V0223 Advanced Submarine Combat System Development	36,549	60,087	68,402	75,648	43,589	44,739	41,569	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This non-acquisition (Non-ACAT) program supports the Navys Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of improvements to present and future sonar and combat control systems. The goal is to address the technology challenges that marginalize tactical control in littoral and open ocean environments during the performance of a variety of missions including peacetime engagement, surveillance, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware and/or software systems are developed under this program to demonstrate technologically promising system concepts in a Laboratory and at-sea submarine environments. Technology areas specific to this program include transducers, hull-mounted and towed arrays, on-board monostatic and bistatic sonar signal processing, target motion analysis (TMA), multiple contact processing and test and evaluation.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION AND VALIDATION because it develops and integrates hardware for experimental test related to specific ship and aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development PROJECT NUMBER: V0223 PROJECT TITLE: Advanced Submarine Combat Systems Development

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

2. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($3,275) Advanced Tactical Control. Demonstrated GRETEP at sea (completed 12/96 on USS PHILADELPHIA). Develop common fusion engine for surface ship and submarine contact management. Developed system engineering and development guidelines for Tactical Control Program products. Provided contact management and data fusion products for advanced sensor products (such as AFTAS and RATTRAP) and acoustic Rapid COTS Insertion (ARCI) efforts, Develop Tactical Control MOEs/MOPs to support evaluation of DARPA Tactical Scene Operator/Associated (TSO/A).

- (U) ($20,509) Advanced Sonar Systems and Processing. Continued passive processing comparative performance evaluations to establish advanced processing builds. Completed definition and commence integration of TB-16/23 related Advanced Processing Build (APB); plan APB at-sea evaluation. Conducted evaluation of BQQ-5/BSY-1 related sphere array processing improvements to support rapid COTS insertion.

- (U) ($160) Advanced Towed Arrays. Initiated planning for high gain Multiline Towed Array (MLTA) testbed and innovative handling system. Conducted Industry Brief for MLTA testbed BAA. Participated in conform IPT for potential technology NSSN insertion opportunities.

- (U) ($6,155) High Frequency Sonar Program. Continued planning and equipment preparation for HFSP sea-tests with large sail receive array. Continued HFSP performance improvement effort. Completed transition documentation. Define HFSP conformal array options to determine system performance needs. Commenced consolidation of alternative HFSP processing approaches.

- (U) (6,000) Fiber Optics. Continued the development and testing of fiber optic pressure sensors as an improvement for AN/BQG-5 WAA and development of the associated in-board opto-electronics receiver cabinet.

- (U) ($450) Test and Evaluation. Continued planning for towed array APB at-sea testing. Coordinated data collection efforts to support processing algorithm development and validation. Continued development of submarine acoustic/environmental data-gathering program to include at-sea evolutions. Continued development and establishment of an automated real time test reconstruction effort. Continued support of HFSP sea-tests with large sail receive array.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development PROJECT NUMBER: V0223 PROJECT TITLE: Advanced Submarine Combat Systems Development

3. (U) FY 1998 PLAN:

- (U) ($3,900) Advanced Tactical Control. Analyze Tactical Control guidelines to Combat System upgrade for CCS MK2 Block 1C. Transition TMAI, All Source Contact Management for SSNs. Develop Weapon Employment Modules. Initiate transition and integration of own-ship vulnerability assessment module based on DARPA and SSN/SSBN Security program efforts (TSM, ISSIPS). Complete TSO/A integration and evaluation. Supply joint efforts in ASW C4I and conduct joint tactical control sea test.

- (U) ($30,374) Advanced Sonar Systems and Processing. Continue algorithm performance evaluations for Advanced Processing Builds (APB). Complete integration of TB-16/23 related APB; assess performance and conduct at-sea evaluation. Initiate TB-16/23 related APB to Rapid COTS Insertion effort. Initiate TB-29 related APB definition and commence integration. Initiate definition of sphere array-related APB. Initiate adaptation surface developed active sonar processing for operation with sphere array. Initiation and development of enhanced localization approaches including passive ranging and TMA.

- (U) ($3,600) Advanced Towed Arrays. Commence development of high gain MLTA testbed and innovative towed array handling system concepts. Deliver MLTA compatible tow cable. Initiate Advanced Array algorithm development and processing. Evaluate improvements in array telemetry and shape estimation systems for applicability to MLTA.

- (U) ($14,363) Advanced Hull Array. Effect transition of Conformal Acoustic Velocity Sensor (CAVES) flank array project to this line. Continue CAVES technology development. Conduct quarter scale array performance lake tests and evaluate performance as a passive receiver. Initiate planning and development of CAVES based technology WAA array equivalent.

- (U) ($7,100) High Frequency Sonar Program. Conduct HFSP sea test and conduct performance analysis. Continue HFSP performance improvement effort. Complete consolidation of alternate HFSP processing approaches. Initiate HFSP modifications to implement developed algorithm improvements and correct deficiencies identified in sea-tests. Initiate studies and analysis to determine impact of a new sail design on HF sail array.

- (U) ($750) Test and Evaluation. Continue data collection efforts to support processing algorithm development and validation. Conduct at-sea test of TB-16/23 related APB. Validate performance of automated real time test

reconstruction tools for accuracy. Define, develop and deploy follow-on high data rate recorders for sphere/hull arrays.

4. (U) FY 1999 PLAN:

- (U) ($5,400) Advanced Tactical Control. Incorporate ARPA and 6.2 Development Products into TCS system. Conduct the Joint TCS sea test. Complete contact management improvements and deliver to SFMPL and CCS MK-2 Block 1C for implementation. Continue vulnerability assessment effort.

- (U) ($37,437) Advanced Sonar Systems and Processing. Continue integration, conduct performance assessment and initiate transition of TB-29 related APB to Rapid COTS Insertion effort. Continue small MLTA-related and sphere array definition APB definition and commence integration and transition to Rapid COTS Insertion effort. Continue adaptation and evaluation of surface developed active processing algorithms for sphere array. Initiate follow-on towed array and hull array APBs. Continue acoustic intercept integration and enhanced localization efforts.

- (U) ($5,400) Advanced Towed Arrays Continue development and laboratory evaluation of high gain MLTA and flexible array handling system.

- (U) ($14,023) Advanced Hull Array. Continue development of CAVES technology . Conduct small aperture at-sea demonstration to validate noise estimates and assess sensor, coating materials and shipboard array installation technology. Continue CAVES/WAA array equivalent; prepare for sea test.

- (U) ($5,542) High Frequency Sonar Program. Continue HFSP processing performance improvement efforts. Continue assessment of new sail design concepts on HF sail array. Commence HFSP conformal array development activity. Investigate the incorporation of Advanced Acoustic Communications capabilities within HFSP. Commence detailed advanced visualization feasibility study. Commence HFSP/weapons sensor interaction study.

- (U) ($600) Test And Evaluation. Conduct CAVES at-sea demonstration and Joint TCS sea test. Conduct evaluation to TA-APB. Continue towed array data-gathering program. Commence sphere array data collection gathering program.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development PROJECT NUMBER: V0223 PROJECT TITLE: Advanced Submarine Combat Systems Development

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	37,205	61,122	70,321
(U) Appropriated Value:	19,149	65,122	0
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:		0	0
a. SBIR transfer	-610	0	0
b. Congressional undistributed reductions	-1,990	-2,335	-712
c. Congressional plus-up	+20,000	0	0
d. FY98 Cut: Savings Identified by GAO	0	-2,700	0
e. Commercial Purchases Inflation Adjustment	0	0	-1,207
(U) FY 1999 PRESBUDG Budget Submit:	36,549	60,087	68,402

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY1997 decrease due to SBIR transfer (-$610K), Congressional undistributed reductions (-1,990K), and Congressional increase (+20,000K). FY1998 decrease due to Congressional undistributed reductions (-2,335K), savings identified by GAO (-2700K). FY1999 congressional undistributed reductions (-712K) and Commercial Purchase Inflation Adjustment (-1207K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE0603562N (Submarine Tactical Warfare System)
(U) PE0604524N (Submarine Combat System)
(U) PE0604503N (Submarine System Equipment Development)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development

PROJECT NUMBER: V0223
PROJECT TITLE: Advanced Submarine Combat Systems Development

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones		1Q Transition of CAVES Program to Program Office	
Engineering Milestones	1Q- Sonar Sys. Level Evaluations Complete 2Q-AFTAS Source Code Delivery 4Q-AFTAS Deployables (2) Delivery 4Q-Initiate TSOA Evaluation	3Q-HFSP Performance Analysis 4Q-Complete TSOA Evaluation	2Q-Transition of TA APBs 2Q-CAVES Sea Test Performance Analysis
T&E Milestones	1Q-GRETEP at-sea Demonstration 3Q-HFSP System Level Lake Test 3Q-AFTAS Sea Tests	2Q-HFSP Sea-Test 3Q-TA-APB Sea Tests	1Q-CAVES Lake Tests 3Q Joint Tactical Control Sea Test 1Q-CAVES Sea Test

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development

PROJECT NUMBER: V0223
PROJECT TITLE: Advanced Submarine Combat Systems Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Product Development	35,308	58,187	67,202
b. Support & Management	791	1,150	600
c. Test & Evaluation	450	750	600
Total	36,549	60,087	68,402

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development PROJECT NUMBER: V0223 PROJECT TITLE: Advanced Submarine Combat Systems Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NUWC/NL	WR	10/97	Cont.	Cont.	74,895	17,284	19,847	25,532	Cont.	Cont.
NUWC/NL	RCP	Var.	Cont.	Cont.	19,176	3,700	3,881	0	Cont.	Cont.
NRL/WASH	WR	10/97	Cont.	Cont.	858	800	1,900	3,600	Cont.	Cont.
NRL/WASH	RCP	Var.	Cont.	Cont.	186	210	0	0	Cont.	Cont.
Miscellaneous	Var.	Var.	Cont.	Cont.	1,050	2,746	5,759	11,470	Cont.	Cont.
APL/JHU	PD	Var.	Cont.	Cont.	155	1,405	1,800	2,000	Cont.	Cont.
Contractor(s)	C/CPFF	Var.	Cont.	Cont.	0	2,000	9,300	10,200	Cont.	Cont.
Mitre	MIPR	Var.	Cont.	Cont.	826	1,530	1,500	2,500	Cont.	Cont.
GTRI	PD	Var.	Cont.	Cont.	0	0	5,450	3,150	Cont.	Cont.
NSWC/CD	WR	10/97	Cont.	Cont.	75	50	3,450	3,300	Cont.	Cont.
NSWC/CD	RCP	Var.	Cont.	Cont.	0	50	0	0	Cont.	Cont.
NRAD	WR	10/97	Cont.	Cont.	0	50	300	300	Cont.	Cont.
NRAD	RCP	Var.	Cont.	Cont.	0	2,250	0	0	Cont.	Cont.
ARPA	MIPR	10/97	Cont.	Cont.	0	0	1,500	1,500	Cont.	Cont.
ARL/UT	PD	Var.	Cont.	Cont.	645	2,569	2,800	2,850	Cont.	Cont.
NSMRL	WR	10/97	Cont.	Cont.	0	514	500	500	Cont.	Cont.
NSMA	RCP	Var.	Cont.	Cont.	0	150	200	300	Cont.	Cont.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROJECT NUMBER: V0223
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development PROJECT TITLE: Advanced Submarine Combat Systems Development

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Support and Management										
Miscellaneous	Var	Var.	Cont.	Cont.	2,097	791	1,150	600	Cont.	Cont.
Test and Evaluation										
NUWC/NL	WR	10/97	Cont.	Cont.	2,246	450	750	600	Cont.	Cont.
Miscellaneous	Var.	Var.	Cont.	Cont.	1,230	0	0	0	Cont.	Cont.

GOVERNMENT FURNISHED PROPERTY: Not Applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	97,866	35,308	58,187	67,202	Cont.	Cont.
Subtotal Support and Management	2,097	791	1,150	600	Cont.	Cont.
Subtotal Test and Evaluation	3,476	450	750	600	Cont.	Cont.
Total Project	103,439	36,549	60,087	68,402	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1722 CV Weapons Elevator Improvements	485	851	1,010	1,026	1,055	1,077	1,106	CONT.	CONT.
22208 Future CV R&D	7,663	11,883	149,505	167,660	135,855	150,174	218,048	CONT.	CONT.
W1723 CV Launch and Recovery Systems	2,621	3,158	2,623	1,876	4,635	1,368	4,331	CONT.	CONT.
W2269 EAF Matting	2,786	4,084	1,169	3,471	0	0	0	0	11,510
TOTAL	13,555	19,976	154,307	174,033	141,545	152,619	223,485	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Navy unique program addresses all technology areas associated with Navy/Marine Corps aircraft operations aboard ships. The program includes:

(U) (S1722) Development of standardized, supportable and maintainable aircraft carrier (CV/CVN) weapons elevators components.

(U) (22208) Development of ship hull, mechanical, electrical, aviation and combat support systems, subsystems and components to significantly improve aircraft carrier affordability, survivability and operational capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of existing and future aircraft carriers.

(U) (W1723) Development of all systems required to provide approach and landing guidance and control, recovery, service, support and launch aircraft operating onto or from ships. Payoffs include increased safety, greater sortie generation rates, enhanced aircraft boarding rates, reduced manning, increased aircraft service life and fleet modernization.

(U) (W2269) Development of lightweight mat and expeditionary arresting gear for use at Marine Corps Expeditionary Airfields (EAF).

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S1722
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Weapons Elevator Improvements

(U) COST ($ in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1722 CV Weapons Elevator Improvements	485	851	1,010	1,026	1,055	1,077	1,106	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides for the advanced development, fabrication, test, evaluation and documentation of standardized aircraft carrier weapons elevators components such as control systems, hoist machinery, doors and hatches. Emphasis is placed on the improvement of safety, reliability, maintainability, watertight integrity and weight reduction.

(U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($430) Conducted variable speed AC drive and platform position sensor tests on LBES.
- (U) ($41) Identified & procured linear actuating sys for use on weapons elevator doors & hatches.
- (U) ($14) Watertight door gasket testing.

2. (U) FY 1998 PLAN:

- (U) ($350) Develop imbedded sensors for monitoring elevator equipment condition.
- (U) ($324) Install and test linear actuating system for elevator doors at LBES.
- (U) ($77) Conduct investigation of alternative elevator overspeed governor designs.
- (U) ($100) Test wire rope coatings to prevent internal corrosion at termination.

3. (U) FY 1999 PLAN:

- (U) ($400) Conduct investigation and engr analysis for integration of multiple elevator PLCs.
- (U) ($400) Continue development and procurement of alternative elevator overspeed governors.
- (U) ($210) Complete development and testing of imbedded sensors in conjunction with PLC.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	486	877	1,036
(U) Appropriated Value:	506	877	0
(U) Adjustments to FY 1997/1998 Appropriated Value/ FY98 President's Budget:			
a. Various pricing adjustments	-21	-26	-26
(U) FY 1999 PRESBUDG Submit:	485	851	1,010

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 97, FY 98 and FY 99 decreases reflect various pricing adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: Not applicable.

D. (U) SCHEDULE PROFILE:

FY 1997 FY 1998 FY 1999

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S1722
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Weapons Elevator Improvements

Program Milestones		3Q Complete Overspeed Governor Investig.	2Q Complete Multiple PLC Investigations
Engineering Milestones		4Q Complete Imbedded Sensor Research	
T&E Milestones	3Q Complete AC Drive Test	4Q Complete Linear Drive Test	3Q Complete Imbedded Sensor Test
Contract Milestones	4Q Procure Linear Drive System		2Q Procure Overspeed Governor

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT NUMBER: S2208/22208 PROJECT TITLE: Future CV R&D

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
22208 Future CV R&D	7,663	11,883	149,505	167,660	135,855	150,174	218,048	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides for the development of aircraft carrier (CV/CVN) specific technologies, the infusion of the surface ship technology base into existing and future aircraft carriers and the potential realization of subsystem design capabilities not currently feasible. This project transitions the most promising technologies from the Navy technology base, other government laboratories, and the private sector into specific advanced development efforts. All systems developed in this project have the potential to support emerging requirements and other promising systems technologies for insertion into new aircraft carrier designs. The emphasis is directed toward developing ship hull, mechanical, electrical, aviation and combat support systems, sub-systems and components to significantly improve aircraft carrier affordability, survivability, and operational capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of future aircraft carriers.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

($7,663) Carrier Technology Assessment and Affordability: Continued engineering assessment of alternative ship design concepts, improved aircraft carrier design tools and assess aircraft carrier design criteria. Evaluated cost and capabilities of design concepts. Continued development of a comprehensive roadmap for future sea-based tactical aviation platforms. Continued assessment of design concepts of simplified systems for selected candidates from the structural system, auxiliary and fluid systems and design concepts for selected standard, modular-packaged subsystems and components. Continued engineering assessment of candidate subsystems and components that could be made common with other surface and submarine subsystems and components to reduce total Navy logistic support costs and simplify ship installation. Continued assessment of alternative propulsion system configurations. Continued development of selected auxiliary machinery modules to complement simplified distributive system architectures for improved affordability.

2. (U) FY 1998 PLAN:

- ($1,500) Commence improvement of aircraft carrier design tools and assess aircraft carrier design criteria.

- ($8,766) Commence propulsion plant alternatives assessments including nuclear and conventional power generation, integrated machinery controls, integrated electric power systems and advanced auxiliary systems.

- ($1,000) Commence development of advanced passive survivability concepts including armor, underbottom, side protection systems and carrier-suitable, pro-active, tactical and damage response systems for incorporation on current and future aircraft carriers.

- ($617) Assess emerging technologies to enable significant reductions in manpower requirements and incorporate on current and future aircraft carriers.

3. (U) FY 1999 PLAN:

- (U) ($ 2,314) Continue improvement of aircraft carrier design tools and assess aircraft carrier design criteria.

- (U) ($ 60,691) Continue development of advanced aircraft launch alternatives including an Advanced Technology Aircraft Launcher (ATL), flight deck aviation support such as ski jump integration, development an integrated rapid aircraft turnaround capability to reduce manpower on the flight deck, and development of an Aviation Weapons Information Management System for incorporation on current and future aircraft carriers.

- (U) ($55,000) Continue propulsion plant alternatives assessments including nuclear and conventional power generation, integrated machinery controls, integrated electric power systems and advanced auxiliary systems.

- (U) ($17,000) Continue development of advanced passive survivability concepts including armor, underbottom, side protection systems and carrier-suitable, pro-active, tactical and damage response systems for incorporation on current and future aircraft carriers.

- (U) ($ 7,500) Continue assessment of alternatives for carrier-suitable integrated information management resources such as a common shipwide computing plant architecture and functional applications; and assess emerging technologies to enable development of advanced carrier topside systems/designs including adjunct multi-function sensor concepts to perform aircraft control and landing guidance functions and design concepts to address RF emission and signature for incorporation on current and future aircraft carriers.

- (U) ($ 7,000) Continue to assess emerging technologies to enable significant reductions in manpower and incorporation on current and future aircraft carriers.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	5,771	90,246	102,242
(U) Appropriated Value:	6,017	90,246	0
(U) Adjustments to FY 1997/98 Appropriated Value/ FY98 President's Budget:			
a) Various pricing adjustments	1,646	-363	-2,737
b) Program Adjustment		-78,000	
c) Program Adjustment			50,000
(U) FY 1999 PRESBUDG Submit:	7,663	11,883	149,505

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97, FY 98 and FY 99 changes reflect various pricing adjustments.

(U) Schedule: FY 98 funding decrease caused delay in ATL DEMVAL award to 2Q FY 99 and delay of Armor and ATL PDR to FY 2000.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.
(U) RELATED RDT&E:
(U) PE 0603564N Ship Preliminary Design & Feasibility Studies
(U) PE 0604567N Ship Contract Design and Live Fire Test and Evaluation

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROGRAM ELEMENT TITLE: Carrier Systems Development

PROJECT NUMBER: S2208/22208 PROJECT TITLE: Future CV R&D

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones	CVX: 4Q COEA PART I		CVX: 1Q COEA PART II
Engineering Milestones			
T&E Milestones			
Contract Milestones			ATL: 2Q DEMVAL AWARD

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Systems Engineering	6,879	11,883	135,505
b. Software Development	500	0	2,500
c. Primary Hardware	0	0	11,500
d. Travel	60	0	0
e. Miscellaneous	224	0	0
Total	7,663	11,883	149,505

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Naval Surface Warfare Center, Carderock Division, Bethesda, MD										
NSWC/CD	WR	Mar 96	Cont.	Cont.	2,505	1,030	360	17,042	Cont.	Cont.
Naval Sea Systems Command Detachment, (PERA CV)										
PERA CV	WR	Feb 97	Cont.	Cont.	25	103	0	500	Cont.	Cont.
Naval Surface Warfare Center, Ship Systems Engineering Station, Philadelphia, PA										
NAVSSES	WR	Feb 96	Cont.	Cont.	295	521	0	500	Cont.	Cont.
Naval Surface Warfare Center, Dahlgren Division, Dahlgren, VA										
NSWC/DD	WR	Apr 96	Cont.	Cont.	515	319	0	15,000	Cont.	Cont.
Naval Surface Warfare Center, Port Hueneme Division, Port Hueneme, CA										
NSWC/PHD	WR	Apr 96	Cont.	Cont.	25	5	0	0		
Naval Air Warfare Center, Aircraft Division, Lakehurst, NJ										
NAWC AD LKE	WR	Feb 96	Cont.	Cont.	1,780	1,465	985	55,600	Cont.	Cont.
Naval Air Warfare Center, Aircraft Division, Patuxent River, MD										
NAWC AD PAX	WR	Feb 97	Cont.	Cont.	15	45	15	2,000	Cont.	Cont.
NCCOSC Research and Development Division, San Diego, CA										
NRaD	WR	Mar 96	Cont.	Cont.	220	40	0	0		
Space and Naval Warfare Systems Center, San Diego, CA										
SPAWAR	PD	Oct 98	Cont.	Cont.	0	0	0	5,000		
Naval Research Laboratory, Washington, DC										
NRL	WR	Feb 96	Cont.	Cont.	330	140	0	5,000	Cont.	Cont.

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development (cont'd)										

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

Supervisor of Shipbuilding, Conversion and Repair, Newport News, VA										
SOSNN	WR	Jun 96	Cont.	Cont.	245	0	0	0	Cont.	Cont.
Naval Air Warfare Center, Weapons Division, China Lake, CA										
NAWC/CL	WR	Oct 98	Cont.	Cont.	0	0	0	500	Cont.	Cont.
John J. McMullen Associates, Arlington, VA										
JJMA	Contr.	Feb 96	Cont.	Cont.	1,500	1,614	685	2,000	Cont.	Cont.
Advanced Marine Enterprises, Inc., Arlington, VA										
AME	Contr.	Apr 96	Cont.	Cont.	301	580	879	2,000	Cont.	Cont.
George G. Sharp, Inc., Arlington, VA										
GGS	Contr.	Apr 96	Cont.	Cont.	20	0	0	500	Cont.	Cont.
M. Rosenblatt & Son, Inc., Arlington, VA										
MRS	Contr.	Apr 96	Cont.	Cont.	245	65	630	500	Cont.	Cont.
American Systems Corporation, Reston, VA										
ASC	Contr.	Feb 96	Cont.	Cont.	240	165	0	300	Cont.	Cont.
ROH, Inc., Arlington, VA										
ROH	Contr.	Mar 96	Cont.	Cont.	105	155	0	300	Cont.	Cont.
Newport News Shipbuilding, Newport News, VA										
NNS	Contr.	Jun 96	Cont.	Cont.	200	0	0	0		
Naval Nuclear propulsion Program										
SEA 08	Misc.	Oct 97	Cont.	Cont.	0	0	6,000	35,000	Cont.	Cont.
Contractors										
(TBD)	Misc.	Oct 96	Cont.	Cont.	0	1,161	2,299	7,263	Cont.	Cont.
Miscellaneous										
Misc.	Misc.	Aug 95	Cont.	Cont.	149	255	30	500	Cont.	Cont.

Support and Management: Not Applicable

Test and Evaluation: Not Applicable

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	8,715	7,663	11,883	149,505	Cont.	Cont.
Subtotal Support and Management	0	0	0	0		
Subtotal Test and Evaluation	0	0	0	0		
Total Project	8,715	7,663	11,883	149,505	Cont.	Cont.

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RDT&E PE/Project Cost Breakdown
(Exhibit R-3, Page 12 of 25)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

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FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W1723
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Launch & Recovery Systems

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1723 CV Launch and Recovery Systems	2,621	3,158	2,623	1,876	4,635	1,368	4,331	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project addresses the Demonstration and Validation (DEMVAL) of advanced systems to meet Navy unique shipboard operational requirements for:

(U) DEMVAL of critical components of the Electromagnetic Aircraft Launch System (EMALS) including the launch engine and its associated power generation, storage and distribution system.

(U) Development of advanced optical, electro-optical and laser tracking, approach and landing control and guidance systems, and air operations reporting systems for pilots, Landing Signals Officers (LSOs), and ship's force. The Virtual Imaging System for Approach and Landing (VISUAL) will provide ship's force and the pilots with enhanced images of the aircraft and ship in low visibility and night conditions. The Shipboard Optical Landing System (SOLS) will provide advanced visual landing aids (VLA) for fixed wing, rotary wing and Vertical/Short Take-Off and Landing (VSTOL) aircraft, so that pilots can fly safer and more accurate approaches to all classes of ships.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($566) Conducted feasibility investigations for launcher motors and power storage mechanizations and concluded engineering support for the EMALS advanced development model (ADM). EMALS support will be continued under the Advanced Technology Launcher (ATL) program in Project 22208 as part of the CVX program.

- (U) ($2,055) Conducted a Milestone I decision to proceed with Program Definition and Risk Reduction phase of the VISUAL program. Initiated design and integration of the VISUAL, including establishment of fleet user and industry teams to provide user and industry inputs to the development process. Applicable technologies were investigated and system requirements were established at the VISUAL Systems Requirements Review (SRR). Provided engineering and management support to the program.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W1723
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Launch & Recovery Systems

(U) FY 1998 PLAN:

- (U) ($3,158) Continue design and integration of the VISUAL technology demonstration program and conduct technology demonstrations and evaluations of critical components. Continue user and industry involvement in the VISUAL development process. Results of this process will be reviewed during a Systems Design Review (SDR) and a preliminary Design Review (PDR) and will provide a system performance specification that is for the engineering development model (EDM) request for proposals (RFP). Provide engineering and management support to the program.

(U) FY 1999 PLAN:

- (U) ($2,623) Continue design and integration of the VISUAL technology demonstration program and continue critical component demonstration and evaluations. Issue the EDM RFP, evaluate proposals, select the EDM integration contractor and prepare for a MS II decision to proceed to the Engineering and Manufacturing Development (E&MD) phase. Provide engineering and management support to the program, particularly for the transition from the PS&RR phase to the E&MD phase of the program.

B. (U) PROGRAM CHANGE SUMMARY: (Dollars in thousands)

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,124	3,255	2,612
(U) Appropriated Value:	2,231	3,255	
(U) Adjustments from FY 1997/1998 Appropriated Value/FY98 President's Budget:			
a. Various pricing adjustments	390	-97	11
U) FY 1999 PRESBUDG Submit:	2,621	3,158	2,623

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 97, FY 98 and FY 99 changes reflect various pricing adjustments.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W1723
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Launch & Recovery Systems

(U) Schedule: Changes in the Milestone schedule are due to the effect of the loss of $2M in 6.4 RDT&E funding in FY 99. This required a deferral of the MS II decision and the transition to E&MD to the 1Q FY00.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0602122N (Aircraft Technology)

(U) PE 0604512N (Shipboard Aviation Systems)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones	VISUAL: 3Q MSI		VISUAL: 4Q MSII
Engineering Milestones		VISUAL: 4Q SDR VISUAL: 4Q PDR	VISUAL: 2Q RFP
T&E Milestones		VISUAL: 2Q DT (03-09/98)	
Contract Milestones			VISUAL: _Q EDM RFP

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT NUMBER: W1723 PROJECT TITLE: CV Launch & Recovery Systems

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	1,783	1,650	1,400
b. Software Development	446	984	723
c. Integrated Logistics Support	150	197	258
d. Development Test & Evaluation	242	327	242
Total	2,621	3,158	2,623

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W1723
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Launch & Recovery Systems

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Naval Air Warfare Center Aircraft Division, Lakehurst, NJ										
NAWCAD-LKE	WX 10/97	N/A	N/A		13,753	2,621	3,158	2,623	Cont.	Cont.
Kaman Electromagnetics, Hudson, MA										
Kaman EM	CPFF	12/92	4,900	4,900	1,840	0	0	0	3,060	4,900
Miscellaneous, Navy										
Misc.	WX	9/95	32,432	32,432	1,277	0	0	0	Cont.	32,432
Support and Management:					200	0	0	0	0	200

Test and Evaluation: Not applicable

GOVERNMENT FURNISHED PROPERTY: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W1723
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Launch & Recovery Systems

	FY 1996 & Prior	FY 1997 Budget	FY1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Production Development	16,870	2,621	3,158	2,623	Cont.	Cont.
Subtotal Support and Management	200					
Subtotal Test and Evaluation	0					
Total Project	17,070	2,621	3,158	2,623	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W2269
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT Title: EAF Matting

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2269 EAF Matting	2,786	4,084	1,169	3,471	0	0	0	0	11,510

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project addresses the Demonstration and Validation (DEMVAL) of lightweight airfield mat and expeditionary arresting gear to meet naval aviation unique Expeditionary Airfield (EAF) operational requirements including transportability requirements on Maritime Prepositioning Ships (MPS).

(U) The EAF mat presently available (AM-2) was developed for heavy fighter aircraft operations, such as the F-4, and is heavy and cumbersome to deploy. Lightweight (1/2 the weight of AM-2) and less voluminous (1/2 the volume of AM-2) mat material may be technically feasible and commercially available, but the potential materials must be evaluated for use with current type/model/series naval and Air Mobility Command (AMC) aircraft at Vertical and Short Take-Off and Landing (VSTOL) airfields ashore. Current aluminum matting requires approximately 15 days to install a complete airfield. Potential material will meet Marine Corps requirements to install complete airfield in five days or less. Candidate mat materials under consideration for continuation of this on-going evaluation program include reinforced synthetic composite materials and polyvinyl fiberglass. These mat materials will be configured and evaluated for the Marine Corps operational scenarios.

(U) The expeditionary arresting gear program will provide the Marine Corps with the capability to conduct short span arrestments of all Navy and Marine Corps tail hook aircraft in the expeditionary environment. The current M-21 arresting gear cannot be adapted to operate on short span (less than 100 feet) surfaces and is incapable of arresting the full inventory of aircraft under casualty (no flaps or half flap) conditions. Installation of the M-21 requires 24 hours, extensive excavation and heavy support equipment. The M-21 has inadequate reliability and several replacement components are no longer produced. The replacement gear will provide transportability, rapid setup, full inventory operational capability under all arrestment conditions, and adequate operational reliability.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($ 49) Procured limited amounts of candidate mat, test materials for EAF landing sites.
- (U) ($2,737) Validated absorber, tape and cross deck pendant design and performance. Developed system requirements for mobility, auxiliary and anchoring subsystems prior to integration and demonstration of full system capability.

(U) FY 1998 PLAN:

- (U) ($ 67) Evaluate candidate materials to determine heat resistant and load bearing properties.
- (U) ($4,017) Validate mobility, auxiliary and anchoring subsystem alternatives. Conduct system integration studies and develop prototype designs.

(U) FY 1999 PLAN:

- (U) ($1,169) Fabricate full scale system prototypes suitable for validation of concepts in a test and controlled operational environment.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT NUMBER: W2269 PROJECT Title: EAF Matting

B. (U) PROGRAM CHANGE SUMMARY: (Dollars in thousands)

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,991	4,209	2,673
(U) Appropriated Value:	3,991	4,209	0
(U) Adjustments from FY 1997/1998 Appropriated Value/FY98 President's Budget:			
a. Various pricing adjustments	-1,205	-125	-1504
(U) FY 1999 PRESBUDG Submit:	2,786	4,084	1,169

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97, FY 98 and FY 99 changes reflect various pricing adjustments.

(V) Schedule: Delays in developing and coordinating program documentation (ORD) delayed the release of the Request for Proposal. The following milestones are changed as a result: A/G RFP release from 2Q/97 to 1Q/98 and A/G MS I from 1Q/97 to 2Q/98. All other schedule changes since the President's budget were added to provide additional program details.

From:	To:
MAT DT 4Q/97	MAT DT 2Q/98
A/G MS I 1Q/97	A/G MS I 2Q/98
A/G RFP 2Q/97	A/G RFP 1Q/98

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT NUMBER: W2269 PROJECT Title: EAF Matting

(U) EAF OPN (PE 0206139M, Expeditionary Airfields)

0	0	0	0	5,605	4,504	4,600	Cont.	Cont.

(U) RELATED RDT&E: Not applicable.

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones		A/G: 2Q MS I	
Engineering Milestones			A/G: 1Q CDR A/G: 2Q Release prototype
T&E Milestones	A/G: 4Q Subsys Test	Mat:2Q DT	
Contract Milestones		A/G: 1Q RFP Release A/G: 2Q Contract Award	

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W2269
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT Title: EAF Matting

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	2,554	3,803	992
b. Software Development	0	0	0
c. Integrated Logistics Support	232	281	177
d. Development Test & Evaluation	0	0	0
Total	2,786	4,084	1,169

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Naval Air Warfare Center Aircraft Division, Lakehurst, NJ										
NAWCAD-LKE	WX	9/30/96	2,786	2,786	0	2,786	1,084	169	2,000	6,039
TBD	CPFF	3/32/98	6,967	6,967	0	0	3,000	1,000	1,471	5,471

Support and Management: Not applicable.

Test and Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable

FY 1997	FY 1998	FY 1999	To	Total

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603512N

PROGRAM ELEMENT TITLE: Carrier Systems Development

PROJECT NUMBER: W2269

PROJECT Title: EAF Matting

	Budget	Budget	Budget	Complete	Program
Subtotal Production Development	2,786	4,084	1,169	3,471	11,510
Subtotal Support and Management	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0
Total Project	2,786	4,084	1,169	3,471	11,510

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0382 - Shipboard Auxiliary Systems Development	15,828	7,013	13,315	11,333	6,789	11,037	11,424	CONT	CONT
S1712 - Hull, Mechanical & Electrical Improvement	1,576	11,613	14,410	13,837	17,297	19,214	15,193	CONT	CONT
S2390 - Molten Carbonate Fuel Cell	0	3,396	0	0	0	0	0	0	3,396
TOTAL	17,404	22,022	27,725	25,170	24,086	30,251	26,617	CONT	CONT

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program develops affordable non-propulsion machinery systems, components, and improvements for current and future surface fleet Hull, Mechanical and Electrical (HM&E) systems. It includes auxiliary machinery, hull and deck machinery, Fiber Optic (FO) systems, shipboard corrosion control, HM&E materials, Underway Replenishment (UNREP), and ship salvage systems. The integrated topside design portion of this program element develops and integrates the necessary technologies to achieve a total integrated topside architecture focused on future surface combatant ships. Technology areas including topside signature control, sensor and antenna integration, weapon system integration, HM&E integration, related decision making tools, and composite materials will be addressed. Other stand alone technology programs will be synergistically integrated with the topside design integration effort to assure total ship systems integration for future ship design efforts. Surface combatants will need an added (stealth) layer of defense to support hardkill and softkill systems in defeating future threats. Composite materials will be considered for their corrosion control and reduced maintenance attributes. Fiber optics development includes the distributed combat systems under the Integrated Interior Communication and Control ((IC)2) total shipwide network engineering, Fiber Optic Data Multiplexing System (FODMS (1) & (2)), fiber optic shipboard cable topology, analog and digital optoelectronic interfaces, passive optical sensors, and local area network installation projects. The fiber optic program was terminated in FY 1997.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603513N

PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

(U) The program is closely coordinated with Advanced Surface Machinery Program (ASMP), formerly Integrated Electric Drive. The program does not duplicate any efforts and is independent of ASMP.

(U) System developments in the Shipboard Auxiliary Systems Development Project (S0382) are usually ACAT IVT or IVM. The HM&E Improvement Project (S1712) is non-ACAT, resulting primarily in new specifications, standards, and operating procedures. The program uses technology from industry and Navy exploratory development programs, evaluates breadboard units in the laboratory, and develops prototype equipment for technical and operational evaluation in Navy platforms and facilities. Thrusts are directed towards improved affordability, performance, producibility, service life, reliability and maintainability, signature reduction, safety, commonality, and standardization, and towards reduced life cycle and acquisition costs, and reductions in weight, volume, and manning. Systems generally apply to all ships and many components may be backfitted during overhauls or equipment replacements, or implemented relatively late in a new ship design cycle. This presents many windows of opportunity to transition technology to the current and future fleet.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under demonstration and validation because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROGRAM ELEMENT TITLE: Shipboard Systems Component Development PROJECT NUMBER: S0382 PROJECT TITLE: Shipboard Auxiliary Systems Development

(U) COST (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0382 - Shipboard Auxiliary Systems Development	15,828	7,013	13,315	11,333	6,789	11,037	11,424	CONT	CONT

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project primarily supports ACAT IV projects that develop shipboard fiber optics and auxiliary machinery components and systems to improve affordability, performance, reliability, and maintainability and result in size, weight, and/or acquisition and life cycle cost savings. The auxiliary machinery HM&E developments include standard commercial based components applying new technology which provide the existing and future fleet affordability through reductions in logistics piece part proliferation including low and high pressure air systems, pumps, and advanced water systems to make and disinfect potable water. The project addresses development of machinery and systems architectures to reduce future ship acquisition and operating costs with advanced machinery, advanced degaussing, controllers, solid state power electronics, power generation including fuel cells, new underway replenishment concepts and salvage systems. Fiber Optic Topology provides the criteria and specifications for the design, implementation and installation of the physical cable plant on board ship to support data transmission requirements. Fiber optic sensors measure parameters such as pressure, temperature, speed (revolutions per minute) and physical separation (limit switches). This program area also provides performance specifications for shipboard use. $(IC)^2$ will coordinate and integrate the development of hardware and software to provide total-shipwide communications for combat systems networking based on standard open architecture networks. The fiber optic program was terminated in FY 1997.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($7,443) Continued development of advanced machinery for HM&E systems to reduce operational, manning, and maintenance costs. Developed design for land based demonstration of automated low pressure air system using component level intelligent distributed control system (CLDCS). Initiated design of land based demonstration of automated chilled water system with CLDCS. Completed Labeval/Shipeval prototype high pressure membrane dehydrator. Completed design and initiated fabrication of auxiliary multi-functional Power Electronic Building Block (PEBB) power converter. Completed Labeval and installation of ground fault locator (GFL) on DDG-74.

Awarded contracts for polymer current limiter (PCL) development for fuse replacement. Completed standard family composite centrifugal pumps and Electrolytic Disinfectant Generator (EDG) Techevals and prepared for MS III approval. Developed eddy current field measurement capability for surface combatant. Completed joint NAVSEA, CNO, and ONR fuel cell development plan for ship service applications. Awarded contract for full-scale 2500 kw ships service molten carbonate fuel cell (MCFC), design. Developed interagency plan for Navy/Marine fuel cell applications. ($915K used to forward finance FY98 program due to termination of Fiber Optics.)

- (U) ($1,482) Completed engineering and development of the Total Ship Integration Management (TSIM) process documentation for the integration of combat system, HM&E, engineering, logistics, and administrative networks for LPD-17. Completed development of Program Integrated Design Environment (PRIDE) database and documentation to support new, upgrade, and SHIPALT design efforts. Upgraded and completed distributed (IC)2 engineering and integration developmental facility. Completed design of potential user systems utilizing the developmental ATM (IC)2 network/backbone. Completed shipboard application of Asynchronous Transfer Mode (ATM) technology. Executed Air Blown Fiber evaluation plan for Navy shipboard fiber optic cable plant installations. Completed conversion of Mil-Specs/Stds to performance/industry standards in accordance with acquisition reform strategy.

- (U) ($400) Completed development of the Underwater Inspection Sensors; completed development of the Towline Extreme Tension Model for Program of Ship Salvage Engineering (POSSE) and USN Tow Manual; and initiated development of the Under Water Closed Circuit Blasting System; and Transient Analysis Model for Programs of Ship Salvage Engineering (POSSE).

- (U) ($6,503) Supported development and implementation of prototype/demonstration ship control and monitoring systems, including hardware and software concepts, to minimize manning on surface combatants.

2. (U) FY 1998 PLAN:

- ($6,613) Continue development of advanced HM&E machinery and systems to reduce operational manning, and eliminate at-sea maintenance. Conduct laboratory evaluations and demonstrate proof of concept for reduced manning of auxiliary machinery and system architectures. Develop design tools to minimize the need for full-scale land based demonstrations of other auxiliary systems. Continue development of PEBB modules, PCL, fuel cells, alternative cells for EDG, and seals for composite pumps. Obtain MS III approval for EDG and composite pumps. Complete Labeval of auxiliary multi-functional PEBB based power converter and concurrent engineering of design to improve performance. Award contract for PEBB brassboard using next generation PEBB semi-conductor devices.

Complete Shipeval of GFL and prepare performance spec for Fleet applications. Conduct Labeval of prototype PCL fuse replacements. Complete eddy current field measurements on surface combatant and tests on LPD-17 physical magnetic model under various load conditions. Initiate development of a magnetic on-board self monitoring and control system ((Closed Loop Degaussing (CLDG)) for steel hulled surface combatants. Complete MCFC 2500kw full scale conceptual design and plan for reduced scale demonstrator. Continue fuel cell development for ship service power applications. ($915k used to forward finance FY98 program due to the termination of Fiber Optics.)

- (U) ($400) Continue development of the Transient Analysis Model for POSSE; the Under Water Closed Circuit Blasting System; and initiate development of the Remotely Operated Vehicle (ROV) Power System.

3. (U) FY 1999 PLAN:

- (U) ($12,865) Continue development of advanced HM&E machinery and systems architectures to reduce manning and eliminate at-sea maintenance. Initiate full scale demonstration of automated chilled water and other auxiliary systems with component level Intelligent Distributed Control System. Continue development of PCL, PEBB modules, and fuel cells. Continue design and development of reduced scale fuel cell demonstrator. Complete upgrade of PEBB based auxiliary power converter and conduct Labeval. Complete GFL algorithm development and implementation. Continue PCL development for PEBB protection applications. Continue development of CLDG for steel hulled surface combatant including onboard sensor suites and control algorithms. Specify and initiate procurement of CLDG components and initiate installation and demonstrations.

- ($450) Complete development of the Under Water Closed Circuit Blasting System; complete development of the ROV Power System and Transient Analysis Model for POSSE. Initiate development of the Improved Shaft Coating System.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S0382
PROJECT TITLE: Shipboard Auxiliary Systems Development

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	16,393	7,227	16,135
(U) Appropriated Value:	17,091	7,227	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	-1,263	-214	-2,820
(U) FY 1999 PRESBUDG Submit:	15,828	7,013	13,315

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $1263K reflects minor pricing adjustments (-$545K) and general undistributed reductions (-$718K).

FY 1998: Decrease of $214K reflects minor pricing adjustments (-$16K) and general undistributed reductions (-198K).

FY 1999: Decrease of $2,820K reflects Auxiliary Systems program adjustment (-$2,600K) and minor pricing adjustments reductions (-$220K).

(U) Schedule Changes: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not Applicable.
(U) RELATED RDT&E: Not Applicable.
(U) RELATED RDT&E:
(U) PE0602121N, Surface Ship Technology
(U) PE0603555N, Undersea Superiority Technical Demonstration
(U) PE0603573N, Advanced Surface Machinery Program (ASMP)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0603513N | PROGRAM ELEMENT TITLE: Shipboard Systems Component Development | PROJECT NUMBER: S0382 | PROJECT TITLE: Shipboard Auxiliary Systems Development

D. (U) SCHEDULE PROFILE:

Program Milestone	FY 1997	FY 1998	FY 1999
FIBER OPTICS	4Q FO Comml Stds,Cable Plant Pride Dbase, ATM Network Tech		
AUXILIARY MACHINERY	4Q PCL Proto 4Q MCFC Contract Award	1Q EDG MS III 2Q Comp Pump MS III 2Q Labeval PCL 4Q MCFC 2500 kw Design 4Q 2nd Gen PEB contract 4Q Comp GFL Shipeval	4Q GFL Spec 4Q PEBB Labeval Complete
SALVAGE	1Q ROV Sys Study 4Q Salvage Sensors 4Q Towline Extreme Tension Model	2Q Initiate ROV Power System Development	4Q UW Closed Circuit Blast System 4Q Trans Anal. Model 4Q ROV Power System
SMART SHIP	1Q Initiate Demo 4Q Complete Demo		
MAGNETIC SILENCING	4Q Eddy Current Measurement Sys Def	4Q LPD-17 Model Compl 4Q Eddy Current Tests on Surface Combatant	1Q Adv Deg ATD Trans to Surf Comb 4Q CLDG Sys for Surf Comb Def
ADVANCED AUXILIARIES	4Q LP Air Sys Sim, Design	4Q LP Air & Chilled Water LABEVAL Proof of Concept 4Q Initial Economic Analysis	4Q New Sys Arch Concepts to support reduced manning 4Q Baseline Functional Control Sys Des 4Q Val Chilled Water Sim & Des Tools

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603513N

PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S0382

PROJECT TITLE: Shipboard Auxiliary Systems Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Auxiliary Machinery	7,443	6,613	12,865
b. Fiber Optic	1,482	0	0
c. Salvage	400	400	450
d. Smart Ship	6,503	--	--
TOTAL	15,828	7,013	13,315

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S0382 PROJECT TITLE: Shipboard Auxiliary Systems Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:										
Ingersoll-Dresser Pump										
Philips./NJ	C/CPFF	3/92			5,900	500	0	0	0	6,400
ElTech International										
Clevelnd,OH	C/CPFF	12/88			3,810	125	0	0	0	3,935
Energy Research Corporation										
Danbury, CT	C/CPFF	9/97			0	1,600	0	0	0	1,600
TBD	C/CPFF	Various			3,953	1,000	1,000	2,000	Cont	Cont
Misc Contr.	Various	Various			11,793	6,236	1,000	1,226	Cont	Cont
NSWC/Dahl.	WR	Various			6,191	0	0	0	0	6,191
NSWC/CD	WR	Various			12,846	3,300	4,241	9,218	Cont	Cont
NAVSSES/Ph	WR	Various			0	700	0	0	0	700
NCCOSC, SD	WR	Various			1,067	700	0	0	Cont	Cont
MiscGovtLab	WR	Various			27,068	1,667	772	871	Cont	Cont
Support and Management:										
Misc.	C/CPFF	Various			159	0	0	0	0	159

Test and Evaluation: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603513N

PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S0382

PROJECT TITLE: Shipboard Auxiliary Systems Development

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	72,628	15,828	7,013	13,315	Cont	Cont
Subtotal Support and Management	159	0	0	0	0	159
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	72,787	15,828	7,013	13,315	Cont	Cont

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712 PROJECT TITLE: HM&E Improvement

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1712 - Hull, Mechanical & Electrical Improvement	1,576	11,613	14,410	13,837	17,297	19,214	15,193	CONT	CONT

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project is non-ACAT and develops improved equipments which are small but critical components of non-propulsion HM&E systems. The program is directed toward improved affordability, performance, reduced life cycle cost, reliability and maintainability, signature reduction, standardization, and weight and manning reductions for the existing and future fleet. The integrated topside design portion of this program element develops and integrates the necessary technologies to achieve a total integrated topside architecture focused on future surface combatant ships. Technology areas including topside signature control, sensor and antenna integration, weapon system integration, HM&E integration, related decision making tools, and composite materials will be addressed. Other stand alone technology programs will be synergistically integrated with this topside design integration effort to assure total ship systems integration for future ship design efforts. Surface combatants will need an added (stealth) layer of defense to support hardkill and softkill systems in defeating future threats. Composite materials will also be considered for their corrosion control and reduced maintenance attributes.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($710) Continued development of affordable mechanical, electrical and hull and deck machinery. Completed development of 1- thru 6-inch Navy Standard Glass Reinforced Plastic (GRP) Ball Valves. Awarded contract to conduct trade-off analysis ship impact study of affordable efficient ships service power generation. Completed Labeval of alternate diesel starting systems.

- (U) ($866) Completed long-term project plan that defines design tools, signature data, subcomponents, components, and full scale prototypes necessary to demonstrate topside design integration concepts, including composite materials for future surface combatants. Established the total signature budget for the next generation surface combatant systems and subsystems that distributes the signature over the platform. Evaluated composite materials for their corrosion control and reduced maintenance attributes. Completed initial entry into composite materials data base. Drafted and formalized a long term Signature Management Plan (SMP) for implementation of reduced

signature technology within the ship acquisition cycle and produce definitive component signature goals for topside equipments anticipated on future ship designs. Began scale model development work to refine computer assessments on ship signatures predictions and goals with emphasis on major hullform and superstructure arrangements.

2. (U) FY 1998 PLAN:

- (U) ($952) Continue development of affordable mechanical and electrical machinery including feasibility study of commercial ship service genset and pump seal technology. Complete qualification of 12-inch GRP ball valve, develop ball valve flow control and 3 way valve technology.

- (U) ($10,661) Define multi-function radar-communication antenna system. Identify common platform for integrated topside design toolset implementation. Initiate development of integrated topside design toolset. Develop preliminary design concepts for integrated topside design prototype components. Develop and initiate validation of composite design procedures. Evaluate composite materials for their corrosion control and reduced maintenance attributes. Transition signature requirements and goals into concept formulation for HM&E elements, aviation systems, etc. Continue computer, testing, and scale modeling signature assessments. Assess major signature component tradeoffs and begin formulation of detailed specifications for topside components. Support transition of Advanced Enclosed Mast/Sensor (AEM/S) System to LPD-17 topside.

3. (U) FY 1999 PLAN:

- (U) ($963) Continue development of improved HM&E auxiliary components for improved maintenance and reliability. Complete ship service genset feasibility study and ball valve development.

- (U) ($13,447) Continue development of integrated topside design toolset. Initiate fabrication concepts of integrated topside surface ship prototype components. Continue development and validation of composite design procedures. Consider composite materials for their corrosion control and reduced maintenance attributes. Conduct advanced engineering analysis and article testing for reduced signature topside features and components. Produce advanced computer and scale modeling predictions for detailed components and basic ship arrangements. Produce specifications and drawings for reduced signature topside components. Support transition of AEM/S to LPD-17 topside.

B. PROGRAM CHANGE SUMMARY:

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712 PROJECT TITLE: HM&E Improvement

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,589	11,967	14,826
(U) Appropriated Value:	1,657	11,967	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	-81	-354	-416
(U) FY 1999 PRESBUDG Submit:	1,576	11,613	14,410

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $81K reflects minor pricing adjustments (-$13K) and general undistributed reductions (-$68K).

FY 1998: Decrease of $354K reflects minor pricing adjustments ($26K) and general undistributed reductions ($-328K).

FY 1999: Decrease of $416K reflects minor pricing adjustments.

(U) Schedule Changes: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE0602121N, Surface Ship Technology

(U) PE0603573N, Advanced Surface Machinery Program (ASMP)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603513N

PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712

PROJECT TITLE: HM&E Improvement

D. (U) SCHEDULE PROFILE:

Program Milestone	FY 1997	FY 1998	FY 1999
AUXILIARY MACHINERY	1Q Diesel Starting Compl	2Q 2 way ball valve family design	2Q Gen Set Compl 4Q 3 Way Ball Valve Design
ADVANCED COMPOSITES	4Q Signature Mgmt Plan	4Q Signatures Tradeoff Analysis 4Q Comp Joint Design Proc 4Q LPD 17 mast EM Design	4Q Reduced Signature Topside Design Perf Specs 4Q Final LPD 17 Mast EM/Sig/Struct Design 4Q Baseline Topside Design Toolset 4Q Comp Fire Perf Req

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712 PROJECT TITLE: HM&E Improvement

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. HM&E	710	952	963
b. Integr. Topside Design	866	10,661	13,447
TOTAL	1,576	11,613	14,410

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712 PROJECT TITLE: HM&E Improvement

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:										
Misc Contr.	Various	Various			245	403	2,451	1,342	Cont	Cont
JJMA	C/CPFF	Various			0	0	843	2,000	Cont	Cont
Boeing	C/CPFF	Various			0	0	1,608	2,000	Cont	Cont
Lockheed/ Martin	C/CPFF	Various			0	0	0	2,000	Cont	Cont
NSWCCD	WR	Various			1,599	1,063	4,686	2,104	Cont	Cont
NSWCDD	WR	Various			0	0	150	1,000	Cont	Cont
NRL	WR	Various			50	80	1,105	1,000	Cont	Cont
NSWCCD/Phil	WR	Various			0	0	0	600	Cont	Cont
NRaD	WR	Various			0	0	195	1,864	Cont	Cont
NAWC	WR	Various			0	30	0	500	Cont	Cont
NRaD	RC	Various			0	0	310	0	Cont	Cont
FISC	RC	Various			0	0	265	0	Cont	Cont

Support and Management: Not applicable.
Test and Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	1,894	1,576	11,613	14,410	Cont	Cont
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	1,894	1,576	11,613	14,410	Cont	Cont

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0384 Combat Survivability Design	2,256	2,000	2,076	2,088	2,138	2,180	2,232	CONT.	CONT.
S1121 Personnel Protection	1,805	0	0	0	0	0	0	0	48,245
S1565 Fire Protection/Damage Control Systems	4,070	4,840	5,519	5,625	5,756	5,869	6,003	CONT.	CONT.
TOTAL	8,131	6,840	7,595	7,713	7,894	8,049	8,235	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The advanced development of equipment/systems/engineering data and full scale weapons effects simulation will provide protection of ships and their personnel from conventional weapon effects, and enable the ship to continue performing assigned missions at an effective level. This program is also concerned with the effects of fire, smoke, and lethal environments created by peacetime accidents and the development of fire protection and damage control capabilities necessary to limit, control, and correct wartime and peacetime casualty situations.

(U) In FY 1998, P.E. 0603514N/S1121 efforts transitioned to P.E. 0604516N/S2054, Integrated Fire Protection/Damage Control. This zero-sum realignment is required since future work in this area will be primarily engineering/manufacturing development and T&E, vice demonstration and validation.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S0384
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Combat Survivability Design

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0384 Combat Survivability Design	2,256	2,000	2,076	2,088	2,138	2,180	2,232	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project supports the development of protection concepts, specifications, and standards to meet objectives of OPNAVINST 9070.1, "Survivability Policy for Surface Ships of the U.S. Navy", dtd 23 Sep 1988. Specifically, combatants must be able to deal with the degrading effects of damage from anti-ship missiles (ASMs), torpedoes, and mines. Additionally, the lessons learned from the Persian Gulf experience demonstrated the need to: (1) improve the resistance of the hull girder and equipment/ systems against underwater explosion (UNDEX) shock and whipping effects, and (2) provide protection to shipboard systems to ensure continuous combat capability.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($150) Finalized UNDEX resistant hull girder design manual. Transitioned to LPD-17 design and made available to DD 21 industry teams.

- (U) ($1,072) Completed UNDEX shock testing of 3 thousand pound capacity Advanced Ship Shock Isolation Systems Technology (ASSIST) mount designed to protect commercial electronic equipment installed on isolated rafts; prepared design drawings and ship design procedures. Completed systems integration and producibility studies. Initiated development of prototype ASSIST mount for protecting commercial machinery.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S0384
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Combat Survivability Design

1. (U) FY 1997 ACCOMPLISHMENTS (Continued):

- (U) ($1,034) Conducted scaled weapon effects tests of Integrated Magazine Protection System (IMPS) concepts to evaluate the effectiveness of water to suppress detonation effects. Conducted ship producibility studies to identify cost effective integration approaches.

2. (U) FY 1998 PLAN:

- (U) ($1,006) Fabricate a prototype ASSIST machinery mount; develop design drawings and ship design procedures. Initiate full scale UNDEX shock demonstration tests employing ASSIST mounts, raft, and commercial machinery.

- (U) ($994) Initiate full scale proof-of-concept IMPS demonstration tests employing multiple missiles warheads, threat stimuli, anti-fratricide shielding to prevent sympathetic detonation, and explosion suppression system; construct full scale models.

3. (U) FY 1999 PLAN:

- (U) ($1,119) Conduct full scale UNDEX shock demonstration tests of ASSIST machinery mounts, raft, and commercial machinery

- (U) ($957) Conduct full scale IMPS demonstration tests employing a shaped charge jet as the threat stimuli, initiating multiple warhead detonations. Develop preliminary ship installation design standards and drawing.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT NUMBER: S0384 PROJECT TITLE: Combat Survivability Design

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,195	2,062	2,116
(U) Appropriated Value	1,502	2,062	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget			
a. Adjustments	754	-62	-40
(U) FY 1999 PRESBUDG Submit	2,256	2,000	2,076

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 changes due to: +785K Near Term Mine Warfare Reprogram; -94K General Undistributed Reductions; and +63K Minor Pricing Adjustments. FY 1998 change due to -62K General Undistributed Reduction. FY 1999 change due to -40K Minor Pricing Adjustments.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S0384
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Combat Survivability Design

C. (U) OTHER PROGRAM FUNDING SUMMARY: Ship design changes such as UNDEX resistant hull designs included in new construction ship acquisition (SCN Funding). Procurement information not available at this level of detail.

(U) RELATED RDT&E:

(U) PE 0604516N, Project S1828 (Combat Readiness & Sustainability).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability

PROJECT NUMBER: S0384
PROJECT TITLE: Combat Survivability Design

D. (U) SCHEDULE PROFILE:

PROGRAM MILESTONES	FY 1997	FY 1998	FY 1999
Engineering Milestones	3Q UNDEX Hull Girder Design Manual		
	4Q ASSIST Electronics Mount /Design Drawings and Procedures	4Q ASSIST Machinery Mount/Design Drawings and Procedures	
			4Q IMPS Design Standards and Drawings (Preliminary)
T&E Milestones	2Q ASSIST UNDEX Electronic Mount Shock Tests		2Q ASSIST UNDEX Machinery Mount Shock Tests
	4Q IMPS Scaled Test		4Q IMPS Test

Contract Milestones: None

FY 1999 RDT&E,N PROGRAM ELEMENT PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S0384
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Combat Survivability Design

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Engineering Assessment/ Design Studies	285	250	190
b. Test and Evaluation	1,511	1,204	1,576
c. Specification/Design Standard Preparation	200	50	100
d. Hardware Development	250	486	200
e. Travel	10	10	10
TOTAL	2,256	2,000	2,076

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) (Not applicable)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT NUMBER: S1565 PROJECT TITLE: Fire Protection/Damage Control System

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1565 Fire Protection/Damage Control Systems	4,070	4,840	5,519	5,625	5,756	5,869	6,003	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Persian Gulf war lessons-learned highlighted the threat to ship's mission caused by fire, smoke, and flooding following an attack, and the need to execute more organized and effective DC actions. Additionally, the inability to rapidly restore vital hull, mechanical, and electrical (HM&E) systems following damage was also addressed.

(U) In that context, including peacetime lessons-learned, this project supports the development and evaluation of systems to enable the ship and crew under reduced manning to contain damage to the primary damage zone, and rapidly restore vital HM&E systems, providing for recovery of mission capability. Development areas include: 1) computer-based damage control assessment and monitoring systems to collect, analyze, and display, in real-time, key data on ship status and recommended DC actions for restoring vital HM&E services, 2) active and passive fire protection systems, and 3) advanced DC training systems which account for all aspects of combat induced damage, decision making in high stress environments, and recovery/ restoration.

1. (U) FY 1997 ACCOMPLISHMENTS :

- (U) ($413) Conducted shipboard T&E of final Real Time Stability Status (RTSS) software module integrated with flooding sensors and tank level indicators.

1. (U) FY 1997 ACCOMPLISHMENTS (Continued):

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT NUMBER: S1565 PROJECT TITLE: Fire Protection/Damage Control System

- (U) ($350) Completed prototype structural assessment software module that defines, for a damaged hull girder, sea state survival limits and recommends dewatering actions; initiated technical evaluation.
- (U) ($250) Conducted full scale fire testing aboard ex-USS SHADWELL to demonstrate the ability of advanced commercial fire detection systems to track fire parameters in real-time.
- (U) ($350) Continued development of a DCS firemain reconfiguration management module that supports rapid isolation and restoration following a rupture. Conducted land-based T&E of sensor option; developed specification.
- (U) ($475) Completed development of a prototype DCS systems reconfiguration management software module for chilled water and electrical systems that enables rapidly displaying system status; developed display guidelines.
- (U) ($1,011) Conducted fleet evaluations aboard the ex-USS SHADWELL to evaluate the effectiveness of DCS in reducing the number of personnel devoted to communications and plotting.
- (U) ($500) Completed development of time-dependent Advanced Survivability Assessment Program (ASAP) dynamic electrical model for use in assessing alternative system designs. Initiated development of fire and smoke spread model.
- (U) ($521) Initiated development of an interactive training system for improving interdepartmental coordination between Repair Locker Leader (RLL) and the Damage Control Assistant (DCA).

1. (U) FY 1997 ACCOMPLISHMENTS (Continued):

- (U) ($200) Completed assessment of current magazine sprinkler systems to provide sufficient cooling to prevent deflagrations under threat conditions. Developed performance-based specifications.

2. (U) FY 1998 PLAN:

- (U) ($450) Integrate RTSS software module with DCS to allow stability data to be presented from the DCS consoles. Conduct fleet evaluation aboard USS Rushmore.

- (U) ($350) Develop an on-line training capability for the DCS structural assessment module and finalize software based on lessons learned.

- (U) ($400) Initiate shipboard demonstration of DCS firemain reconfiguration management module utilizing a fully operational firemain to demonstrate shipboard compatibility and operational effectiveness.

- (U) ($200) Initiate conversion of the Damage Control Assessment Management System (DCAMS) software module used for tracking and locating portable DC assessments to run on the Windows NT operating system.

- (U) ($1,110) Initiate demonstration of HM&E services to automatically isolate, reconfigure and affect the appropriate DC response (e.g. initiate fire suppression) following damage. Alternative commercial control/communications technologies, survivable electric power, and fluid systems will be modeled on full scale to assess total system performance in a weapon effects environment. Initiate full scale demonstration tests for automated fire suppression.

2. (U) FY 1998 PLAN (Continued):

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control System

- (U) ($1,230) Initiate fleet evaluations aboard the ex-USS SHADWELL utilizing a complete DC command structure and the latest labor savings technologies to demonstrate the effectiveness of alternative reduced manning damage control concepts/architectures in responding to a major casualty.

- (U) ($150) Complete interactive training system for the RLL and DCA.

- (U) ($700) Continue development of ASAP fire and smoke model.

- (U) ($250) Initiate evaluation of self-contained water mist fire extinguishing systems for protecting flammable liquid storage spaces.

3. (U) FY 1999 PLAN:

- (U) ($400) Complete shipboard demonstration of DCS firemain reconfiguration management module.

- (U) ($250) Complete conversion of DCAMS to run on the Windows NT operating system.

- (U) ($900) Complete fleet evaluations aboard the ex-USS Shadwell to demonstrate the effectiveness of alternative reduced manning concepts.

3. (U) FY 1999 PLAN (Continued):

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S1565
PROJECT TITLE: Fire Protection/Damage Control System

- (U) ($809) Conduct fleet evaluations aboard the ex-USS SHADWELL in support of developing shipboard procedures for firefighting in a chemical, biological, and radiological (CBR) environment.

- (U) ($1,710) Conduct full scale weapon effects demonstrations of automated fire supression system options including intelligent component level valve control and central overall system control architectures.

- ((U) ($650) Complete development of the ASAP fire and smoke model. Initiate development of a crew casualty/damage control model that supports ship designs by predicting crew casualties and the capability of personnel to take necessary actions to contain damage/restore mission capability.

- (U) ($450) Complete evaluation of self-contained watermist fire extinguishing systems; develop installation specification.

- (U) ($350) Initiate development of firefighting devices/systems that provide for remote control of a firehose nozzle enabling sustained operations in a reduced manning environment. Initiate evaluation of commercial robotic firefighting devices.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT NUMBER: S1565 PROJECT TITLE: Fire Protection/Damage Control System

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	4,175	4,988	5,652
(U) Appropriated Value	2,353	4,988	
(U) Adjustments to FY 1997/98 Appropriated Value/1998 President's Budget			
a. Adjustments	1,717	-148	-133
(U) FY 1999 PRESBUDG Submit	4,070	4,840	5,519

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 changes due to: +2,000K Near Term Mine Warfare Reprogram; -181K General Undistributed Reductions; and -102K Minor Pricing Adjustments. FY 1998 change due to -148K General Undistributed Reduction; FY 1999 changes due to -141K General Undistributed Reductions and +8K Minor Adjustments.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control System

C. (U) OTHER PROGRAM FUNDING SUMMARY: Ship design changes included in new construction ship acquisition (SCN funding). Procurement information not available at this level of detail.

(U) RELATED RDT&E: (U) PE 0604516N, Project S2054 (Integrated Fire Protection/Damage Control).

D. (U) SCHEDULE PROFILE:

Program Milestones	FY 1997	FY 1998	FY 1999
Engineering Milestones	2Q ASAP Dynamic Electrical Model		3Q ASAP Fire/Smoke Model
	4Q RTSS Software Module		
	4Q Magazine Sprinkler System Vulnerability Assessment and Specification		
	4Q Systems Reconfiguration Management Display Guidelines		

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT NUMBER: S1565 PROJECT TITLE: Fire Protection/Damage Control System

	FY 1997	FY 1998	FY 1999
Engineering Milestones (Continued)		4Q DCS Structural Software Module	
		4Q DCA/RPL Interactive Training System	
T&E Milestones	4Q RTSS Shipboard T&E	4Q RTSS USS RUSHMORE Evaluation	
	3Q DCS Fleet Evaluations	4Q Reduced Manning Option Evaluations	4Q CBR Environment Firefighting Evaluations
	4Q Fire/Smoke Sensor Demonstration		
	4Q Firemain Reconfiguration Sensor Evaluations		4Q Firemain Reconfiguration Shipboard Evaluations

FY 1997 FY 1998 FY 1999

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT NUMBER: S1565 PROJECT TITLE: Fire Protection/Damage Control System

T&E Milestones Continued

3Q Automated HM&E Demonstrations

4Q Self Contained Water Mist Evaluations

Contract Milestones: None

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S1565
PROJECT TITLE: Fire Protection/Damage Control System

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Engineering Assessment /Design Studies	400	350	600
b. Test and Evaluation	1,331	2,883	3,747
c. Specifications/Design Standard Preparation	100	180	350
d. Training Development	625	150	0
e. Software Development	1,589	1,252	797
f. Travel	25	25	25
TOTAL	4,070	4,840	5,519

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1830 RADIAC Development	2,729	2,940	3,600	3,603	3,673	3,667	3,646	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Project S1830 coordinates all Navy efforts for the development of nuclear radiation detection devices in direct support of the Navy Nuclear Propulsion Program and other users by providing accurate, reliable Health Physics instrumentation at the lowest possible life-cycle cost. Reliable radiation monitoring instruments are needed to ensure the radiological safety of Navy personnel. This includes hand-held RADIAC meters, personnel dose measurement devices, and area monitors used to measure radiation fields. The Laser Heated Thermoluminescent Dosimetry (LHTLD) System will be able to meet new NRC regulations and will provide sensitive measurements down to the levels required to meet all new and imminent health and safety requirements. The Multifunction RADIAC will cut calibration costs by up to 75% and reduce the requirements for spare parts by 85% by replacing over 60 different models of obsolete equipment. This project has a 5 to 1 payback ratio. New requirements for the measurement of lower neutron levels necessitate the development of modernized instrumentation. The program is critical to joint-service radiation safety initiatives within DOD and has been coordinated with Army, Air Force, and Defense Nuclear Agency personnel to achieve the maximum cross-service applicability. All OR's issued 25 Aug 1987.

Multifunction RADIAC (MFR), OR #176-04-86
Laser Heated Thermoluminescent Dosimetry (LHTLD) System, OR #180-04-87
Neutron Dosimetry System, OR #179-04-87
Automated RADIAC Calibration and Diagnostics System, OR #175-04-86

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROJECT NUMBER: S1830
PROGRAM ELEMENT TITLE: Radiological Control PROJECT TITLE: RADIAC Development

Underwater RADIAC System, OR #178-04-88
Wide Range Survey Meter, OR #177-04-87
Tritium Monitors, OR #182-04-89
EOD Personal Dosimeter, OR #181-04-87 (Updated 09 MAR 95 as 392-04-95)

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($2,153) Continued enhancements to LHTLD System. Continued development of LH TLD Dosimeters.
- (U) ($396) Continued development of MFR universal probe. Completed plastic scintillation and beta probes. Began development of extendable gamma probe and flexible gamma probe.
- (U) ($60) Continued development of Casualty Dosimeter.
- (U) ($120) Resumed development of Tritium Monitor and continued development of Underwater RADIAC.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROGRAM ELEMENT TITLE: Radiological Control PROJECT NUMBER: S1830 PROJECT TITLE: RADIAC Development

2. (U) FY 1998 PLAN:

- (U) ($2,080) Continue enhancements to LHTLD System. Continue development of LHTLD Dosimeters.
- (U) ($617) Complete development of MFR universal probe, flexible probe, and extendable probe. Begin development of remote detectors and MFR Large Scale Integrated (LSI) circuit boards.
- (U) ($150) Continue development of Underwater RADIAC.
- (U) ($93) Continue development of Casualty Dosimeter.

3. (U) FY 1999 PLAN:

- (U) ($2,327) Continue enhancements to LHTLD System. Continue development of LHTLD Dosimeters.
- (U) ($800) Begin MFR improvements. Continue development of remote detectors and MFR LSI boards.
- (U) ($223) Begin research, development and testing of Tritium Monitoring Systems.
- (U) ($200) Begin Casualty Dosimeter Development and Testing.
- (U) ($50) Begin ARCADES enhancements.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROJECT NUMBER: S1830
PROGRAM ELEMENT TITLE: Radiological Control PROJECT TITLE: RADIAC Development

B. PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,769	3,030	3,677
(U) Appropriated Value:	2,886	3,030	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. SBIR	-37		
b. Undistributed reduction	-120	-90	
c. Minor pricing adjustments			-77
(U) FY 1999 PRESBUDG Submit:	2,729	2,940	3,600

CHANGE SUMMARY EXPLANATION:

Funding: FY 1997 changes are due to the Small Business Innovative Research assessment (-$37K) and to Congressional Undistributed reductions (-$120K). FY 1998 changes are due to Congressional Undistributed reductions (-90K). FY 1999 changes are due to minor pricing adjustments (-$77K).

Schedule: Not applicable.
Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROGRAM ELEMENT TITLE: Radiological Control PROJECT NUMBER: S1830 PROJECT TITLE: RADIAC Development

C. OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN Line 292000 (Portion)	3,409	5,951	4,035	6,613	7,171	6,713	5,646	11,337	50,875

D. (U) SCHEDULE PROFILE: See Attachment(A).

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROJECT NUMBER: S1830
PROGRAM ELEMENT TITLE: Radiological Control PROJECT TITLE: RADIAC Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development (contractor)	1,553	1,735	2,326
b. Government Engineering Support	742	480	518
c. Developmental Test and Evaluation	188	501	556
d. Configuration Management	64	69	75
e. Travel	10	10	10
f. Integrated Logistics Support	75	75	55
g. Software Development	60	40	30
h. Program Management Support	37	30	30
Total	2,729	2,940	3,600

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROJECT NUMBER: S1830
PROGRAM ELEMENT TITLE: Radiological Control PROJECT TITLE: RADIAC Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Developments										
International Sensor Technology Pullman, WA(LHTLD)	CPFF	09/90	7,111	7,111	7,111	0	0	0	0	7,111
Miscellaneous	Various	Various	CONT.	CONT.	3,766	1,290	1,735	2,326	CONT.	CONT.
Support and Management										
Naval Command, Control & Ocean Surveillance Center In-Service Engineering Charleston, SC	WR	Various	CONT.	CONT.	474	1,014	694	708	CONT.	CONT.
Naval Surface Warfare Center,	WR	Various	4,980	4,980	4,980	0	0	0	0	4,980

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603542N PROJECT NUMBER: S1830
PROGRAM ELEMENT TITLE: Radiological Control PROJECT TITLE: RADIAC Development

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
White Oak Det. Silver Spring, MD										
Miscellaneous Test and Evaluation	Various	Various	CONT.	CONT.	2,251	10	10	10	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	2,078	415	501	556	CONT.	CONT.

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program

GOVERNMENT FURNISHED PROPERTY:
Product Development - Not applicable.
Support and Management - Not applicable.
Test and Evaluation - Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

PROJECT NUMBER: S1830
PROJECT TITLE: RADIAC Development

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development					10,877	1,290	1,735	2,326	CONT.	CONT.
Subtotal Support and Management					7,705	1,024	704	718	CONT.	CONT.
Subtotal Test and Evaluation					2,078	415	501	556	CONT.	CONT.
Total Project					20,660	2,729	2,940	3,600	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603553N
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare

(U) COST: (Dollars in Thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V1704 ASW Advanced Development	3,453	5,491	11,871	15,792	21,767	26,448	21,483	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The ASW Advanced Development Project provides the advanced development demonstration and validation of technology for potential surface sonar and combat system application. Efforts focus on resolution of technical issues associated with providing capability against the year 2000 and beyond threat with emphasis on shallow water/littoral area USW and on dem/val of Integrated Undersea Warfare (IUSW-21) concepts and technology. Key technology areas being investigated include active sonar transmissions, signal and advanced processing, active sonar classification, towed and hull arrays and transducer technology, multi-static sonar, and multi-sensor data fusion. The major near-term effort is development of a mid-frequency Towed Active Receive Subsystem (TARS) prototype which will function as a deep receiver adjunct for the SQS-53 transmitter, thereby providing significantly enhanced submarine detection performance against deep submarine targets. FY 1999 and subsequent efforts will focus on major technological and performance thrusts for Undersea Warfare which will define surface combatant USW capability for the Navy in the next century (IUSW-21).

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($3,453) TARS. Completed development of TARS array components (array, towing system, receiver) and begin TARS integration. Conducted and evaluate results of initial at-sea demonstration on research vessel. Performed performance and operational modeling and analysis to derive top level USW measures of effectiveness (MOE) required to support SC-21 COEA mission definition.

2. (U) FY 1998 PLAN:

- (U) ($3,791) TARS. Complete TARS integration. Complete TARS wet end installation and conduct TARS array at-sea tactical system demonstration. Perform post sea test data analysis and provide support for transition to MFTA under PMS411.

- (U) ($1,700) IUSW-21 Requirements Engineering. Develop top-level requirements for IUSW-21 advanced development model (ADM) based on DD-21 performance requirements. Develop IUSW-21 concept of operations and perform functional decomposition with goal of identifying opportunities for manning reductions. Perform technology assessment in support of functional decomposition and required manning reductions.

3. (U) FY 1999 PLAN:

- (U) ($2,000) Towed Systems (TARS - $1000). Complete TARS test program and transition to MFTA. Initiate system engineering for Variable Depth Sonar Handling System ($1000).

- (U) ($8,871) Advanced Processing. Initiate development of advanced signal, information, display/OMI and tactical control processing algorithms and advanced processing builds in support of new and existing sensors. (1 October 1998 - 28 February 1999)

- (U) ($1,000) Advanced Hull Systems. Initiate systems engineering for Broadband ASW and High Resolution Obstacle Avoidance hull Advanced Development Models.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY1999
(U) FY 1998 President's Budget:	3,781	5,704	4,717
(U) Appropriated Value:	3,964	5,704	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. Congressional undistributed adjustments	-511	-213	
a. IUSW-21 Functional Realignment			+7,154
(U) FY 1999 PRESBUDG Budget Submit:	3,453	5,491	11,871

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 decrease (-511K) due to Congressional undistributed adjustments. FY1998 decrease (-213K) due to Congressional undistributed adjustments. FY 1999 increase (+7270K) due to program IUSW-21 Realignment, and (-$116K) due to general reductions.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

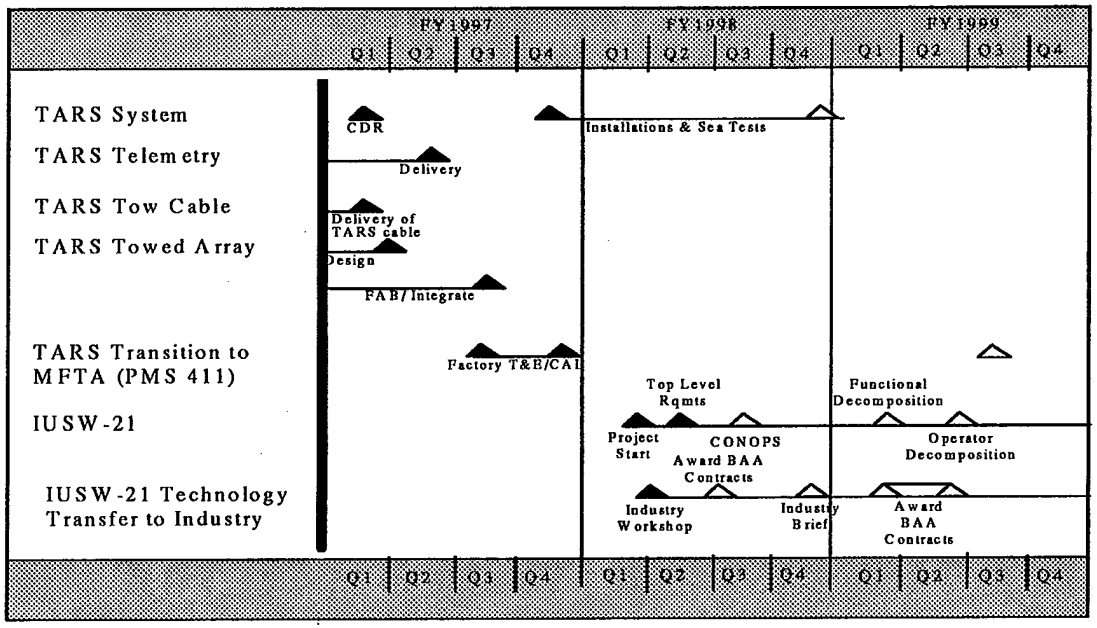
(U) RELATED RDT&E
(U) PE 0602121N (Surface Ship & Submarine HM&E Technology)
(U) PE 0603561N (Advanced Submarine System Development)
(U) PE 0603504N (Advanced Submarine Combat System Development)
(U) PE 0205620N (Surface ASW Combat Systems Integration)
(U) PE 0603747N (Undersea Warfare Advanced Technology)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

Program Element: 0603553N
Project Number: V1704
Title: Surface ASW Advanced Development

Schedule Profile



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Product Development	2,908	4,541	11,071
b. Support and Management	145	200	300
c. Test and Evaluation	400	750	500
Total	3,453	5,491	11,871

B.(U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NAVUNSEAWARCEN DET Newport, RI	WR	6/96	CONT.	CONT.	42,967	2,354	1,684	2,537	CONT.	CONT.
Misc Contractors	C/CPFF	Q2/95	TBD	CONT.	4,585	554	1,835	6,134	CONT.	CONT.
Miscellaneous	WR				4,821		1,022	2,400		
Support and Management										
Misc Contractors	C/CPFF	3/95	TBD	CONT.	653	145	200	300	CONT.	CONT.
Test and Evaluation										
NAVUNSEAWARCEN DET Newport, RI	WR	10/95	CONT.	CONT.	0	400	750	500	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY: Not applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	52,373	2,908	4,541	11,071	CONT.	CONT.
Subtotal Support and Management	653	145	200	300	CONT.	CONT.
Subtotal Test and Evaluation	0	400	750	500	CONT.	CONT.
Total Project	53,026	3,453	5,491	11,871	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2033 Advanced Submarine Systems Development	59,618	57,315	60,520	59,986	25,326	25,945	26,663	CONT.	CONT.
F2177 New Design HM&E	2,061	0	0	0	0	0	0	0	144,268
S2391 Submarine Technology	0	53,303	0	0	0	0	0	0	
TOTAL	61,679	110,618	60,520	59,986	25,326	25,945	26,663	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible.

(U) Project S2033 identifies the most promising and emerging technologies and transitions them into specific demonstration/validation efforts. The project transitions technologies developed by Navy technology bases, the private sector, and the Defense Advanced Research Projects Agency (DARPA) Tactical Technology Office. Advanced systems developed under this program have potential for backfit into existing classes of submarines, supporting emerging requirements, and systems technology insertion into future submarine designs. Research and development (R&D) investment factors used to select these technologies include: economic environment and return on investment; mission enhancement; and safety and survivability. The project also conducts an SSN Security Program (SSP) to develop techniques and devices that decrease the detection vulnerability of attack submarines, specifically operating in littoral environments; supports two Information Exchange Programs (IEP) with the United Kingdom (UK), one on submarine electromagnetic silencing and the second on submarine platform equipment, systems and hull technology; operates the Large Scale Vehicle (LSV) to provide at-sea test capability for propulsor, acoustic and non-acoustic signature reduction, remote vehicle R&D, and large scale hydrodynamic experimentation; operates the Integrated Measurement System (ISMS) in support of structural acoustics technology development; operates the Hydrodynamic/Hydroacoustic Technology Center (H/HTC) to enhance our ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies; and provides life cycle support for the R&D Submarine modifications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

(U) Project F2177 is dedicated to the New Attack Submarine (New SSN). The primary goal of the project is to develop affordable yet capable submarine platform specific systems by evaluating a broad range of system technology alternatives and examining cost reduction, producibility improvement, and technical risk reduction.

(U) Project S2391 is authorized by the Secretary of the Navy to pursue a Large-Scale Vehicle (LSV) demonstrator that is not limited to form or single hull design and issue a competitive solicitation to all responsible sources for such a demonstrator. To avoid costly oversights and conflicts between the LSV builder and the technology providers, the Secretary of the Navy should ensure that the NAS shipbuilders are participants, as appropriate, in the process of including new technologies into the LSV. A report is requested not later than submission of the FY 99 budget request detailing the Navy's plans for LSV development.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2033 Advanced Submarine Systems Development	59,618	57,315	60,520	59,986	25,326	25,945	26,663	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Project S2033 identifies the most promising and emerging technologies and transitions them into specific demonstration/validation efforts. The project transitions technologies developed by Navy technology bases, the private sector, and the DARPA Tactical Technology Office. Advanced systems developed under this program have potential for backfit into existing classes of submarines, supporting emerging requirements, and systems technology insertion into future submarine designs. R&D investment factors used to select these technologies include: economic environment and return on investment; mission enhancement; and safety and survivability. The project also conducts the SSP to develop techniques and devices that decrease the detection vulnerability of attack submarines specifically operating in littoral environments; supports two Information Exchange Programs with the UK, one on submarine electromagnetic silencing and the second on submarine platform equipment, systems and hull technology; operates the LSV to provide at-sea test capability for propulsor, acoustic and non-acoustic signature reduction, remote vehicle R&D, and large scale hydrodynamic experimentation; operates the ISMS in support of structural acoustics technology development; operates the H/HTC to enhance our ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies; and provides life cycle support for the R&D Submarine modifications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($1,826) Continued concept integration studies (e.g., active control systems interaction/integration study; stealth histories; *Secretary of Defense Report on Nuclear Attack Submarine Procurement and Submarine Technology* selected Appendix C technologies cost benefit studies).

- (U) ($12,283) Continued operations and support for the LSV. Completed support for test and demonstration of the advanced hybrid advanced technology demonstration. Completed support for test and demonstration of the non-acoustic detection and signature reduction program called Standard Crimson. Conducted unmanned undersea vehicle support experiments, continued large scale hydrodynamic studies. Continued operation and support for the H/HTC including hardware/software maintenance and hardware upgrades. Initiated operation of the ISMS. Commenced life cycle support for the R&D Submarine modifications (transitioned from PE 0603561N/S2034).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

- (U) ($19,886) Continued development of modeling and simulation procedures to address hydrodynamic issues integral to operational submarines and future ship designs (e.g., code certifications and design tool integration). Continued identification and feasibility assessments of HM&E component technologies related to main propulsion electric drive. Commenced proof of concept hardware demonstration for scaled models of HM&E components for the development of electric drive technology. Commenced demonstration and validation efforts for critical assessment tools using scale models. Completed demonstration/validation phase of the arc fault prevention program. Transitioned programs to PE 0604558N. Completed fabrication of the composite shaft. Installed AVR system on USS BOISE (SSN 764) and conduct at-sea system evaluation thereby completing the ONR-NAVSEA jointly funded program. Completed Project F. Completed development and testing of shock and acoustic isolation devices and integrate into the specifications and design of the New SSN. Commenced development and design of a rim driven main seawater pump. Completed concept downselect and design.

- (U) ($3,293) Conducted Situation Awareness Support (SAS) and Tactical Decision Aids for Submarine Security (TDASS) modeling and investigations, assess tactical utility of environmental sensors, develop littoral area operations and environment characteristics, tactics and countermeasures. Initiated planning for SAS Sea Test II. Program management responsibility continues under PEO-USW.

- (U) ($3,139) Provided funding for at-sea technical and tactical evaluation of the Total Ship Monitoring (TSM) System SSN Advanced Development Model (ADM) System. Continued development of system enhancements/refinements based on ongoing test results. PEO USW had program management responsibility.

- (U) ($4,618) Continued demonstration and validation of the elastomeric ejection system. Continued elastomeric disk design. Fabricated additional disks and test. Continued the previously ONR funded Advanced Hybrid Propulsor project developing a new concept propulsor which provides improved affordability and maintainability over current advanced propulsor configurations, while maintaining or improving acoustic and hydrodynamic performance. Small scale model testing will be used to evaluate powering, maneuvering, cavitation and acoustics performance.

- (U) ($13,573) Initiated development of an advanced sail concept to exploit shaping and materials to improve ship hydrodynamics, add additional volume for mission capability enhancements, and reduce the ship's acoustic and non-acoustic signatures. Initiated development and demonstration of improved acoustic isolation using active or hybrid (active/passive) isolation systems. Initiated development and demonstration of innovative submarine internal structural designs to increase isolation of acoustic enery to/from machinery, electronics, and habitability spaces. Pursued evaluation and development of mission and future design. Initiated development of technologies that influence hydrodynamic performance - specific areas include hull and appendage flow dynamics and visualization techniques, maneuvering control, stability and recovery, and self-noise.

- (U) ($1,000) Funded, at Congressional direction, Doppler Sonar Velocity Log.

3. (U) FY 1998 PLAN:

- (U) ($2,015) Continue concept integration studies (e.g., *Secretary of Defense Report on Nuclear Attack Submarine Procurement and Submarine Technology* selected Appendix C technologies cost benefit studies).

- (U) ($12,700) Continue operations and support of the H/HTC including hardware/software maintenance and hardware upgrades. Continue life cycle support for the R&D Submarine modifications (transitioned from 0603561N/S2034). Continue operations and support for the LSV. Conduct restricted availability to modify the vehicle to replicate the New SSN. Upgrade the radiated noise range and analysis equipment, and install new battery charger. Conduct first New SSN propulsor performance validation trials. Continue large scale hydrodynamic studies. Continue operations of the ISMS.

- (U) ($19,300) Continue development of modeling and simulation procedures to address hydrodynamic issues integral to operational submarines and future ship designs (e.g., code certification and design tool integration). Continue identification and feasibility assessments of HM&E component technologies related to main propulsion electric drive. Continue proof of concept hardware demonstration for scaled models of the main propulsion electric drive component technologies. Continue scale model and tool development, demonstration and validation. Identify larger scales required to provide proof of concept. Begin design, build and test of critical components such as the motor, motor controller, and advanced materials. Begin manufacture of rim driven main seawater pump hardware.

- (U) ($4,000) Continue development of SAS sensors, TDASS modules, characterization of operations and environment, tactics and countermeasures for littoral areas. Conduct SAS Sea Test II. Program management responsibility continues under PEO USW. Future FY99 and beyond SSN Security Program functions will be performed under PE 0101224N, Project V1871 Submarine Survivability.

- (U) ($7,000) Continue EES demonstration and validation and EES second generation elastomer disk life cycle test. Continue developing a new concept propulsor which provides improved affordability and maintainability over current advanced propulsor configurations, while maintaining or improving acoustic and hydrodynamic performance. Small scale model testing will be used to evaluate powering, maneuvering, cavitation and acoustics performance. Fabricate 1/4 scale candidate configurations.

- (U) ($11,300) Continue development of an advanced sail concept to exploit shaping and materials to improve ship hydrodynamics, add additional volume for mission capability enhancements, and reduce the ship's acoustic and non-acoustic signatures. Continue development and demonstration of improved acoustic isolation using active or hybrid (active/passive) isolation systems. Continue development and demonstration of innovative submarine internal structural designs to increase isolation of acoustic enery to/from machinery, electronics, and habitability spaces.

- (U) ($1,000) Initiate identification, development, and demonstration of alternate means of silencing electromagnetic signatures as well as enhancing the performance of existing systems on New SSN. The program continues the Information Exchange Program (IEP) with the UK.

4. (U) FY 1999 PLAN:

- (U) ($2,220) Continue concept integration studies (e.g., *Secretary of Defense Report on Nuclear Attack Submarine Procurement and Submarine Technology* selected Appendix C technologies cost benefit studies).

- (U) ($29,400) Continue development of modeling and simulation procedures to address hydrodynamic issues integral to operational submarines and future ship designs. Continue feasibility assessments of HM&E component technologies related to main propulsion electric drive. Continue proof of concept hardware demonstration of the main propulsion electric drive. Continue large scale model build and develop plans for the demonstration and validation of tools. Complete manufacture of rim driven main seawater pump test hardware.

- (U) ($12,600) Continue operations and support for the LSV and H/HTC including hardware/software maintenance and hardware upgrades. Continue life cycle support for the R&D Submarine. Continue operations of the ISMS.

- (U) ($7,000) Complete development of the elastomeric ejection system. Complete a new concept propulsor w hich provides improved affordability and maintainability over current advanced propulsor configurations, while maintaining or improving acoustic and hydrodynamic performance. Evaluate the 1/4 scale candidate configurations on the LSV.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N

PROGRAM ELEMENT TITLE: Advanced Submarine System Development

- (U) ($7,800) Continue development of an advanced sail concept to improve ship hydrodynamics, add additional volume for mission capability enhancements, and reduce the ship's acoustic and non-acoustic signatures. Continue development of acoustic isolation using active or hybrid isolation systems. Continue development of innovative submarine internal structural designs.

- (U) ($1,500) Continue development of alternate means of silencing electromagnetic signatures as well as enhancing the performance of existing systems on New SSN. The program continues the IEP with the UK.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	61,620	59,067	65,385
(U) Appropriated Value	64,248	59,067	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget			
a. Congressional Undistributed Reductions/General Adjustments	-3,343	-1,752	-965
b. SBIR Assessment	-1,287		
c. SSN Security Functional Transfer			-3,900
(U) FY 1999 Pres Budg Submit:	59,618	57,315	60,520

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 97 adjustments from FY 98 President's Budget include -$3,343K for Congressional undistributed adjustments, -$1,287K for SBIR. FY98 decreased by $1,752K for Congressional undistributed adjustments. FY 99 was decreased by -$3,900K for the SSN Security Functional Transfer to PE 0101224N (SSBN/SSN Security and Survivability Program), -$965K for pricing adjustments and NWCF adjustments.

(U) Schedule: Not applicable.

(U) Technical: Proceed with the Category II and Core Technologies as identified in *Secretary of Defense Report on Nuclear Attack Submarine Procurement and Submarine Technology*.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0101224N (SSBN Security & Survivability Program)
(U) PE 0603569E (DARPA Advanced Submarine Technology Program)
(U) PE 0603792N (Advanced Technology Transition)
(U) PE 0604558N (New Design SSN Development)
(U) PE 0603508N (Ship and Submarine HM&E Advanced Technology)
(U) PE 0602121N (Surface Ship and Submarine HM&E Technology)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones	Transition projects to New SSN	Transition projects to New SSN	Continue hydrodynamics testing on LSV
	Continue LSV support for new SSN propulsor development program	Continue LSV support for new SSN propulsor development program	Continue LSV support for new SSN propulsor development program
	Commence Hydrodynamics testing for scaling effects on LSV	Continue hydrodynamics testing on LSV	
	Complete AVR dem/val	Continue EES dem/val	
	Transition ISMS facility from ONR		

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

	FY 1997	FY 1998	FY 1999
		Begin Advanced Sub Propulsion Sys. LSV testing	
	US/UK commission mobile deep array (NOULD 96)	Conduct LSV Propulsor testing for SEAWOLF propulsor development/improvement program	
	Began advanced sail concept exploration		
Engineering Milestones			
	Complete sea trial with arc fault wide band optic sensor	Complete EES 2nd generation elastomer disk life cycle test	Deliver LSV advanced sail
	Deliver composite shaft joint	Design & fab LSV adv sail	Install LSV sail and instrumentation/ sensor suite
	Complete development of LIDAR, early warning, TDASS module	Dev instrument/ sensor suite for LSV test	Modify LSV I for hydrodynamic/maneuvering experiments

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

	FY 1997	FY 1998	FY 1999
	Initiate dev of enabling component and analytical techniques needed for main propulsion electric drive	Continue dev of enabling component and analytical techniques needed for main propulsion electric drive	Continue dev of enabling component and analytical techniques needed for main propulsion electric drive
	Install AVR system on USS BOISE (SSN 764)	Rip out AVR System from USS BOISE	
	Field test periscope mounted LIDAR early warning device	Deliver full length composite shaft	
	Design & manufacture EES 2nd generation elastomer disk		
	Complete sail shape assessment - select sail shape on sail shapes		
T&E Milestones	Conduct AVR at-sea system eval.	Conduct SAS Sea Test II	

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

	FY 1997	FY 1998	FY 1999
Contract Milestones			

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Hardware Development	39,320	36,880	43,508
b. Developmental T&E	13,255	11,935	12,312
c. Countermeasures Dev	3,239	4,000	0
d. R&D Facilities Mgmt	3,804	4,500	4,700
TOTAL	59,618	57,315	60,520

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
TRACOR Austin, Texas	C/CPFF	12/87	CONT.	CONT.	8,757	1,854	1,900	1,900	CONT.	CONT.
NNS Norfolk, Virginia	S/CPFF	03/90	15,054	15,054	15,054	0	0	0	0	15,054
NNS Norfolk, Virginia	S/CPFF	01/95	CONT.	CONT.	4,848	10,543	10,000	11,400	CONT.	CONT.
GD/EBDiv Groton, Connecticut	S/CPFF	03/92	19,231	19,231	19,231	0	0	0	0	19,231
GD/EBDiv Groton, Connecticut	S/CPFF	01/95	CONT.	CONT.	11,437	6,715	6,500	7,000	CONT.	CONT.
JHU/APL Laurel, Maryland	S/CPFF	10/89	CONT.	CONT.	23,160	3,050	3,900	500	CONT.	CONT.
AT&T Whippany, New Jersey	S/CPFF	10/94	3,627	3,627	3,627	0	0	0	0	3,627
NSWC Bethesda & Annapolis, Maryland; Bayview, Idaho; Portsmouth, Virginia	WR	Var	CONT.	CONT.	83,800	15,037	14,100	15,740	CONT.	CONT.
NUWC New London, Connecticut; Newport, Rhode Island	WR	Var	CONT.	CONT.	14,582	3,826	3,000	3,300	CONT.	CONT.
Misc	Var	Var	CONT.	CONT.	54,809	4,725	7,000	8,300	CONT.	CONT.
Support and Management										
Misc	Var	Var	CONT.	CONT.	4,051	613	180	180	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Test and Evaluation										
NSWC	WR	Var	CONT.	CONT.	13,334	1,262	2,015	1,000	CONT.	CONT.
Bethesda & Annapolis, Maryland; Bayview, Idaho										
AT&T	C/CPFF	10/94	5,746	5,746	2,904	2,842	0	0	0	5,746
Whippany, New Jersey										
GD/EBDiv			CONT.	CONT.	9,123	3,310	3,400	3,500	CONT.	CONT.
Groton, Connecticut										
JHU/APL			1,997	1,997	1,397	600	0	0	0	1,997
Laurel, Maryland										
Misc	Var	Var	10,024	10,024	9,651	5,241	5,320	7,700	0	27,912

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	239,305	45,750	46,400	48,140	CONT.	CONT.
Subtotal Support and Management	4,051	613	180	180	CONT.	CONT.
Subtotal Test and Evaluation	36,409	13,255	10,735	12,200	CONT.	CONT.
Total Project	279,765	59,618	57,315	60,520	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F0770 Advanced Submarine Support Equipment Program (ASSEP)	2,281	1,816	2,468	3,253	3,291	3,374	3,472	CONT.	CONT.
V1739 Submarine Special Operations Support Development	2,015	2,191	2,208	2,373	1,939	2,155	2,338	CONT.	CONT.
TOTAL	4,296	4,007	4,676	5,626	5,230	5,529	5,810	CONT.	CONT.

(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.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.PROJECT

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

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FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F0770 Advanced Submarine Support Equipment Program	2,281	1,816	2,468	3,253	3,291	3,374	3,472	CONT.	CONT.

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; radio frequency (RF) extensions; RF bandwith improvements; passive localization; upgrades to the Photonics 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 NAPDD # 428-87.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 Accomplishments:

- (U) ($1,437) Continued development of Laser Warning Receiver FDMs.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

- (U) ($844) Continued RCSR techniques and materials investigation, Laser Warning Receiver development , and update of simulation tools through Technical Design Agent (TDA) and contractor support. Initiated development of a shock hardened radome for the ESM antenna through TDA and contractor support.

2. (U) FY 1998 PLAN:

- (U) ($682) Continue development of Laser Warning Receiver FDMs.

- (U) ($1,059) Continue RCSR techniques and materials investigation, and Laser Warning development through TDA and contractor support. Complete development of a shock-hardened radome for the ESM antenna and update of simulation tools through TDA and contractor support.

- (U) ($75) Initiate development of FDMs for Passive Localization, Millimeter Wave (MMW) Frequency Extension, and Photonics Mast Automatic Target Recognition and Tracking Algorithms by generating procurement documentation through TDA and contractor support.

3. (U) FY 1999 PLAN:

- (U) ($1,368) Continue development of Passive Localization, Photonics Mast Auto Target Recognition and Tracking algorithms and MMW Frequency Extension FDM's by awarding development contracts.

- (U) ($1,100) Complete development of Laser Warning Receiver FDMs. Continue Passive Localization, Photonics Mast Auto Target Recognition and Tracking algorithms, and MMW Frequency Extension development through TDA and contractor support.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems PROJECT NUMBER: F0770 PROJECT TITLE: Advanced Submarine Support Equipment Program

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY1998	FY 1999
(U) FY 1998 President's Budget:	2,324	2,612	3,475
(U) Appropriated Value:	2,440	2,612	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. SBIR Transfer	-40	0	0
b. Undistributed Reductions	-119	-96	-47
c. ASSEP R&D Reduction	0	0	-1,000
d. NWCF R&D - Undersea Warfare Centers	0	0	+34
e. Sub ESM Program Adjustments	0	-700	0
f. PBD 606: Mil & Civ Pay Rates	0	0	+6
(U) FY 1999 PRESBUDG Submit:	2,281	1,816	2,468

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: The $159K decrease in FY 1997 is due to an SBIR assessment and undistributed reductions. The $796K decrease in FY98 is due to a Submarine ESM program adjustment (-$700K) and undistributed reductions (-$96K). The $1,007K decrease in FY99 is due to a decision to delay the Low Probability of Intercept FDM and HMI design enhancement ($-1,000K), undistributed reductions (-$47K), an adjustment for NWCF R&D Undersea Warfare Centers ($+34K) and an adjustment for PBD 606 (+$6).

(U) Schedule: HMI design enhancement and Low Probability of Intercept FDM contract awards are delayed two years. LIDAR at-sea testing is eliminated in FY98.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands): 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)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Feasibility Demonstration Models	2,166	1,716	2,220
b. Requirements Development	80	85	233
c. Miscellaneous	35	15	15
Total	2,281	1,816	2,468

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Method/ Performing Activity	Contract Award/ Fund Type Vehicle	Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Actual	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Sensor Technology Insertion FDM contracts										
JHU/APL	C/CPIF	12/95	3,054	3,054	935	1,437	682	0	0	3,054
TBD	C/CPIF	3/99	CONT.	CONT.	0	0	0	1,368	CONT.	CONT.
Miscellaneous					14,877	789	1,088	1,073	CONT.	CONT.
Support and Management										
Miscellaneous					2,372	55	46	27	CONT.	CONT.
Test and Evaluation					0	0	0	0	0	0

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

GOVERMENT FURNISHED PROPERTY: Not Applicable.

	FY 1996 & Prior	FY 1997 Actual	FY 1998 Budget	FY 1999 Budget	Total Complete	Total Program
Subtotal Product Development	15,812	2,226	1,770	2,441	CONT.	CONT.
Subtotal Support and Management	2,372	55	46	27	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	18,184	2,281	1,816	2,468	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V1739 Submarine Special Operations Support Development	2,015	2,191	2,208	2,373	1,939	2,155	2,338	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program responds to the increased threat of Naval activity in the Littoral and the 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 1997 ACCOMPLISHMENTS:

- (U) ($2,015) Conducted/supported an Arctic Science Exercise and plan for ICEX 1-98.

2. (U) FY 1998 PLAN:

- (U) ($1,982) Conduct/support an Arctic Science Exercise and ICEX 1-98.
- (U) ($209) Provide updates to the Naval Warfare Publication (NWP) concerning routine and emergency under-ice surfacing operations for SSN 688.

3. (U) FY 1999 PLAN:

- (U) ($2,208) Conduct/support an Arctic Science Exercise and plan for ICEX 1-00.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,018	2,319	2,264

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

(U) Appropriated Value:	2,138	2,319	
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 Presidents Budget:			
a. Congressional Undistributed Reductions	-3	-128	-56
(U) FY 1999 PRESBUDG Submit:	2,015	2,191	2,208

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: FY97 Supplemental Revised Economic Assumptions (-$3).
FY 1998: Undistributed reductions (-$128).
FY 1999: Arctic Operations Support Reduction (-$60), undistributed reductions (-74K), NWCF R&D Undersea Warfare Centers (+69K), Military and Civilian Pay Raise (+9K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.
(U) RELATED RDT&E:
(U) PE 0602323N Submarine Technology-provides technologies for advanced development efforts.
(U) PE 0602435N Ocean and Atmospheric Technology-provides technologies for advanced development efforts.
(U) PE 0603504N Advanced Submarine Combat Systems Development-conducts advanced development of submarine acoustic sensors and combat control technologies.
(U) PE 0604524N Submarine Combat System-incorporates Arctic-specific improvements.

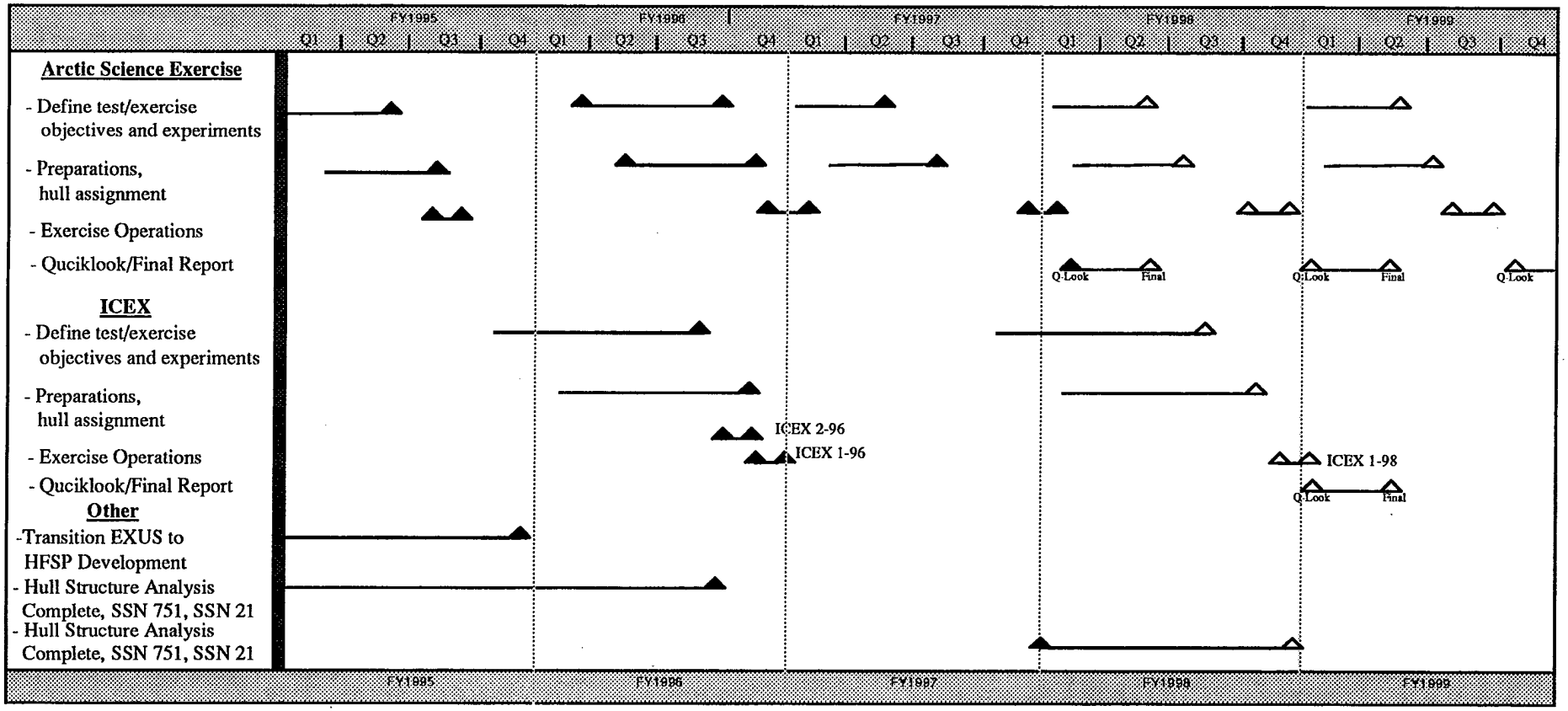
D. (U) SCHEDULE PROFILE: See attached.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

Schedule Profile



R-1 Line Item 46

Budget Item Justification
(Exhibit R-2, Page 11 of 14)

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Developmental Test & Evaluation	1,440	1,611	1,628
b. Contractor Engineering Support	400	400	400
c. Program Management Support	160	160	160
d. Travel	15	20	20
Total	2,015	2,191	2,208

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands):

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Advanced Research Projects Agency	MIPR	N/A	CONT.	CONT.	2,906	0	0	0	CONT.	CONT.
NUWC Division Newport, RI	WR	3/93	CONT.	CONT.	1,336	0	0	0	CONT.	CONT.
Naval Surface Warfare Center Carderock, MD	WR	3/93	CONT.	CONT.	1,101	0	209	0	CONT.	CONT.
ARL/UT University of Texas	PD	3/93	CONT.	CONT.	1,483	0	0	0	CONT.	CONT.
Miscellaneous	N/A	N/A	CONT.	CONT.	132	0	0	0	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

Support Costs and Management Services										
Miscellaneous	N/A	N/A	CONT.	CONT.	1,157	575	371	580	CONT.	CONT.
Test and Evaluation										
Submarine Development Squadron Five Det Arctic Submarine Lab (Formerly NUWC Division) Keyport, WA)	WR	5/93	CONT.	CONT.	3,767	1,390	1,561	1,628	CONT.	CONT.

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Sippican, Incorporated	N/A	3/96	CONT.	CONT.	168	0	0	0	CONT.	CONT.
NFSEC Port Hueneme, CA	WR	3/97	CONT.	CONT.	0	50	0	0	CONT.	CONT.
Miscellaneous	N/A	N/A	CONT.	CONT.	126	0	0	0	CONT.	CONT.
CMDR, Third Naval Construction Brigade Pearl Harbor, HI	WR	12/97	CONT.	CONT.	0	0	50	0	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	6,958	0	209	0	CONT.	CONT.
Subtotal Support and Management	1,157	575	371	580	CONT.	CONT.
Subtotal Test and Evaluation	4,061	1,440	1,611	1,628	CONT.	CONT.
Total Project	12,176	2,015	2,191	2,208	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2196 Design Tools, Plans and Concepts	14,356	15,713	14,900	14,019	17,432	15,643	13,356	Continuing	Continuing

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The efforts within this PE directly support the Navy's ability to design more affordable ships with reduced manning, increased producibility, reduced operating & support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for ship studies, and the actual conduct of design concept studies for the ships in that plan. The program provides the foundation for affordable surface ship design, construction, and life cycle support and is a required first step in the integration of total ship systems, including combat systems and hull, mechanical and electrical (HM&E) systems. Inadequate early planning and ship concept formulation can result in down-stream design/construction and operational problems. A more subtle and severely negative impact of neglecting this early effort is that the "best" concepts may never even be considered and our greatest potential ship design advances never realized. Designs and technologies must meet the threat. This project supports this requirement. While these efforts support all surface ship acquisition programs, they are not direct efforts for specific authorized shipbuilding programs. Computer modeling and simulation developments will permit virtual operation and evaluation of the ship and enable reduction of ship production and support cost by allowing fleet representatives, shipbuilders and maintenance staffs to build, test, operate or repair the ship "in the computer" at a design stage where the design is flexible and where feedback and suggested changes can be incorporated relatively easily. A key affordability concept of future designs is use of a common modular open systems architecture for future ships. This total ship architecture will be used across ship types and include modularity at many levels, use of common interfaces, alignment with world class modular ship construction methods, generic build strategies, zonal distributed system architectures, cost effective equipment selection, greater use of commercial technologies, and shipboard weapons, sensor & electronic - modules, zones, and standard interfaces. This common modular open systems architecture for ship and shipboard systems will reduce the total cost of ownership and is the cornerstone of an affordable fleet. Efforts under Project S2196 transfer directly to early stage ship design in PE 0603564N, Ship Preliminary Design and Feasibility Studies. This project is the only R&D effort (Government or commercial) that supports this country's naval ship design and engineering capabilities in the area of early stage (Concept through Contract Design) design tools, criteria, and methods.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

(U) This project accomplishes the following: (1) identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs; (2) investigates new affordable ship concepts and evaluates technologies necessary to support these concepts; (3) provides design methods and automated design tools to develop and evaluate ship concepts, support early ship design, and solve pressing fleet engineering problems; (4) develops design criteria and common standards to improve affordability; (5) improves the quality of the product in the design phases, to reduce or eliminate the costs of fixing problems after ships reach the fleet; (6) develops investment strategies for new concepts and technologies; (7) and supports development of Mission Need Statements (MNS) for future ships.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($578) Integrated new technologies in total ship concepts. Developed ship concepts for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conducted pre-Milestone 0 ship concept studies for large deck amphibious assault ships, command ships, and other potential ship concepts / configurations in support of SCN planning. Analyzed the cost/benefit of new concepts and technologies. Supported alternative advanced hull form technology development.

- (U) ($1,331) Developed and improved early stage ship design methods, criteria, standards, and data bases. Improved surface ship synthesis/assessment models in the following areas: refinement of hull form generation and definition, updated user interface, moved software to Windows NT operating environment, general arrangement & compartment information database upgrades, began link to commercial CAD II system, developed interim ability to handle common modules, updates to handle ship configuration changes to support on-going future surface combatant ship designs. Improved ship cost estimating capabilities: scoped out link to new cost models. Supported development of advanced computer aided design methods and tools for early stage ship design in the following areas: definition of integrated survivability assessment and analysis capability, developed surface ships structural design database, developed signature assessment tools, updated machinery design tools, topside geometry definition upgrades. Started migration of HM&E technology database to commercial software.

- (U) ($211) Conducted initial hands-on evaluation of state-of-the-art visualization and simulation techniques for application to ship design and engineering. Completed initial exploratory application of techniques having multi-disciplinary applicability. Developed approach for out year efforts based on results of assessment of ability to use/not use legacy design tools.

- (U) ($1,078) Collected and analyzed long-term hydrodynamic loads data and updated algorithms for longitudinal and transverse bending as well as torsion loads. Completed grillage strength test fixture. Assessed developing ultimate strength relationships. Completed fatigue testing. Updated reliability inputs and assessment techniques; validated processes and utilized technologies/improved design methods on existing ships. Developed unstiffened panels (part II) of the reliability-based load and resistance factor design (LRFD) structural rules for naval surface ships. Supported Ship Structure Committee (SSC) Research.

- (U) ($449) Supported user base in execution of EM Engineering interim Baseline I+ installations and integration. Developed integration plan for EM Engineering Baseline II evolution into the Surface Ship Integrated Topside Design Project.

- (U) ($8,900) Developed, demonstrated, and validated architectures, technologies, and concepts that reduce total ownership costs for the future fleet. Identified areas/methods for common across ship type means to improved life cycle affordability of naval ships and shipboard systems. Efforts focused on application to future ships. Where feasible, backfit to existing ships were pursued. Transitioned previous FYs efforts on LPD 17 for implementation and application to the 21st century surface combatant (SC 21), and other ships in the SCN plan.

  (U) Total Ship Modular Open Systems Architecture: Developed common ship architectures for HM&E systems, C4I systems, and combat systems including interface standards for modular ship systems. Revised total ship concepts for modular surface combat ships. Incorporated revised zonal distributed systems concepts into this design. Supported SC 21 program systems engineering on modularity requirements and flexible mission systems. Began development of modular installation interface control drawings (MIICD) for across ship type use for installations of current and future combat systems. Early stage design for production assessment of future surface combatants. Assessed US shipbuilding industry ability to produce future ship critical technologies and systems. Supported NAVSEA Professor of Ship Production research grant efforts on technology transition and use of commercial shipbuilding practices. Began assessment of alternative shipboard systems architectures that can utilize commercial processes and/or commercial-off-the-shelf (COTS) equipment and materials. Supported integration of distributed computing plant functional architecture into the physical architecture of a modular ship architecture by developing high level concepts and alternatives. Began assessment of these alternatives. Drafted performance specifications for a modular open systems functional and physical architecture for the future surface combatant and other ships and their shipboard systems. Developed concepts and requirements for dedicated serviceways for distributed systems. Revised heating, ventilation and cooling (HVAC) alternative zonal distributed systems architecture concept based on improved ship production recommendations from shipbuilder. With focus on surface combatants continued development of generic and engineered build strategies for naval ships that foster product-oriented ship

design and construction, and incorporate common modular open system architecture by having two shipbuilders look ahead to potential future production process changes.

(U) Total Ownership Cost Methods & Modeling: Development of a total ownership cost modeling and cost decision making tools for ships. Organized and supported Navy-shipbuilding industry cost model development executive and technical teams. Delivered prototype Product Oriented Design and Construction (PODAC) cost model. Implemented the PODAC cost model at three shipyards and NAVSEA headquarters. Validated the prototype PODAC cost model at one shipyard. Developed framework and first cut at high level parametric cost estimating method using gross compensated tonnage and complexity factors. Revised the PODAC cost model estimating ratios based on results of ship production and equipment cost data analysis for one ship type. Assembled database of cost-benefit studies done and the sources of the cost data. Analyzed operating and support (O&S) cost benefits of example combat systems weapons, electronics, and sensor zones; modular crew sanitary spaces; co-located galley; and zonal firemain system. Did search of existing operating and support cost models and methods. Developed plan to develop a ship operating and support cost model. Supported cost modeling and cost analysis for future surface combatant programs.

(U) Use of Ownership Cost Reduction Best Practices from Industry & Other Services: Supported transition of industry open systems experience to HM&E systems usage. Gathered ship operation commercial regulatory body experience on equipment certification and commercial ship technology practices.

(U) Cost Effective Equipment Selection, Maintenance, and Logistics Support: Developed more cost effective methods and practices to standardize shipboard equipment for life cycle cost savings. Delivered first version of equipment selection tool that links to existing Navy and commercial equipment databases. Assessed cost-benefit and feasible of possible family of standard hydraulic units. Gathered and transferred equipment selection lessons learned and practices to on-going ship programs.

(U) Best Value Enabling and Innovative Technologies for Total Ownership Cost Reduction: Examined potential commercial technologies to provide more affordable solutions to ship board functional requirements and/or reduced maintenance and modernization costs. Evaluated commercial technologies to meet hull outfitting functions. Concept development of food service (galley) modules, ventilation and chilled water HVAC modules, and ship auxiliary systems. Purchased commercial food service equipment for installation and then demonstration and evaluation on existing ships. Surveyed fleet storeroom, habitability, and food service requirements. Supported transition of recessed commercial accommodation ladder design. System engineering for demonstration and evaluation of commercial lighting systems - specular reflectors, sulfur fusion light with light tube, and fiber optic lighting applications. Developed concepts for modular damage control equipment stowage. Prepared for shock test of commercial rotary vane steering gears. Prepared performance

specification for a modular steering gear system using rotary vane technology. Supported system integration assessment of combat and HM&E systems and technologies for potential usage on future surface combatants. Refined radio communication modularity concepts and potential means to integrate them within the ship. Examined use of commercial opens systems standards and equipment for modular radio communications. Modular packaging systems engineering and concept development for Concentric Canister Launcher (CCL). Supported modular horizontal CCL concepts and electronics breadboarding using commercial components. Developed and tested Shipboard Modular Architecture and Reconfiguration Technology (SMART) deck modular track/hold down systems and compartment support systems (i.e. modular electrical connections) for use in mounting standardized and modular equipment aboard ships in C4I and other types of spaces to reduce the future costs of ship equipment/system modernization. Completed shock test of track system. Incorporated SMART deck system and concepts in prototype Combat Information Center (CIC) of the future. Completed foreign comparative testing of MEKO modular gun system by completing shock testing of the module.

(U) ($1,809) Developed initial concepts for advanced guns for new ships including a modular Vertical Gun Advanced Ships (VGAS) system which could provide longer range and more lethal firepower than present guns and planned shipboard gun systems improvement. Completed engineering evaluation of technologies, concept definition, and definitization of the requirements. Developed first draft of VGAS requirements and the rationale for those requirements. Initial evaluation of concepts for an advanced naval ship modular vertical gas gun system. Assessed potential industry concepts and technologies. Completed independent Life Cycle Cost Estimate to support ACAT designation. Developed program plans and Work Breakdown Structure for FY 98 and out-year efforts. These efforts built on the total ship modular architecture efforts for weapons and other combat systems that are being done under the Affordability Through Commonality (ATC) project that is in this PE.

2. (U) FY 1998 PLAN:

- (U) ($737) Integrate new technologies in total ship concepts. Develop ship concepts for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conduct pre-Milestone 0 ship concept studies for large deck amphibious assault ships, command ships, medical capabilities afloat, and other potential ship concepts / configurations in support of SCN planning. Analyze the cost/benefit of new concepts and technologies.

- (U) ($1,574) Develop and improve early stage ship design methods, criteria, standards, and data bases. Improve surface ship synthesis/assessment models in the following areas: integrate improved performance assessment capabilities, update program executive, link to commercial CAD II system, increase ability to handle common modules and other large space objects, link to industry STEP data exchange protocols, updates to support on-going future ship designs to handle new ship configurations, hull form alternatives, and signature reduction features. Improve ship cost estimating capabilities: support new cost model team on interfaces to design tools. Support development of advanced computer aided design methods and tools for early stage ship design in the following areas: update design weight estimating tool, develop surface ships structural rational design tools, integrate structural analysis tools with CAD II system, begin upgrades to manning estimation tools, complete development of infrared & magnetic signature assessment tools, upgrade ship hydrostatics & stability analysis for new geometry definition, and general arrangements tool upgrades. Support Navy Industry Digital Data Exchange Specification Committee (NIDDESC) development of STEP computer aided design (CAD) systems data exchange protocol standards for shipbuilding industry. Identify, characterize and assess new and emergent technologies and update the HM&E technology database. Finish migration of HM&E technology database to commercial software.

- (U) ($1,451) Begin broad-based implementation of state-of-the-art visualization and simulation techniques for ship design and engineering applications. Acquire and start validation, adaptation, and implementation of commercial visualization and simulation tools for the areas of: fluid / piping systems simulation, and crew reduction performance simulation. Develop custom visualization and simulation tools where no alternate source exists in the following areas: automated ventilation duct routing and analysis. Begin development of standard "wrapper" program to integrate visualization and simulation tools with legacy computer aided design and physics-based hull, mechanical, & electrical (HM&E) analysis tools. Begin development of capabilities for realistic, physics-based simulation of ship performance, behavior, and response in the following area: survivability, damage tolerance, and damaged mission capability simulation by developing an integrated survivability assessment and analysis capability.

- (U) ($985) Collect and analyze long-term hydrodynamic loads data. Develop and validate seaway loads prediction method. Complete assessment and methods for predicting extreme and cumulative lifetime loads. Develop non-dimensional response amplitude operators for vertical and lateral bending moments. Complete updating of compressive strength of plating stiffeners study. Begin large scale grillage strength tests and assessments.Complete stiffener geometry testing. Complete compressive strength of stiffener testing. Complete analysis of fatigue test data and update design data sheet (DDS). Update reliability inputs and assessment techniques. Develop stiffened panels (part III) of the reliability-based load and resistance factor design (LRFD) structural rules for naval surface ships. Validate processes and utilize technologies/improve design methods on existing ships and new designs. Support Ship Structure Committee (SSC) Research.

- (U) ($10,966) Develop, demonstrate, and validate architectures, technologies, and concepts that reduce total ownership costs for the future fleet. Identify areas/methods for common across ship type means to improved life cycle affordability of naval ships and shipboard systems. Efforts are focused on application to future ships. Where feasible, backfit to existing ships will be pursued. Implement and apply these efforts to the 21st century surface combatant (SC 21), and future carrier CV(X), and other ships in the SCN plan. Primary emphasis is on ship and ship systems commonality and modularity for and affordability of the DD21.

  (U) Total Ship Modular Open Systems Architecture: Develop common ship architectures for HM&E systems, C4I systems, and combat systems including interface standards for modular ship systems. Develop ship configurations and systems architectures that can utilize commercial processes and/or commercial-off-the-shelf (COTS) equipment and materials. Revise modular total ship architecture concepts, and refine performance requirements for surface combatants. Perform producibility, operational, survivability, and cost analysis of this ship architecture. Support SC 21 systems engineering on modularity requirements and meeting flexible mission systems requirements. Refine zonal distributed systems architectures for HVAC, firemain, and other auxiliary/support systems that foster improved ship production and total life cycle ship affordability and that are scaleable to all classes/sizes of ship types and apply to future surface combatant ships. Analysis of alternative distributed systems (i.e. replacements for current means for providing support to main systems and compartments). Survivability and operational evaluations for these systems on surface combatants. Develop detailed requirements for dedicated serviceways for zonal distributed and other support systems. Develop plans and Navy-Industry team approach to define Weapons / Topside / Electronic Zones definition & interface standards for combat systems and C4I, and to develop module to ship, module to module, and intra-module interface standards for hull, mechanical & electrical systems. Develop Generic Build Strategy definition and use of a Product Oriented Work Breakdown System (PWBS) capabilities for CAD II ship design system. Support integration of distributed computing plant schematic architecture into the physical architecture of modular ship architecture. Identify changes to

naval ship configurations, ship systems, and equipment designs to enable the use of commercial shipbuilding processes for the construction of future naval ships. Perform early stage design for production analysis of concepts and technologies for on-going ship acquisition programs primarily SC 21 program. Support NAVSEA Professor of Ship Production research grant.

(U) Total Ownership Cost Methods & Modeling: Develop a total ownership cost modeling and cost decision making tools for ships. Support Navy-Shipbuilding Industry cost model development team. Implement the Product Oriented Design & Construction (PODAC) cost model at two more shipyards. Validate the prototype PODAC cost model at two more shipyards. PODAC cost model extensions for combat systems, and C4I. Collect and analyze cost data of shipbuilders for development of activity cost factors for surface combatant type ships. Use PODAC cost model to analyze new technologies to validate the models capabilities to correctly reflect acquisition cost impacts. Refine high level parametric cost estimating method using gross compensated tonnage and complexity factors. Add risk and schedule capabilities to PODAC cost model. Update database of cost-benefit studies done and the sources of the cost data. Analyze operating and support (O&S) cost benefits of example modular architectures and technologies. Begin execution of plan to develop a ship operating and support cost model. Support cost modeling and cost analysis for SC-21 and other on-going ship programs.

(U) Use of Ownership Cost Reduction Best Practices from Industry & Other Services: Benchmark affordability/ life cycle cost reduction best practices from industry & other services. Based on lessons learned, develop, maintain, and update specifications and standards for implementing use of ownershipcost reduction technologies, and concepts. Work to have these standards and specifications reviewed by industry standard committees and bodies. Evaluate feasibility of affordability best practices for naval fleet / ship use.

(U) Cost Effective Equipment Selection, Maintenance, and Logistics Support: Develop methods and practices for more cost effective shipboard equipment selection. Update equipment selection tool to utilize world wide web links to existing Navy and commercial equipment databases. Analyze potential across acquisition program common buy equipment and engineering support for resolution of common buy issues. Begin development of equipment selection processes including use of COTS equipment. Definition of families of equipment/ components especially using COTS equipment. Equipment selection support to on-going ship design / acquisition programs, especially SC-21. Gather and transfer equipment selection lessons learned and practices to on-going ship programs. Begin benchmarking of commercial logistics support concepts.

(U) Best Value Enabling and Innovative Technologies for Total Ownership Cost Reduction: Examine potential commercial technologies to provide more affordable solutions to shipboard functional requirements and/or reduced maintenance and modernization costs. Evaluate commercial technologies to meet hull outfitting

functions. Survey industry and other sources for modularity enabling technologies. Revise concept for food service (galley) modules, ventilation and chilled water HVAC modules, and ship auxiliary systems. Purchase commercial food service equipment for installation and then demonstrate and evaluate on existing ships. Survey fleet storeroom, habitability, and food service requirements. Evaluate results of LPD 17 detailed design experience with ownership cost reduction technologies and concepts and transition these to on-going ship acquisition programs. Support prototype evaluations for ships under construction (such as DDG 51 class and LPD 17 class) and modernization (CVN 68 class) for habitability common modules, and commercial furniture for offices and berthing. Demonstrate and evaluate commercial lighting systems - sulfur fusion light with light tube, and fiber optic lighting applications. System integration assessment of combat and HM&E systems and technologies for potential usage on future surface combatants. Develop detailed radio communication modularity concepts and potential means to integrate them within the ship. Prototype use of commercial opens systems standards and equipment for modular radio communications. Modular packaging systems engineering and concept development for Concentric Canister Launcher (CCL). Support modular horizontal CCL concepts revision and testing of electronics breadboard using commercial components. Develop and test Shipboard Modular Architecture and Reconfiguration Technology (SMART) deck modular track/hold down systems and compartment support systems (i.e. modular electrical connections) for use in mounting standardized and modular equipment aboard ships in C4I and other types of spaces to reduce the future costs of ship equipment/ system modernization. Assessment of incorporation of SMART deck system and concepts in prototype Combat Information Center (CIC) of the future. Concept developmemnt of mission element modules that would be used across different systems/spaces that have rapidly changing equipment especially electronics. Support requirements definition for flexible mission bays / spaces. Work with next generation combat systems and C4I developers to provide modularization engineering support.

3. (U) FY 1999 PLAN:

- (U) ($685) Integrate new technologies in total ship concepts. Develop ship concepts for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conduct pre-Milestone 0 ship concept studies for large deck amphibious assault ships, command ships, medical capabilities afloat, future mine countermeasures ships, and other potential ship concepts / configurations in support of SCN planning. Analyze the cost/benefit of new concepts and technologies.

- (U) ($1,475) Develop and improve early stage ship design methods, criteria, standards, and data bases. Improve surface ship synthesis/assessment models in the following areas: improve performance assessment capabilities, complete link to commercial CAD II system, increase ability to handle alternative distributed system architectures, link to industry STEP data exchange protocols, begin efforts to link with operational effectiveness models, update and enhance capabilities to support on-going future surface ship designs to handle new ship configurations, hull form alternatives, signature reduction features, address minimum required shipboard manning, reduced construction cost, and increased capabilities to determine ship size impacts of new technologies. Improve ship cost estimating capabilities: link new acquisition cost modeling capability to ship synthesis/assessment models. Support development of advanced computer aided design methods and tools for early stage ship design in the following areas: complete development and integration of structural analysis tools with CAD II system, upgrade manning estimation tools, enhance machinery design tools, complete general arrangements tool upgrades, and integrate distributed systems analysis software with CAD II system. Support Navy Industry Digital Data Exchange Specification Committee (NIDDESC) development of STEP computer aided design (CAD) systems data exchange protocol standards for shipbuilding industry. Identify, characterize and assess new and emergent technologies and update the HM&E technology database.

- (U) ($1,475) Broad-based implementation of state-of-the-art visualization and simulation techniques for ship design and engineering applications. Integrate visualization and simulation tools from all sources, including DARPA, ONR, and other government activities for areas such as ship motions, maneuvering, powering, personnel flow, stores flow, structural response, command and communications systems, electric power systems, piping systems, HVAC systems, and combat systems. Acquire and validate, adapt, and implement commercial and other source visualization and simulation tools for the areas of: fluid / piping systems simulation, and crew reduction performance simulation. Develop custom visualization and simulation tools where no alternate source exists in the following areas: aircraft handling simulation, signature visualization & simulation. Complete development of standard "wrapper" program to integrate visualization and simulation tools with legacy computer aided design and physics-based hull, mechanical, & electrical (HM&E) analysis tools. Develop capabilities for realistic, physics-based simulation of ship performance,

behavior, and response in the following areas: survivability, damage tolerance, and damaged mission capability simulation by developing an integrated survivability assessment and analysis capability.

- (U) ($1,080) Begin development of methodology for overall strength analysis of surface ships. Add new reliability inputs and assessment techniques to design rules. Incorporate methods for predicting extreme and cumulative lifetime loads into design rules. Collect and analyze long-term hydrodynamic loads data. Correlate full scale loads measurements with model test results. Validate and adapt advanced seaway loads prediction methods for use with design rules. Develop methodology for bow form effects on hull loads. Establish safety indices for naval ship structures. Large scale grillage strength tests. Begin assessment of grillage strength test data. Update design data sheet for compressive strength of plating stiffeners and grillages. Develop structural fatigue (part IV) of the reliability-based load and resistance factor design (LRFD) structural rules for naval surface ships. Validate processes and utilize technologies/improved design methods on existing ships and new designs. Support Ship Structure Committee (SSC) Research.

- (U) ($10,185) Develop, demonstrate, and validate architectures, technologies, and concepts that reduce total ownership costs for the future fleet. Identify areas/methods for common across ship type means to improved life cycle affordability of naval ships and shipboard systems. Efforts are focused on application to future ships. Where feasible, backfit to existing ships will be pursued. Implement and apply these efforts to the 21st century surface combatant (SC 21), and future carrier CV(X), and other ships in the SCN plan. Primary emphasis is on ship and ship systems commonality and modularity for and affordability of the DD21.

  (U) Total Ship Modular Open Systems Architecture: Begin multi-year Navy-Industry effort to develop details for a total ship architecture which: uses common interfaces, has modularity at many levels, is aligned with world class modular ship construction, uses a generic build strategy, uses zonal distributed systems, has HM&E modules and common interfaces, and has weapon, sensor & electronic - modules, zones, & standard interfaces. This development effort will include ship configurations and systems architectures that can utilize commercial processes and/or commercial-off-the-shelf (COTS) equipment and materials. Apply this effort to future surface combatants as the prototype. Develop detailed total ship modular open systems architecture requirements for surface combatants. Perform operational, survivability, and cost analysis of this ship architecture. Begin detailed design of zonal distributed systems architectures for HVAC, firemain, and other auxiliary/support systems, that are scaleable to all classes/sizes of ship types. Draft performance specifications and other requirements for this modular open systems architecture including common interfaces. Start detailed definition of Weapons / Topside / Electronic Zones definition & interface standards for combat systems and C4I. Start detailed definition module to ship, module to module, and intra-module interface standards for hull, mechanical & electrical systems. Evaluate and use industry interfaces standards where available. Studies/analyses of alternative distributed systems (i.e.

replacements for current means for providing support to main systems and compartments). Survivability and operations evaluations for these systems on surface combatants. Incorporate flexible mission bays/spaces into this total ship architecture. Begin development of detailed requirements for dedicated serviceways for zonal distributed and other support systems. Support integration of distributed computing plant schematic architecture into the physical architecture of modular ship architecture. Begin the development of a detailed generic build strategy for a modular open systems architecture for a family of surface combatants. Include results of the commonality architecture and zonal distributed systems and analyze their impact on ship production costs, scheduling, fabrication, erection, outfitting, and testing. Begin development of a generic maintenance and modernization strategy for a modular open systems architecture family of surface combatants. Perform early stage design for production analysis of concepts and technologies for on-going ship acquisition programs primarily SC-21. Support NAVSEA Professor of Ship Production research grant.

(U) Total Ownership Cost Methods & Modeling: Develop a total ownership cost modeling and cost decision making tools for ships. Support Navy-Shipbuilding Industry cost model development team. Validate the prototype PODAC cost model at two more shipyards. Begin extension of PODAC cost model for combat systems and C4I costs. Collect and analyze cost data of shipbuilders for development of activity cost factors for surface combatants. Develop PODAC cost model estimating ratios for shipbuilding intermediate products, parametric scaleable systems, and shipboard equipment for surface combatant ships. Complete development of risk and schedule capabilities to PODAC cost model. Use PODAC cost model to analyze new technologies to validate the models capabilities to correctly reflect acquisition cost impacts. Develop ship operating and support (O&S) cost model. Develop O&S cost model estimating ratios for shipbuilding intermediate products, parametric scaleable systems, and shipboard equipment for surface combatant ships. Link O&S cost analysis methodology with product work break down of PODAC cost model. Analyze O&S cost benefits of architectures, technologies, and concepts. Update database of cost-benefit studies done and the sources of the cost data. Support cost modeling and cost analysis for on-going ship programs.

(U) Use of Ownership Cost Reduction Best Practices from Industry & Other Services: Benchmark affordability/ life cycle cost reduction best practices from industry & other services. Do cost/benefit & performance analysis of these best practices. As needed based on lessons learned, develop, maintain, and update specifications and standards for implementing use of total ship modular open systems architecture and other ownership cost reduction technologies, and concepts. Work to have these standards and specifications reviewed by industry standard committees and bodies. Evaluate feasibility of affordability best practices for naval fleet / ship use. Adapt affordability best practices for naval fleet / ship use.

(U) Cost Effective Equipment Selection, Maintenance, and Logistics Support: Develop engineering tools, criteria, and methods for cost effective selection. Update equipment selection tool links to commercial

equipment databases. Analyze potential across acquisition program common buy equipment and engineering support for resolution of common buy issues. Transfer lessons learned and adapt the across acquisition program common equipment buy into the SC 21 program. Develop equipment selection processes including use of COTS equipment. Definition of families of equipment / components especially using COTS equipment. Equipment selection support to on-going ship design / acquisition programs. Gather and transfer equipment selection lessons learned and practices to on-going ship programs. Prepare ILS and other processes, requirements in specifications that foster use of cost effective equipment. Complete benchmarking of commercial logistics support concepts. Analyze the cost-benefit and performance of commercial logistics support concepts.

(U) Best Value Enabling and Innovative Technologies for Total Ownership Cost Reduction: Adapt, develop, demonstrate, and validate ownership cost reducing technologies for shipboard use. Gather concepts and technologies from outside shipbuilding and ship operation industries. Examine and evaluate potential commercial technologies to provide more affordable solutions to shipboard functional requirements and/or reduced maintenance and modernization costs. Survey industry and other sources for modularity enabling technologies. Develop galley of the future module concept design using commercial food preparation processes and equipment. Complete engineering effort on prototype evaluations for ships under construction (such as DDG 51 class and LPD 17 class), and modernization (CVN 68 class) for habitability common modules, and commercial furniture for offices and berthing. Complete demonstration and evaluation of commercial lighting systems - sulfur fusion light with light tube, and fiber optic lighting applications. Evaluate results of LPD 17 detailed design experience with modular systems and spaces and transition these into on-going ship acquisition programs. Capture and integrate LPD 17 shipbuilder updated modular sanitary spaces into SC 21 and CV(X) programs. Capture LPD 17 shipbuilder developed package units, and construction modules that are now common modules into SC 21 ships and CV(X). Targeted candidates are AFFF stations, fire hose stations, CPS fan rooms, LP air, and water mist fire suppression system. Integrate LPD 17 detailed design experience updated ATC auxiliary systems modules into SC 21 ships and CV(X). Complete development of radio communication modularity using commercial opens systems standards and equipment for modular radio communications. Modular packaging systems engineering and concept development for Concentric Canister Launcher (CCL). Complete development and testing on Shipboard Modular Architecture and Reconfiguration Technology (SMART) deck modular track/hold down systems and compartment support systems (i.e. modular electrical connections) for use in mounting standardized and modular equipment aboard ships in C4I and other types of spaces to reduce the future costs of ship equipment/system modernization. Assessment of incorporation of SMART deck system and concepts in prototype Combat Information Center (CIC) of the future. Support C4I modularity especially use of standard commercial 'racks' and interfaces for radio communications equipment. Work to backfit these on ships under construction and in modernization. Begin efforts on common modules for aircraft maintenance and supply support that can be cross decked with the aircraft and not

require ship modifications for aircraft system changes. Concept design of mission element electronics module by developing concepts for internal to a module/space support systems (electric, cooling, lighting, air, etc.). Identify legacy combat systems for packaging and/or modularization for future surface combatant and other ships. Work with next generation combat systems and C4I developers to provide modularization engineering support so that these systems are supported by zonal distributed systems, and the weapons / topside / sensor zone and interfaces are not violated. Support modularization of the high ship integration and testing cost items identified to fit with the modular architecture of future surface combatant and other ships.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship and fleet wide applications.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	13,242	16,198	22,254
(U) Appropriated Value:	13,807	16,198	----
(U) Adjustments to FY 1997/1998 Appropriated Value / FY 1998 President's Budget:	+549	-485	-7,354
(U) FY 1999 PREBUDG Submit:	14,356	15,713	14,900

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET · DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 net increase (+$549K) is due to undistributed general reductions and supplemental revised economic assumptions, and BTRA for additional concept studies. FY 1998 decrease (-$485K) is due to general adjustments and revised economic assumptions. FY 99 net decrease (-$7,354K) is due to funding realignments and general adjustments.
(U) Schedule: Efforts in this PE were re-phased for DD21 lead award in FY 04.
(U) Technical: The brunt of the FY 99 adjustment is borne by the Affordability Through Commonality (ATC) program. This adjustment shifts risk to the contractor teams that will be doing the ship design and systems integration for the DD21, 21st Century Destroyer. Relying on industry investment on life cycle affordability technologies for the DD21 and other future ships such as CVN 77 and CV(X).

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.
(U) RELATED RDT&E:
(U) PE 0602121N (Surface Ship Technology)
(U) PE 0603513N (Shipboard System Component Development)
(U) PE 0603514N (Ship Combat Survivability)
(U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)
(U) PE 0603573N (Advanced Surface Machinery Systems)
(U) PE 0604567N (Ship Contract Design/Live Fire T&E)
(U) PE 0605130D (Foreign Comparative Test Program)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones	(Not applicable - Non-Acquisition Program)		
Engineering Milestones	Unstiffened Panels LRFD structural rules 4Q	Stiffened Panel LRFD structural rules 4Q	Structural Fatigue LRFD structural rules 4Q
	Updated design data sheet for Fatigue of ship metal structures(DDS) 3Q	Cost Tool Integration w/SBD 4Q	Fracture & Grillage Tests of Shipyard Fabrication Specimens Complete 4Q
	Visualization Virtual Mockup for SBD 4Q	Feasibility Tool (ASSET) Integration w/SBD 4Q	Visualization/Simulation of Discrete Electrical Control Systems & Weapon/Cargo/Vehicle Flow 4Q
	HVAC Module Level II Design and Zonal Arch. Definition 4Q	Standard "Wrapper" Program for Physics Based Analysis 4Q	Dynamic Fluid System behavior 4Q
	C4I Modularity Prototype Space 3Q	Radio Communication Modular Equipment Stds. 4Q	C4I Modularity Distributed Systems Prototype 4Q
	Prototype Stateroom Module Complete 3Q	HM&E Open Systems Interface Standards Development Plan 4Q	HM&E Open Systems Interface Standards Complete 4Q

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

	FY 1997	FY 1998	FY 1999
Engineering Milestones (continued)	Early Stage Design for Production Guidance Production 4Q	Combat Systems Zone & Interface Standards Development Plan 4Q	Zonal HVAC Distr. System Open Systems Concept Design 4Q
	PODAC Cost Model Prototype Version 0 2Q	PODAC Cost Model Validation Complete 4Q	PODAC Cost Model Version 1 Complete 4Q
	Assessment of Impact of Zonal Distributed Syst. Arch. on Ship 4Q	Dedicated Distributed Systems Serviceways Level II Design 4Q	Modular Food Service Level II Design 4Q
	Surface Combatant GBS Phase I 4Q	Integrated Jointer Bulkhead System Complete 4Q	Surface Combatant Open Ship Systems Arch GBS Phase II 4Q
Testing Milestones	5 inch Modular Gun System FCT Complete 4Q	Commercial Lighting Evaluation in Hanger Deck 4Q	
Contract Milestones	(Not applicable)		

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

(U) COST (Dollars in thousands)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Pre-MS0 Ship Concepts	578	737	685
b. Ship Design Methods, Tools, & Criteria	1,318	1,568	1,465
c. Simulation Based Design	211	1,441	1,470
d. Reliability Based Structural Design	1,078	985	1,080
e. EM Engineering	444	--	--
f. Affordability Through Commonality	8,872	10,945	10,160
g. Vertical Gun Advanced Ships (VGAS)	1,809		
h. Travel	46	37	40
TOTAL	14,356	15,713	14,900

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Advanced Marine Enterprises (AME) Arlington, VA	C/CPFF	4-95	CONT.	CONT.	2,629	1,547	2,520	2,400	CONT.	CONT.
John J. McMullen Assoc. (JJMA) Arlington, VA	C/CPFF	4-95	CONT.	CONT.	1,314	430	804	800	CONT.	CONT.
Gibbs&Cox, Inc. Arlington, VA & New York, NY (This contract is a team contract supporting the Affordability Through Commonality Task. Other contract team members are: Advanced Engineering & Research Associates, Arlington, VA; AME, Arlington, VA; Avondale Industries, New Orleans, LA; Bath Irons Works, Bath, ME; Dayton T. Brown, Islip, NY; Hopeman Brothers, Waynesboro, VA; Ingalls Shipbuilding, Pascagoula, MS; M. Rosenblatt & Son, Arlington, VA; NKF Engin., Arlington, VA; PDI Corp., Annapolis, MD; Thomas Enterprises, Alexandria, VA; United Defense LP (FMC), Minneapolis, MN; and Lockheed-Martin, Bethesda, MD.)	C/CPFF	9-94	CONT.	CONT.	10,496	1,155	355	500	CONT.	CONT.
Other Contractors	Various	Various	N/A	N/A	22,901	4,114	5,005	4,700	CONT.	CONT.
NSWC/Carderock Division	WR	Various	N/A	N/A	11,606	4,946	5,635	5,200	CONT.	CONT.
Other Govt. Activities	WR	Various	N/A	N/A	4,285	2,164	1,394	1,300	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY:4 PROGRAM ELEMENT: 0603563N PROJECT NUMBER: S2196
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design PROJECT TITLE: Design Tools, Plans & Concepts

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Support and Management					0	0	0	0	0	0
Test and Evaluation					0	0	0	0	0	0
GOVERNMENT FURNISHED PROPERTY - Not applicable.										
Subtotal Product Development					53,231	14,356	15,713	14,900	CONT.	CONT.
Subtotal Support and Management					0	0	0	0	0	0
Subtotal Test and Evaluation					0	0	0	0	0	0
Total Project					53,231	14,356	15,713	14,900	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0408 Ship Feasibility Studies	15,761	3,728	2,023	10,334	8,211	15	0	0	40,072
22300 CV Feasibility Studies	0	33,801	40,645	15,428	167	229	294	0	90,564
S2392 Cruiser Conversion Studies		14,555	0	0	0	0	0	0	14,555
TOTAL	15,761	52,084	42,668	25,762	8,378	244	294	0	145,191

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The primary objective of Ship Preliminary Design and Feasibility Studies is to design more capable warships at reduced cost, with reduced manning and increased producibility, utilizing the latest technologies. Modern day ship design and acquisition processes do not separate Preliminary and Contract Design. These are seamless design actions conducted between MS I and II. Therefore after FY 1996, design activities formerly conducted in this Program Element (P.E.) as Preliminary Design were combined under P.E. 0604567N, Ship Contract Design/Live Fire Test and Evaluation. This program directly supports the Navy Shipbuilding Plan by performing ship Feasibility Studies and developing Preliminary Designs for new ships in the SCN Plan.

(U) Project S0408 - Ship Development (Advanced), supports post Milestone 0 ship Feasibility Studies that provide the technical definition and initial cost estimates for various ship alternatives being considered in the Analysis of Alternatives (AOA). This project develops the primary supporting documentation for Milestone I decisions.

(U) Project 22300 (Formerly S2300) - CV Feasibility Studies support post Milestone 0 ship Feasibility Studies that provide the technical definition and initial cost estimates for various ship alternatives being considered in the Analysis of Alternatives (AOA). This project supports interim Operational Requirements Document (ORD) preparation and develops the primary supporting documentation for Milestone I decisions.

(U) Project S2392 - This Congressional add program is funded to support planning yard feasibility studies in support of the CG47 Class Conversion Plan.

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

(U) JUSTIFICATION FOR BUDGET ACTIVITY. This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: S0408 PROJECT TITLE: Ship Feasibility Studies

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0408 Ship Development (Advanced)	15,761	3,728	2,023	10,334	8,211	15	0	0	40,072

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Ship concepts, identified in PE 0603563N (Ship Concept Advanced Design) are transitioned to and further developed by this project after an approved Milestone 0 (MS 0) decision. This project performs the Ship Feasibility Studies required after MS 0 to address a specific Mission Needs Statement (MNS) and supports the Analysis of Alternatives(AOA) for new surface ships in the Navy Shipbuilding Plan; performs impact studies of warfare, hull, mechanical and electrical subsystems on advanced ship designs; develops the initial documentation and design methodology required by the government for the design of surface ships in the Shipbuilding Program in accordance with the requirements of the DoD 5000 directives/instructions; supports the development of the Operational Requirements Document (ORD) and other documentation required at Milestone I; develops and evaluates conventional and unconventional hull form alternatives suitable for future acquisition in support of a Milestone I decision. Completion of this phase allows review and approval, at Milestone I, to transfer a ship program to the Contract Design Program Element 0604567N. Ship Feasibility Study products include a description of the alternative ships' principal characteristics and mission critical subsystems, weight estimates, general arrangement sketches, technical risk assessments, and Class F cost estimates. The objective is to provide the decision makers with feasible, affordable alternatives.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($15,761) Conducted Ship Feasibility Studies, AOA analysis and supported ORD preparation for ships in the SCN plan which reached MS 0. Prepared Feasibility Studies, AOA analysis and documentation for the 21st Century Surface Combatant (SC-21) that were completed in the fourth quarter to support a planned FY 98 Milestone I Decision. Expanded ADC(X) Feasibility Studies and AOA support to include the Fleet Oiler.

2. (U) FY 1998 PLAN:

- (U) ($3,728) Complete ADC(X) Ship Feasibility Studies, AOA support and preparation of documentation required for the planned Milestone I decision.

3. (U) FY 1999 PLAN:

- (U) ($2,023) Feasibility Studies and AOA support will begin for a new class of helicopter carrier, LH(X) following a Milestone 0 decision.

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S0408
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: Ship Feasibility Studies

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	12,347	3,848	2,062
(U) Appropriated Value:	12,942	3,848	
(U) Adjustments to FY 1997/1998 Appropriated Value/FY98 President's Budget:			
a. Various pricing adjustments	3,414	-120	-39
		0	
(U) FY 1999 PRESBUDG Budget Submit	15,761	3,728	2,023

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97 reflects increases due to general adjustments ($3,414K). FY 98 reflects decreases due to general adjustments and economic assumption (-$120K). FY 99 reflects an increase due to general adjustments including revised economic assumption (-$39K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE 0603563N (Ship Concept Advanced Design)
(U) PE 0604567N (Ship Contract Design/Live Fire T&E)
(U) PE 0603508N (Ship Propulsion System)

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: S0408 PROJECT TITLE: Ship Feasibility Studies

(U) PE 0603513N (Shipboard Systems Component Development)
(U) PE 0602121N (Surface Ship Technology)
(U) PE 0603573N (Advanced Surface Machinery Systems)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones		1Q DD21 MS I	1Q LH (X)MS 0
Engineering Milestones	TBD - Milestone schedule is established at MS I.		
T&E Milestones	See individual ship acquisition program documentation.		
Contract Milestones	See individual ship acquisition program documentation.		

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: S0408 PROJECT TITLE: Ship Feasibility Studies

. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Ship Design Feasibility Studies	15,646	3,683	1,993
b. Travel	115	45	30
TOTAL	15,761	3,728	2,023

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: S0408 PROJECT TITLE: Ship Feasibility Studies

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
Naval Surface Warfare Center Dahlgren Dahlgren VA	WR	Various	CONT.	CONT.	5,210	3,632	0	317	CONT.	CONT.
Other Government	WR/Reqn	Various	CONT.	CONT.	4,347	2,636	400	700	CONT.	CONT.
Aplied Physics Laboratory Laurel, MD	Comp	Various	CONT.	CONT.	3,635	3,304	0	0	CONT.	CONT.
J.J. McMullen Arlington, VA	Comp	Various	CONT.	CONT.	0	3,172	2,470	0	CONT.	CONT.
Other Contractor	Comp	Various	CONT.	CONT.	6,155	2,892	808	1,006	CONT.	CONT.
Support and Management Various	Comp	Various	CONT.	CONT.	55	125	50	0	0	CONT.
Test and Evaluation										

GOVERNMENT FURNISHED PROPERTY: (Not applicable)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) Continued

	FY 1996	FY 1997	FY 1998	FY 1999	To	Total

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: S0408 PROJECT TITLE: Ship Feasibility Studies

	& Prior	Budget	Budget	Budget	Complete	Program
Subtotal Product Development	19,347	15,636	3,678	2,023	CONT.	CONT.
Subtotal Support and Management	55	125	50	0	CONT.	CONT.
Subtotal Test and Evaluation						
Total Project	19,402	15,761	3,728	2,023	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: 22300 PROJECT TITLE: CV Feasibility Studies

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
22300 CV Feasibility Studies	0	33,801	40,645	15,428	167	229	294	0	90,564

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project performs the ship Feasibility Studies required after Milestone 0 (MS 0) to address a specific Mission Needs Statement (MNS) and supports the Analysis of Alternatives (AOA) for the Future Carrier (CVX) Program; performs impact studies of aircraft/air wing composition, propulsion, hull alternatives, combat systems, machinery and electrical subsystems, and cost on CVX designs; supports the development of the Operational Requirements Document (ORD) and other documentation required at Milestone I. Completion of this phase allows review and approval, at Milestone I, to transfer a ship program to the Contract Design Program Element 0604567N. Ship Feasibility Study products include a description of the alternative ships' principal characteristics and mission critical subsystems, weight estimates, general arrangement sketches, technical risk assessments, and Class F cost estimates. The objective is to provide the decision makers with feasible, affordable alternatives.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1998 PLAN:

- (U) ($26,000) Commence ship feasibility studies and support ORD preparation for the CVX.
- (U) ($3,834) Utilize existing and developmental commercial and government hardware and software, and develop interfaces where required, to enable rapid visualization and analysis of future carrier systems and ship concepts through development of virtual prototypes.
- (U) ($3,967) Provide CVX AOA engineering support.

4. (U) FY 1999 PLAN:

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: 22300 PROJECT TITLE: CV Feasibility Studies

- (U) ($30,465) Continue Ship Feasibility Studies and ORD preparation for CVX.
- (U) ($ 5,180) Utilize existing and developmental commercial and government hardware and software, and develop interfaces where required, to enable rapid visualization and analysis of future carrier systems and ship concepts through development of virtual prototypes.
- (U) ($ 5,000) Continue AOA engineering support for CVX.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT NUMBER: 22300 PROJECT TITLE: CV Feasibility Studies

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	34,834	41,422
(U) Appropriated Value:	0	34,834	
(U) Adjustments to FY 1997/1998 Appropriated Value/FY98 President's Budget:			
a. Various Pricing Adjustments	0	-1033	-777
(U) FY 1999 PRESBUDG Submit:	0	33,801	40,645

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 98 decreases are due to general adjustments (-$956K) and economic assumption (-$77K). FY 99 decreases due to general adjustments(-$65K), commercial purchase inflation adjustment (-$718K) and increase for Mil and Civ pay rates ($6K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0604567N (Ship Contract Design/Live Fire T&E)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: 22300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones			
Engineering Milestones	TBD - Milestone schedule is established at MS I		
T&E Milestones	See Individual ship acquisition program documentation.		
Contract Milestones	See individual ship acquisition program documentation.		

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies
PROJECT NUMBER: 22300
PROJECT TITLE: CV Feasibility Studies

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. System Engineering	0	33,504	40,445
b. Travel	0	297	200
c. Miscellaneous	0	0	0
TOTAL	0	33,801	40,645

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: 22300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor Government Performing Activity	Contract Method/ Fund Type Vehicle	Award Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NAVSURFWARCEN, Carderock Division, Bethesda, MD	WR	Oct 97	CONT.	CONT.	0	0	3,000	3,000	CONT.	CONT.
NAVSURFWARCEN, Ship Systems Engineering Station, Philadelphia, PA	WR	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
NAVSURFWARCEN, Dahlgren Division, Dahlgren, VA	WR	Oct 97	CONT.	CONT.	0	0	2,000	2,000	CONT.	CONT.
NAVAIRWARCEN, Aircraft Division, Lakehurst, NJ	WR	Oct 97	CONT.	CONT.	0	0	1,000	2,000	CONT.	CONT.
Space & Warfare Systems Center, San Diego	WR	Jan 97	CONT.	CONT.	0	0	1,000	1,000	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: 22300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

Contractor Government Performing Activity	Contract Method/ Fund Type Vehicle	Award Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
NAVAL Research Laboratory, Washington, DC	WR	Oct 97	CONT.	CONT.	0	0	500	1,000	CONT.	CONT.
Naval Nuclear Propulsion Program SEA 08	Contr.	Oct 97	CONT.	CONT.	0	0	6,000	0	CONT.	CONT.
Naval Sea System Command Detachment, PERA CV	WR	Oct 97	CONT.	CONT.	0	0	510	500	CONT.	CONT.
Avondale Industries, New Orleans, LA	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
Electric Boat Corp. Groton, CT	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
Hughes Aircraft Co. Fullerton, CA	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
Ingalls Shipbuilding Pascagoula, MS	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: 22300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

Government Performing Activity	Method/ Fund Type Vehicle	Award Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Lockheed Martin Moorestown, NJ	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
Newport News Shipbuilding, Newport News, VA	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
John J. McMullen Assoc. Arlington, VA		Oct. 97	CONT.	CONT.	0	0	4,513	4,000	CONT.	CONT.
Advanced Marine Enterprises, Inc. Arlington, VA	Contr.	Oct. 97	CONT.	CONT.	0	0	4,719	5,000	CONT.	CONT.
M. Rosenblatt & Son Inc., Arlington, VA	Contr.	Oct 97	CONT.	CONT.	0	0	500	500	CONT.	CONT.
George G. Sharp, Inc., Arlington, VA	Contr	Oct 97	CONT.	CONT.	0	0	0	500	CONT.	CONT.
Contractors	Contr	Oct 97	CONT.	CONT.	0	0	1,559	16,645	CONT.	CONT.
Miscellaneous	Misc.	Oct 97	CONT.	CONT.	0	0	5,000	1,000	CONT.	CONT.
Support and Management:										
Test and Evaluation:										

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: 22300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

GOVERNMENT FURNISHED PROPERTY: (Not applicable).

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) Continued

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	0	0	33,801	40,645	16,118	90,564
Subtotal Support and Management						
Subtotal Test and Evaluation						
Total Project	0	0	33,801	40,645	16,118	90,564

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery
PROJECT NUMBER: S1314
PROJECT TITLE: Advanced Surface Machinery Programs

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1314 Advanced Surface Machinery (ASM) Programs	64,459	46,324	58,419	83,821	44,363	33,259	26,198	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: ASM Programs develop affordable advanced machinery and subsystems for surface ship propulsion, electric and auxiliary requirements. These programs are in various phases of development ranging from concept formulation to full scale development. The goals of the ASM Programs are to: Reduce acquisition and operating costs of naval ships and increase military effectiveness. These goals are to be accomplished by leveraging investments in technologies that will be usable by both the military and commercial sectors. Some technologies being developed for military application will have significant commercial viability upon completion of development, while other technologies being developed commercially have significant military applications and will be demonstrated and adapted for military use.

(U) ASM places primary emphasis on a system architecture and a systems engineering approach which maintains flexibility and minimizes investment until technologies are demonstrated, affordability is assessed, trade off decisions are made, and subsystems evaluated and brought together for optimal total ship cost effectiveness. The products of ASM include: InterCooled Recuperated (ICR) Gas Turbine Engine; Standard Monitoring and Control System (SMCS); Integrated Power System (IPS); and, Systems Engineering & Modular Architecture.

(U) ICR Gas Turbine Engine. The ICR Gas Turbine Engine is a next generation marine propulsion gas turbine. ICR will significantly reduce life cycle fuel cost and provide a minimum impact alternative to increase range.

(U) A contract for ICR Advanced Development (AD) with an option for Full Scale Development was awarded to Westinghouse Electric Corporation in December 1991. The ICR is derived from the Rolls-Royce RB211 aircraft engine and through the introduction of an intercooler, recuperator, and variable area nozzles achieves approximately a 26% to 27% propulsion fuel savings when compared to the LM2500. The RB211 is a modern commercial aircraft engine with over 2000 engines delivered to date and production projected well into the next century.

(U) ICR developmental full scale system testing began in July 1994 and is continuing at Pyestock, U. K.. Recuperator recovery efforts are continuing following the failure in January 1995 of the initial recuperator. A second generation recuperator, which is the exhaust heat recovery unit that provides most of the fuel efficiency gains, was delivered to the test site in December 1995. To date a series of seven (7) engine tests have been completed with over 1200 hours of successful testing including over 900 hours with the redesigned recuperator which performed satisfactorily. Tests to date have met objectives.

(U) A Cooperative Agreement between the United Kingdom and United States governments was signed by USD(A&T) on 21 June 1994 and revised in March 1997 for in-kind and cash contributions to the ICR program. A Cooperative Agreement between the French and United States governments was signed by ASN(RD&A) on 30 August 95 for in-kind and cash contributions to the ICR program.

(U) Zonal Electrical Distribution System (ZEDS). The Zonal Electrical Distribution System is a standard architecture for electrical distribution designed to improve ship producibility and reduce ship acquisition and construction costs. Initial installations of ZEDS incorporated a zonal electrical distribution architecture in order to achieve major enhancements to producibility by reducing the number of watertight compartment penetrations and facilitate testing by ship construction zones. Initial ship installation was FY 94 DDG 51 class ships. This project has been combined with IPS for future systems concepts utilizing dc distribution with rapid reconfiguration and automated fault isolation/ detection and forms an integral part of the IPS architecture.

(U) Integrated Power System (IPS). IPS provides power for all load requirements from any combination of prime movers and provides total ship power management. IPS can employ ICR and ZEDS, plus large scale high power density motors, power electronics, and cost saving power distribution architectures. IPS components and technologies are defined through system effectiveness analyses, which include cost and performance factors. IPS addresses ASM Program goals through: reduced ship acquisition cost through integration of propulsion and ship's service prime movers; lower ship operational costs resulting from more flexible operating characteristics and more efficient components; reduced ship construction costs by allowing more extensive modular construction of power generation, distribution, and loads if desired; improved ship survivability and reduced vulnerability through increased arrangement flexibility and improved electrical system survivability; reduced manning through improved power management systems and reduced on-board maintenance requirements; improved ship signature characteristics, if required; improved design adaptability to meet future requirements of multiple ship types or missions; integrating power management and protection by fully utilizing the power electronics in the system to perform fault protection as well as power conversion and load management

functions; simplified technology insertion which allows new technologies to be installed within IPS configurations much more inexpensively than presently possible; and, reduced machinery system acquisition costs through utilization of commercially shared technologies and components. The target application for IPS is the twenty-first century surface combatant. Elements of IPS such as solid state power electronics and variable speed drives on auxiliaries will be integrated in near-term ship acquisition targets.

(U) A contract for IPS Full Scale Advanced Development (FSAD) was awarded to Lockheed-Martin (then Martin Marietta) Ocean, Radar and Sensor Systems, Syracuse, New York in February 1995. IPS FSAD incorporates a commercial marine approach to shipboard power generation, propulsion, and electrical power distribution, employing a commercial industrial-derivative generator and propulsion motor, and a developmental propulsion power converter. The focus of the FSAD effort is on system integration, with maximum use of commercial technology adapted as necessary to satisfy military requirements. A feature of IPS FSAD with particular military benefits is the zonal direct current (DC) ship service electrical distribution system. The IPS architecture will allow the Navy to incorporate developing technologies such as next generation power electronics, Power Electronic Building Blocks (PEBB's), fuel cells, permanent magnet electric machines and pulse power systems into future ship designs as pre-planned replacements or additions with minimum impact to ship design and construction processes.

(U) IPS has the potential to revolutionize the design, construction and operation of U.S. naval ships by using electricity as the primary energy transfer medium aboard ship. IPS reduces the number of installed prime movers to a minimum, with concomitant reduction in operation and maintenance manning requirements, as any power generating unit can supply either propulsion or ship service power to support ship operational priorities at any given time. The flexibility of electric power transmission allows power generating modules with various power ratings to be connected to propulsion loads and ship service power converters in whatever arrangements support the ship's mission at lowest overall cost. The ability to independently position the minimum amount of machinery components in unmanned space permits greater separation and compartmentation in the ship, with significant benefits in manning, safety and ship survivability relative to conventional design arrangements. Additionally, the use of small, unmanned machinery spaces will permit the use of non-CFC based fire extinguishing agents (such as CO2) to be installed as integral fire suppression systems similar to those currently used in fleet propulsion gas turbine enclosures.

(U) Systems Engineering & Modular Architecture. Systems Engineering & Modular Architecture in the ASM Programs are focused on increasing the commonality of components used across ship types and in developing modules which will be integral with standardization, zonal system architectures, and generic shipbuilding strategies. The purpose of

increased commonality is to reduce the total cost of ship ownership by using common modules composed of standard components and/or standard interfaces.

(U) ASM modules are being designed to support anticipated ship construction requirements. These modules include Power Generation Modules, Propulsion Motor Modules, Power Distribution Modules, Power Conversion Modules, and Power Management Modules. Each of these major items consists of numerous sub-modules which, through computer aided design techniques, are integrated as necessary to fulfill unique ship requirements.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROGRAM ELEMENT TITLE: Advanced Surface Machinery PROJECT NUMBER: S1314 PROJECT TITLE: Advanced Surface Machinery Programs

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($41,629) ICR: Completed A/3 strip and inspect, testing of B/3, and B/3 strip and inspect. Built A/4 and completed the first 500hr endurance test using A/4 engine. Initiated design and fabrication of the EDM recuperator.

- (U) ($21,222) IPS: Continued development of IPS including: Completed manufacturing design and began manufacture of generator, propulsion motor, and propulsion distribution subsystems; completed system design and started detail design of Ship Service Distribution System (SSDS) functional equivalent modules which included the DC power supply and Ship Service Converter Modules (SSCM); took delivery of and began testing Ship Service Inverter Modules (SSIM); redefined IPS supervisory power management hardware environment, continued power management software development; completed IPS supervisory and zonal power management code and test; completed IPS system and distribution module design reviews; completed FSAD local control ethernet environment development; and, continued FSAD pre-LBES and LBES site preparation and equipment delivery. Completed preliminary design of axial full scale Permanent Magnet (PM) propulsion motor.

- (U) ($ 1,608) Systems Engineering: Performed life cycle costing, producibility studies, manning studies, module development, systems integration, and architecture design, in support of ASMP efforts. Completed initial IPS Pilot Ship installation study and life-cycle cost model. Provided support to naval architecture and costing teams for DD-21 Analysis of Alternatives (AOA).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery
PROJECT NUMBER: S1314
PROJECT TITLE: Advanced Surface Machinery Programs

2. (U) FY 1998 PLAN:

- (U) ($29,398) ICR: Take delivery of EDM recuperator. Modify the exhaust collector, perform testing on B/4 engine, install the EDM recuperator, and initiate testing on the A/5 engine. Testing will include high pressure turbine metal temperature measurements on B/4, and functional and performance testing on A/5. Complete strip and inspection of the B/4 engine.

- (U) ($15,228) IPS: Continue development of IPS including: Complete generator subsystem, propulsion motor, and propulsion distribution subsystems fabrication and factory acceptance testing (FAT); complete FSAD SSDS equipment fabrication and factory testing including ship service power supply and SSIM/SSCM; take delivery of SSDS DC power supply and SSCM's; complete IPS power management code and test; complete FSAD SIM/STIM system integration and test; take delivery of generator, propulsion motor and propulsion distribution subsystems; conduct FSAD pre-LBES testing; complete FSAD LBES site preparation; complete INCO of all FSAD equipment; commence FSAD system testing at LBES.

- (U) ($ 1,698) Systems Engineering: Perform life cycle costing, producibility studies, manning studies, module development, systems integration, and architecture design and other ASMP efforts. Continue support for DD-21 design effort and other ASMP ship candidates.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery
PROJECT NUMBER: S1314
PROJECT TITLE: Advanced Surface Machinery Programs

3. (U) FY 1999 PLAN:

- (U) ($33,007) IPS: Complete FSAD testing and conduct an Early Operational Assessment (EOA) by COMOPTEVFOR. Continue development of IPS to transition the FSAD proof of concept system into ship ready systems and components including: continue IPS system design and integration; conduct design of modules to replace FSAD functional equivalents; continue development of the IPS system dynamic performance simulation; refine the dynamic performance simulations based on module designs in progress; conduct module design incorporating FSAD test results to include module integration engineering, dynamic analyses, and life cycle cost analysis; upon completion of module design, begin preparation of follow-on engineering development procurement documents; begin development of module simulator/stimulator (SIM/STIM) for risk reduction during power management system development and hardware installation and checkout; begin design of LBES modifications; continue testing to validate performance models and characterize module interfaces.

  (U) Power Electronic Building Block (PEBB) Demonstration: Initiate detailed design and fabrication of PEBB based IPS power conversion modules (PCM's) and drive converters which will characterize PEBB based PCM performance and provide indications of beneficial ship design impacts and potential life cycle cost reductions. This effort will include planning to complete transition of the PEBB based PCMs through qualification.

- (U) ($23,543) ICR: Finish the A/5 engine testing began last FY, conduct A/6 engine testing, and initiate a 500-hour endurance test on engine B/6 in NAVSSES Philadelphia.

- (U) ($ 1,869) Systems Engineering: Perform life cycle costing, producibility studies, manning studies, module development, systems integration, and architecture design and other ASMP efforts. Continue support for DD-21 design efforts and other ASMP ship candidates.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery
PROJECT NUMBER: S1314
PROJECT TITLE: Advanced Surface Machinery Programs

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	66,055	49,741	52,089
(U) Appropriated Value:	68,873	47,741	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. Adjustments	-4,414	-1,417	+6,330
(U) FY 1999 PRESBUDG Submit:	64,459	46,324	58,419

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 reduced by $1,472K for Small Business Innovative Research program, $2,818K for general undistributed adjustments, $81K for Revised Economic Assumptions and $43K for March 1997 Updating BTRs. FY 1998 reduced $1,311K for general reductions and $106K for Economic Assumptions. FY 1999 increased $16K NWCF R&D - Surface Warfare Centers, and $142K DBOF Surcharge Correction and other pricing adjustments ($7,202) and reduced $1,030K for Commercial Purchased Inflation Adjustment..

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROGRAM ELEMENT TITLE: Advanced Surface Machinery

PROJECT NUMBER: S1314 PROJECT TITLE: Advanced Surface Machinery Programs

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY1997 ACTUAL	FY1998 ESTIMATE	FY1999 ESTIMATE	FY2000 ESTIMATE	FY2001 ESTIMATE	FY2002 ESTIMATE	FY2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
SCN Line (ICR) - TBD	0	0	0	0	0	0	TBD	TBD	TBD

(U) RELATED RDT&E:

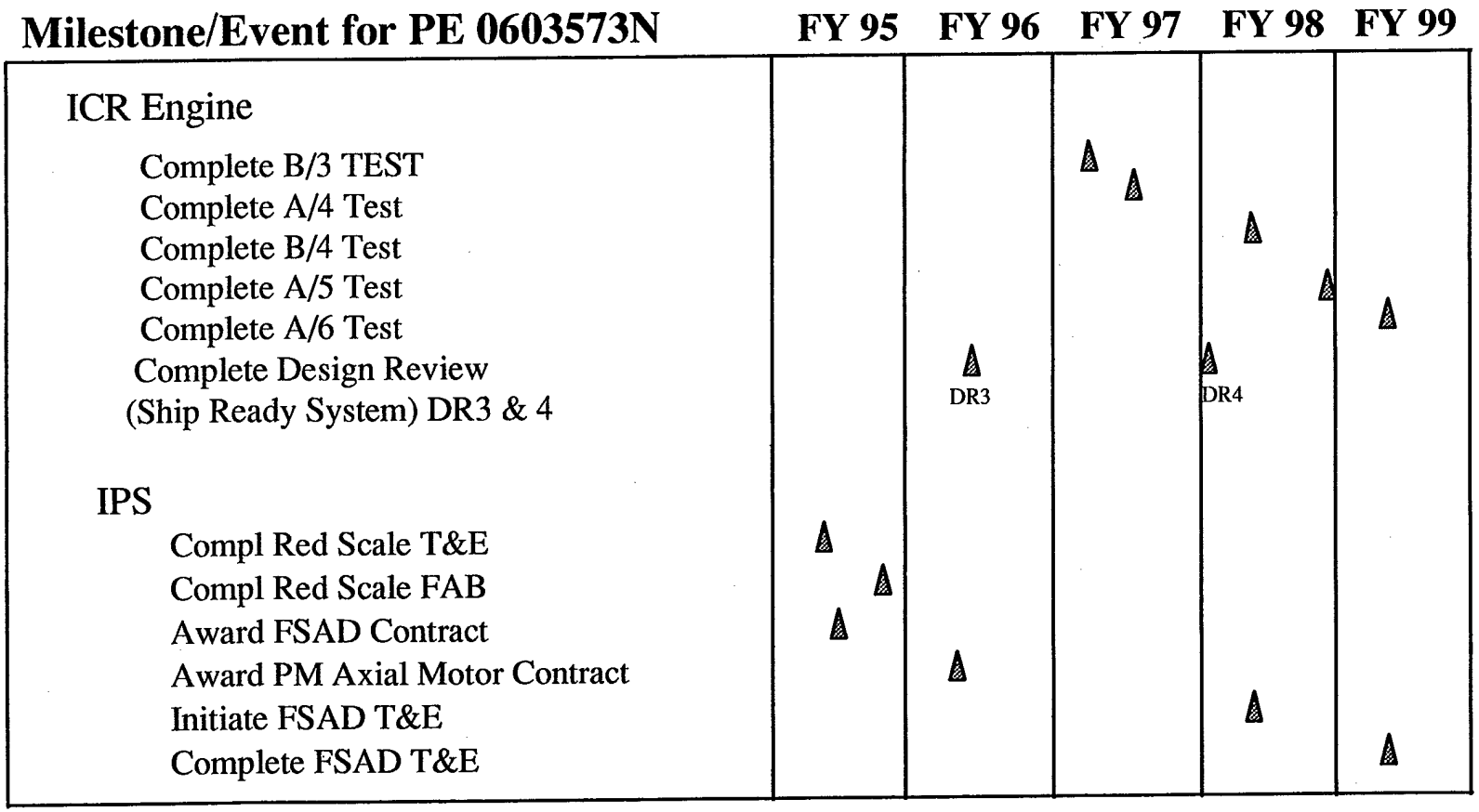
(U) PE 0602121N (Surface Ship Technology)
(U) PE 0603721N (Environmental Protection)
(U) PE 0603508N (Ship Propulsion System)

D. (U) SCHEDULE PROFILE: See Attached

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery
PROJECT NUMBER: S1314
PROJECT TITLE: Advanced Surface Machinery Programs

Milestone/Event for PE 0603573N



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603573N

PROGRAM ELEMENT TITLE: Advanced Surface Machinery

PROJECT NUMBER: S1314

PROJECT TITLE: Advanced Surface Machinery Programs

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. PRIMARY HARDWARE DEVELOPMENT	57,319	40,889	51,357
b. SYSTEMS ENGINEERING	1,608	1,698	1,867
c. DEVELOPMENTAL T&E	5,417	3,612	5,095
d. TRAVEL	115	125	100
TOTAL	64,459	46,324	58,419

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROGRAM ELEMENT TITLE: Advanced Surface Machinery PROJECT NUMBER: S1314 PROJECT TITLE: Advanced Surface Machinery Programs

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
N0002492C4166 NORTHROP GRUMMAN, SUNNYVALE CA (ICR)										
	C/CPAF	12/91	CONT.	CONT.	234,932	39,943	28,380	20,487	CONT.	CONT.
N0002492C4207 NEWPORT NEWS, NEWPORT NEWS VA (IPS RSAD)										
	SS/CPFF	5/92	8,319	8,319	8,319	0	0	0	0	8,319
N0002495C4109 LOCKHEED MARTIN, SYRACUSE NY (INTEGRATED POWER SYSTEMS FSAD)										
	C/CPAF	2/95	CONT.	CONT.	26,533	14,343	10,332	4,802	CONT.	CONT.
N0002496C4004 NEWPORT NEWS SHIPBUILDING, NEWPORT NEWS VA (PM MOTORS - AXIAL)										
	C/CPAF	5/96	2,400	2,400	2,481	0	0	0	0	2,481
TBD (INTEGRATED POWER SYSTEMS FSED)										
	C/CPAF	1Q/99	TBD	TBD	0	0	0	19,435	CONT.	CONT.
TBD (POWER ELECTRONIC BUILDING BLOCK (PEBB) DEMO)										
	C/CPAF	1Q/99	TBD	TBD	0	0	0	2,700	CONT.	CONT.
NAVSURFWARCEN ANNAPOLIS MD										
	WR	1Q/96	CONT.	CONT.	39,393	3,235	3,200	4,300	CONT.	CONT.
MISC CONTRACTS (LESS THAN $1M) TOTAL:					24,423	1,365	700	1,400	CONT.	CONT.
MISC GOV'T ACTIVITIES (LESS THAN $1M) TOTAL:					1,311	156	100	200	TBD	TBD
TOTAL PRODUCT DEVELOPMENT:					337,392	59,042	42,712	53,324	CONT.	CONT.

Contractor/ Government	Contract Method/	Award/	Perform	Project	Total

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery PROJECT TITLE: Advanced Surface Machinery Programs

Performing Activity	Fund Type Vehicle	Oblig Date	Activity EAC	Office EAC	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Support and Management	Not applicable.									
Test and Evaluation										
NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA										
	WR	1Q/96	CONT.	CONT.	21,286	5,417	3,612	5,095	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development	Not applicable.								
Support and Management	Not applicable.								
Test and Evaluation	Not applicable.								

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	337,392	59,042	42,712	53,324	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	21,286	5,417	3,612	5,095	CONT.	CONT.
Total Project	358,678	64,459	46,324	58,419	CONT.	CONT.

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROGRAM ELEMENT TITLE: Combat System Integration PROJECT NUMBER: S0164 PROJECT TITLE: Combat System Integration

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0164 Combat System Integration	5,672	7,379	9,654	9,373	9,605	9,754	9,932	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides shore based testing of integrated combat direction, weapon, sensor and computing systems prior to their installation in operational fleet units. The operational computer programs are assembled and tested to assure proper configuration and interoperability in a test environment similar to their ultimate shipboard operational environment. Included is operational assessment testing of the integrated suite of computer programs. This is the only opportunity for this range of testing of individually developed and tested combat system subsystem programs prior to shipboard delivery for operational use. Combat system level configuration control is maintained by updates to the Surface Ship Combat System Master Plan (SSCSMP).

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develop s and integrates hardware for experimental test related to specific ship or aircraft applications.

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROGRAM ELEMENT TITLE: Combat System Integration PROJECT NUMBER: S0164 PROJECT TITLE: Combat System Integration

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($4,698) Conducted integration testing of: Advanced Combat Direction System (ACDS) Block 1 upgrades and Shipboard Self Defense System in CV/CVN, LHD and LSD Ship classes; and, ACDS Block 0 upgrades in CV/CVN, LHD and LHA classes.

- (U) ($754) Initiated design and development of test beds for CVN 68 and CVN 76 Classes and continue for LPD17 Class. Continued planning and preparations for out-year testing including simulation system, test bed and test procedures design and development.

- (U) ($220) Continued SSCSMP updates.

2. (U) FY 1998 PLAN:

- (U) ($5,285) Conduct integration testing of Advanced Combat Direction System (ACDS) Block 1 upgrades and Integrated Ships Defense System in CV/CVN, LHD and LSD ship classes.

- (U) ($1,819) Continue design and development of test beds for CVN 68, CVN 76 and LPD 17 classes. Continue planning and preparations for out-year testing including simulation system, test bed and test procedures design and development.

- (U) ($275) Continue SSCSMP updates.

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROGRAM ELEMENT TITLE: Combat System Integration PROJECT NUMBER: S0164 PROJECT TITLE: Combat System Integration

3. (U) FY 1999 PLAN:

- (U) ($7,178) Conduct integration testing of AKCITA BLOCK 0 and SEA ATHENA upgrades in CV/CVN, LHD and LHA ship classes.
- (U) ($2,201) Continue development of test bed for LPD 17 class. Continue planning and preparations for out-year testing including simulation system, test bed and test procedures design and development.
- (U) ($275) Continue SSCSMP updates.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,645	7,739	9,793
(U) Appropriated Value	3,879	7,739	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget			
a. Adjustments	+1,793	-360	-139
(U) FY 1999 PRESBUDG Submit:	5,672	7,379	9,654

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: BTR ICSTF Critical Non-Aegis Combat System Integration testing (+$2,100); additional adjustments due to undistributed reductions and minor pricing adjustments(-$307).

FY1998: Decrease for Contract Advisory and Assistance Services (-$130), additional adjustments for general

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROGRAM ELEMENT TITLE: Combat System Integration PROJECT NUMBER: S0164 PROJECT TITLE: Combat System Integration

reductions (-$230).

FY 1999: Decrease for Commercial Purchases Inflation Adjustments (-$170); additional adjustments for NWCS Surface Warfare Center (+$21), Mil and Civ Pay Rates(+$6), and DBOF Surcharge Correction (+$4).

(U) Schedule: Weekly testing will be adjusted to provide test hours necessary to fulfill the requirements of the full scope of testing and meet the established fleet delivery schedules.

(U) Technical: Fleet delivery of combat system computer programs which have undergone full interoperability testing.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: Computer programs developed under these programs are tested in their integrated configur ation:
- (U) PE 0204571N (Consolidated Training Systems Development)
- (U) PE 0205620N (Surface ASW Combat Systems Integration)
- (U) PE 0603382N (Advanced Combat System Technology)
- (U) PE 0603755N (Ship Self Defense)
- (U) PE 0604301N (MK 92 Fire Control System Upgrade)
- (U) PE 0604372N (New Threat Upgrade)
- (U) PE 0604518N (CIC Conversion)
- (U) PE 0604755N (Ship Self Defense)

D. (U) SCHEDULE PROFILE: Not applicable.

DATE: February 1998

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROGRAM ELEMENT TITLE: Combat System Integration PROJECT NUMBER: S0164 PROJECT TITLE: Combat System Integration

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Integration Testing			
Test Bed & Simulation			
Development	305	602	537
Planning	288	516	428
Procedures	342	408	397
Development	301	582	508
Conduct	2,957	3,282	5,409
Reporting	236	375	457
Configuration Management	330	422	485
Technical Support	401	621	764
b. SSCSMP	220	275	275
c. Travel	40	40	40
d. Miscellaneous	252	256	354
TOTAL	5,672	7,379	9,654

DATE: February 1998

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROGRAM ELEMENT TITLE: Combat System Integration PROJECT NUMBER: S0164 PROJECT TITLE: Combat System Integration

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
N/A										
Support and Management										
N/A										
Test and Evaluation										
Integrated Combat System Test Facility San Diego, Ca.	WR	Various			43,258	0	0	0	0	0
Naval Surface Warfare Center, Port Hueneme Division Port Hueneme, Ca.	WR	Various	CONT.	CONT.	55,832	4,382	6,089	8,364	CONT.	CONT.
Applied Physics Laboratory Laurel, MD	SS/FP	07/95	1,075	1,075	1,075	0	0	0	0	1,075
Miscellaneous	Various	Various	CONT.	CONT.	42,245	1,290	1,290	1,290	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

DATE: February 1998

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603582N
PROGRAM ELEMENT TITLE: Combat System Integration
PROJECT NUMBER: S0164
PROJECT TITLE: Combat System Integration

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	0	0	0	0	N/A	N/A
Subtotal Support and Management	0	0	0	0	N/A	N/A
Subtotal Test and Evaluation	142,410	5,672	7,379	9,654	CONT.	CONT.
Total Project	142,410	5,672	7,379	9,654	CONT.	CONT.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603611M Marine Corps Amphibious Assault Vehicles

PROJECT: B0020

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
B0020 ADVANCED AMPHIBIOUS ASSAULT VEHICLE (AAAV)	55731	68186	104822	92795	111047	131002	152132	Continuing	Continuing
Quantity of RDT&E Articles			3				11		

A. (U) **Mission Description and Budget Item Justification:** (U) The AAAV program will field a successor to the Marine Corps' current Amphibious vehicle, the AAV7A1. The AAAV will provide the principal means of tactical surface mobility for the Marine Air-Ground Task Force (MAGTF) during both ship-to-objective maneuver and subsequent combat operations ashore.

(U) **Justification for Budget Activity:** This program is funded under Demonstration and Validation because it develops and integrates hardware for experimental tests related to specific ship or aircraft amphibious vehicle applications.

(U) FY 1997 Accomplishments:

- (U) $ 47034 Continue Program Definition and Risk Reduction (PDRR) (formerly Dem/Val) phase which includes, contractor design, modeling, and simulation of the AAAV Personnel (P) and Command (C) prototypes.
- (U) $ 663 Complete re-design, modification Version A, conduct detail design of remaining peripherals of MTU Version B.
- (U) $ 2891 Continue to provide in-house support.
- (U) $ 1071 Provide for Project Office Personnel costs.
- (U) $ 4002 Continue to enlist program support to coordinate and update program planning.
- (U) $ 70 Initiate Ballistic Armor validation testing.

(U)Total $ 55,731

(U) FY 1998 Planned Program:

- (U) $ 60208 Continue PDRR phase, contractor design, Modeling and Simulation, and initiate fabrication of the AAAV Personnel (P) prototypes.
- (U) $ 4472 Continue to provide in-house support.
- (U) $ 1319 Continue to enlist program support to coordinate and update program planning.
- (U) $ 2187 SBIR: Portion of program reserved for Small Business Innovation Research assessment in accordance with 15 U.S.C. 638(f)(1).

(U)Total $ 68,186

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603611M Marine Corps Amphibious Assault Vehicles
	PROJECT B0020

(U) **FY 1999 Planned Program:**

•	(U) $	96752	Continue PDRR phase, complete fabrication of first prototype, initiate extensive contractor prototype testing.
•	(U) $	2451	Continue to provide in-house support.
•	(U) $	4069	Continue to enlist program support, and software Independent Verification and Validation.
•	(U) $	1550	Complete Armor validation, initiate characterization, Hydraulic test rig testing, and initiate prototype testing.
(U)Total $		104,822	

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	61318	60134	106245
(U) Adjustments to Previous President's Budget	-5587	+8052	-1423
(U) Current Budget Submit	55731	68186	104822

(U) Change Summary Explanation:

(U) Funding: FY 1997 reflects below threshold reprogramming of $3,999 million and $1,588 million for SBIR, FFRDC, and economic adjustment reduction. The FY 1998 increase reflects a return of funds reduced in previous years, a decrease of $2319 million for FFDRC and various economic and R&D general reductions, and a Congressional increase of $8 million for an additional prototype. FY 1999 reflects funding adjustments for NWCF surcharges, research labortory rates, NCCOSC rates adjustments, and Surface Warfare Center adjustments.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

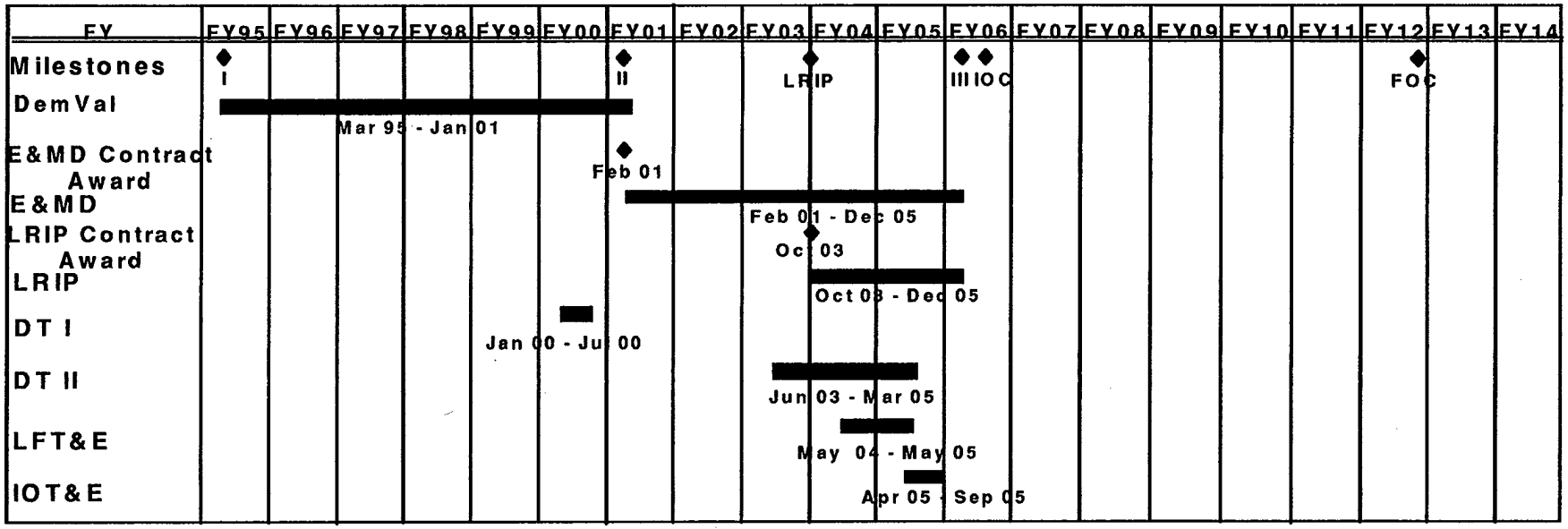
FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Compl	Total Cost

(U) Related RDT&E:
(U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems), Project C0021, AAV7A1.
(U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems), Project C2237, AVTB.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603611M Marine Corps Amphibious Assault Vehicles PROJECT B0020

D. (U) Schedule Pofile

AAAV Budget Exhibit Schedule



Dates Shown Above are Calendar Year

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603611M Marine Corps Amphibious Assault Vehicles

PROJECT: B0020

A. (U) Project Cost Breakdown

	FY 1997	FY 1998	FY 1999
Product Development	47697	60208	96752
Support and Management	7964	7978	6520
Test and Evaluation	70	0	1550
Total	55731	68186	104822

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Product Development Organizations										
GDLS (Dem/Val)	CPAF	JUN 96			17046	47034	60208	96752	CONT.	CONT.
GDLS (Turret), Warren, MI.	CPFF	DEC 94	7359	7359	7359	0	0	0	0	7359
UDLP (Turret) San Jose, CA	CPFF	DEC 94	6227	6227	6227	0	0	0	0	6227
MTU (Engine B) Friedrichshafen Germany (9071)	CPFF	APR 94	3783	3783	3683	100	0	0	0	3783
GDLS (ATR)	CPFF	SEP 93	16642	16642	16642	0	0	0	0	16642
FMC/UDLP ATR	CPFF	SEP 93	16180	16180	16180	0	0	0	0	16180
MTU Engine A II	CPFF	APR 93	6170	6170	6170	0	0	0	0	6170
MTU Engine B/Version B	CPFF	APR 95	2650	2650	2650	0	0	0	0	2650
MTU Eng. #9102 Eng. 400 Hr test	CPFF	JUN 95	4603	4603	4040	563	0	0	0	4603

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603611M Marine Corps Amphibious Assault Vehicles

PROJECT: B0020

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Support and Management Organizations										
TMA Alex, VA	CPFF	DEC 93	5423	5423	2275	987	619	1100	261	5423
Misc. Contracts	CPFF	Various	8230	8230	2572	3015	700	2969	0	8230
Misc. Gov. labs	WR	Various	13707	13707	6242	2059	4172	2136	0	13707
Program Office Personnel Costs	WR	OCT 96	1700	1700	0	1071	0	0	0	1700
Modeling & Simulation	WR	Various	3761	3761	2314	832	300	315	0	3761
Misc SBIR	TBD	TBD	0	0	0	0	2187	0	0	2131
Test and Evaluation Organizations										
Miscellaneous	Various	Various	5327	5327	1165	70	0	1550	0	5327

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Product Development Property									
				27	0	0	0	0	27

Support and Management Property N/A

Test and Evaluation Property N/A

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603611M Marine Corps Amphibious Assault Vehicles

PROJECT: B0020

	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Subtotal Product Development	80024	47697	60208	96752	CONT.	CONT.
Subtotal Support and Management	13403	7964	7978	6520	CONT.	CONT.
Subtotal Test and Evaluation	1165	70	0	1550	CONT.	CONT.
Total Project	94592	55731	68186	104822	CONT.	CONT.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603612M Marine Corps Mine/Countermeasures Systems

PROJECT: C2106

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C2106 ADVANCED COUNTERMEASURES SYSTEM	0	0	1958	2437	1749	0	0	0	0
Quantity of RDT&E Articles									

A. (U) **Mission Description and Budget Item Justification:** (U) This project was formerly titled Distributed Explosive Mine Neutralization System (DEMNS). The AMCS program centers on neutralization of blast-hardened and complexed-fuzed mines, and unexploded munitions (current and future threat) that defeat the effectiveness of current minefield breaching systems. Primary goals are: neutralization in-stride from a standoff position; very high neutralization percentages against all types of mines; and joint applicability for use with primary assault platforms to include land and amphibious assaults.

(U) The Coastal Battlefield Reconnaissance and Analysis (COBRA) system is a passive multispectral sensor system capable of operating in a PIONEER unmanned aerial vehicle (UAV). Imagery recorded on the UAV or disseminated via data link is analyzed by the COBRA ground station. Ground station algorithm processing provides near real-time automatic minefield detection with Differential Global Positioning System (DGPS) location accuracy.

(U) **Justification for Budget Activity:** This program is funded under DEMONSTRATION AND VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

(U) FY 1997 Accomplishments:

- (U) $ Efforts funded under Program Element 0603640M.

(U)Total $ 0

(U) FY 1998 Planned Program:

- (U) $ Efforts funded under Program Element 0603640M

(U)Total $ 0

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE: February 1998
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603612M Marine Corps Mine/Countermeasures Systems — PROJECT: C2106

(U) **FY 1999 Planned Program:**

- (U) $ 150 Prepare milestone documentation for Coastal Battlefield Reconnaissance and Analysis (COBRA).
- (U) $ 150 Award COBRA Advanced Development Model (ADM) contract.
- (U) $ 965 Design COBRA Advanced Development Model. Start Fabrication.
- (U) $ 693 Conduct testing of COBRA advanced technology tunable camera.

(U)Total $ 1958

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	0	0	1985
(U) Adjustments to Previous President's Budget	0	0	-27
(U) Current Budget Submit	0	0	1958

(U) Change Summary Explanation:

(U) Funding: The FY 1999 decrease due to Commercial Purchase Inflation adjustment.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Compl	Total Cost

(U) Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603612M Marine Corps Mine/Countermeasures Systems PROJECT C2106

(U) **Related RDT&E**
(U) PE 0603606A (Landmine Warfare and Barrier Advanced Technology)
(U) PE 0603619A (Landmine Warfare and Barrier Advanced Demonstrations)
(U) PE 0604808A (Landmine Warfare and Barrier Engineering Development)
(U) PE 0602131M (Marine Corps Landing Force Technology)
(U) PE 0603640M (Marine Corps Advanced Technology Demonstrations)
(U) PE 0604612M (Marine Corps Mine/Countermeasures Systems (Engineering))
(U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
(U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
(U) PE 0603782N (Shallow Water Mine Countermeasures Demonstrations)
(U) PE 0603635M (Marine Corps Combat/Supporting Arms Systems)
(U) This program is in compliance with Tri-Service Reliance Agreements.

D. (U) **Schedule Profile** Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	40542	40357	37133	10910	2752	2311	2649	Continuing	Continuing
C1964 Antiarmor Weapon System	435	411	429	489	566	619	722	Continuing	Continuing
C2112 Howitzer, Medium Towed 155MM XM777 (LW 155)	13564	37635	25409	8349	0	0	0	0	107672
C2113 Predator Short Range Assault Weapon (SRAW)	26542	2311	9827	0	0	0	0	0	124065
C2250 Team Target Engagement Simulator (TTES)	1	0	0	0	0	0	0	0	133
C2251 JT ADV AMPHIBIOUS LOGISTICS/COMBAT SERVICE SUPPORT (JT AAL/CSS) TECHNOLOGY	0	0	734	1219	1457	1692	1927	Continuing	Continuing
C2256 21 CENTURY LAND WARRIOR	0	0	734	853	729	0	0	0	2316
Quantity of RDT&E Articles									

(U) **Mission Description and Budget Item Justification:** This PE supports the demonstration and validation of Marine Corps Ground/Supporting Arms Systems for utilization in Marine Air-Ground Expeditionary Force amphibious operations.

(U) **Justification for Budget Activity:** This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C1964

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C1964 Antiarmor Weapon System	435	411	429	489	566	619	722	Continuing	Continuing
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification:

(U) This project provides for Marine Corps participation in the Joint Anti-Armor program entitled Javelin (Advanced Anti-Tank Weapon System - Medium (AAWS-M)) and the AntiArmor Weapon System - Heavy (AAWS-H). The Javelin weapon system will provide the Marine Corps and Army with state-of-the-art capability to destroy sophisticated and future armored threats. No such medium anti-armor system is currently available to the infantryman. The AAWS-H is a long range, antitank weapon system that will replace the Tube Launched Optically tracked Wire guided Missile system. It will satisfy an operational requirement to provide increased range (4000 meters), increased lethality against all armored threats, to include explosive reactive armor, active protection, increased probability of hit and kill and increased gunner survivability. Possible Light Armored Vehicle-Anti Tank usage would promote commonality among Marine Corps systems.

(U) FY 1997 Accomplishments:

- (U) $ 276 Engineering/Technical Support for Javelin production qualification testing (PQT) & pre-planned product improvement (P3I).
- (U) $ 39 Continue preparations to perform an in service evaluation assessment (ISEA) for Javelin.
- (U) $ 120 Complete Javelin Milestone III documentation and other program support.

(U)Total $ 435

(U) FY 1998 Planned Program:

- (U) $ 191 Engineering/Technical Support to monitor and participate in PQT & P3I for Javelin.
- (U) $ 210 Engineering/Technical Support to monitor and participate in technical developments in the AAWS-H
- (U) $ 9 Prepare necessary Marine Corps documentation for AAWS-H Milestone I.
- (U) $ 1 SBIR: Portion of program reserved for Small Business Innovation Research assessment in accordance with 15 U.S.C. 638 (f) (1).

(U)Total $ 411

(U) FY 1999 Planned Program:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems
	PROJECT C1964

• (U) $	201	Engineering/Technical Support to monitor and participate in PQT & P3I for Javelin.
• (U) $	196	Engineering/Technical support to monitor and participate in developmental testing and technical developments in the AAWS-H program.
• (U) $	32	Prepare necessary Marine Corps documentation for the AAWS-H program.
(U)Total $	429	

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	436	431	447
(U) Adjustments to Previous President's Budget	-1	-20	-18
(U) Current Budget Submit	435	411	429

(U) Change Summary Explanation: Decrease of $1 thousand in FY 1997, $20 thousand in FY 1998, and $18 thousand in FY 1999 due to minor affordability changes.

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Complete	Total Cost
(U) PMC BLI# 301100/301101	38,151	57,802	82,842	79,789	27,976	0	0	0	286,560

(U) Related RDT&E
PE 0604611A

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems
	PROJECT C1964

D. (U) Schedule Profile

Javelin

	FY 1996	FY 1997	FY1998	FY 1999	TO COMPLETE
Program Milestones		3Q MS III			
Contract Milestones		3Q 1st Multiyear Contract Award	1Q MY Contract Award	3Q MY Contract Award	1Q FY00 2nd Multiyear Contract Award (FY00-02)
Fielding			3Q FY99-4Q FY03		

AAWS-H

	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
Program Milestones		2Q MS 0	MS I		
Studies & Analysis Milestones			1Q Analysis of Alternatives		
Developmental Testing - Army				^^	
Fielding				TBD	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C2112 Howitzer, Medium Towed 155MM XM777 (LW 155)	13564	37635	25409	8349	0	0	0	0	107672
Quantity of RDT&E Articles		8							

A. (U) **Mission Description and Budget Item Justification:** (U) The LW155 is the replacement for the aging, operationally deficient M198 155 Howitzer for the Marine Corps and the Army. The LW155 retains the current M198 howitzer's range, but will weigh 9,000 pounds compared to the M198's 16,000 pounds. The weight reduction significantly improves transportability and mobility by sea, air, and land platforms and enables the LW155 to emplace, displace, and bold shift in half the time of the current system while increasing the rate of fire. Thus, the LW155 provides greater transportability and mobility in strategic/tactical movements. The LW155 is a joint Marine Corps and Army program, with the Marine Corps as the Lead service. The Joint Operational Requirements Document (JORD) was approved by the Assistant Commandant of the Marine Corps on 27 June 1996. The JORD was validated and approved by the Army on 29 September 1995. A MS I/II MCPDM was approved on 5 February 1996. After a ten month "shoot-off" between competitors a three year EMD contract was signed with Cadillac Gage Textron Inc. on 17 March 1997.

(U) FY 1997 Accomplishments:

- (U) $ 1,843 Provided government Project Management Office Support.
- (U) $ 416 Provided Other Government Development Engineering to System, Logistics, Safety, Quality Assurance (QA), Corrosion Prevention.
- (U) $ 2,027 Provided ARDEC Matrix Development Engineering to System, Logistics, Safety, Quality Assurance (QA).
- (U) $ 1,425 Benet Labs provided cannon engineering production planning and manufacturing.
- (U) $ 1,014 Conducted Operational Assessment Test and Developmental Test, completed shoot-off report. Started EMD Cannon Testing.
- (U) $ 6,170 Awarded EMD Contract for Development and Prototype Manufacturing.
- (U) $ 669 Completed Source Selection Evaluation Board.

(U)Total $ 13,564

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems PROJECT C2112

(U) FY 1998 Planned Program:

•	(U) $	2,484	Provide Government Project Management Office Support.
•	(U) $	2,480	Provide ARDEC Matrix Development Engineering to System, Logistics, Safety, Quality Assurance (QA), Corrosion Prevention.
•	(U) $	980	Provided Other Government Development Engineering to System, Logistics, Safety, Quality Assurance (QA).
•	(U) $	22,439	Continue Contractor Development Engineering and Prototype Manufacturing. Labor/Material for 8 prototypes.
•	(U) $	2,280	Conduct System Development Test and Evaluation at Yuma Proving Grounds (fatigue, wear, recoil, safety, hot/cold, firing table).
•	(U) $	3,980	Conduct Engineering and Manufacturing Prototype at Benet Labs and Watervliet Arsenal
•	(U) $	2332	Conduct Modeling and Integration to the basic gun.
•	(U) $	660	SBIR: Portion of program reserved for Small Business Innovation Research assessment in accordance with 15 U.S.C. 638(f)(1).
(U)Total $		37,635	

(U) FY 1999 Planned Program:

•	(U) $	3,500	Provide government Project Management Office Support (testing, validation of MS III prep).
•	(U) $	2,700	Provide ARDEC Matrix Development Engineering to System, Logistics, Safety, Quality Assurance (QA), Corrosion Prevention.
•	(U) $	837	Provided Other Government Development Engineering to System, Logistics, Safety, Quality Assurance (QA).
•	(U) $	6,372	Continue Contractor Development Engineering and Prototype Manufacturing.
•	(U) $	2,600	Conduct System Development Test and Evaluation at Yuma Proving Grounds (fatigue, wear, recoil, safety, arctic/desert, firing table).
•	(U) $	1,344	Conduct Other System Testing to include MOT&E, Mobility, and Conduct Logistics Demonstration
•	(U) $	2,400	Conduct Engineering and Prototype Manufacturing at Benet Labs and Watervliet Arsenal.
•	(U) $	2,056	Conduct Technical Date Analysis and Validation, Physical Configuration Audit, and Firing Table Software.
•	(U) $	3,600	Conduct Engineering Change Proposal and Contract Modifications
(U)Total $		25,409	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	13,269	35,303	33,915
(U) Adjustments to Previous President's Budget	+295	+2332	-8,506
(U) Current Budget Submit	13,564	37,635	25,409

(U) Change Summary Explanation:

(U) Funding: FY 1997 increase is based on revised Life Cycle Cost estimated. The FY 1998 adjustment due to a Congressional add, a 1.5% General Reduction, R&D General reduction, CAAS, and Economic assumptions. The FY 1999 decreases reflect revised cost estimates, minor affordability adjustments and an assumption that FY 1998 Congressional increase accelerated the program.

(U) Schedule: Unchanged

(U) Technical: Unchanged

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Compl	Total Cost
(U) PMC (BLI# 218500) Howitzer, Medium Towed 155MM XM777 (LW 155)	0	0	10,002	86,328	116,786	121,586	117,658	100,003	552,363

(U) Related RDT&E: PE 0604854A (Artillery Systems-Engineering Development)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

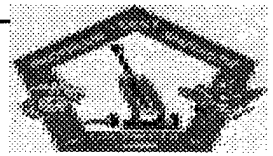
DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

D. (U) **Schedule Profile**



LW 155 USMC
EMD & PRODUCTION

Activity	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	To Complete	Total
Shoot-off														
EMD Phase														
EMD Key Events				DT	IPR	MOT&E								
Milestone III														
Production					LL									
Deliveries														
Contracts		Shoot-off	EMD		LL Opt	Pr Opt 1	Pr Opt 2	LRIP						

$ Millions - Current Year	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	To Complete	Total
RDT&E	6.4	14.4	13.6	37.6	25.4	8.3								105.7
PMC					10.0	86.3	116.8	121.6	117.7	93.4	6.6			552.4

The Future of Towed Cannon Artillery

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE: February 1998
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems
	PROJECT: C2112

A. (U) Project Cost Breakdown	FY 1997	FY 1998	FY 1999
Project Cost Categories			
a. Primary Hardware Development	6,170	25,431	6,372
b. Government Developmental Engineering	2,443	3,460	3,537
c. Tech Data Analysis and Validation, Physical Configuration Audit, Firing Table Software	669	0	2,056
d. Program Management Support	1,843	2,484	3,500
e. Test and Evaluation	1014	2,280	3,944
f. Conduct Engineering and Prototype Manufacturing At Benet & Watervliet Arsenal	1,425	3,980	2,400
h. Conduct Engineering Change Proposal Contract Modification	0	0	3,600
Total	13564	37635	25409

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

B. Budget Acquisition History and Planning Information

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Performing Organizations										
Product Development Organizations										
Cadiliac Gage Textron, Inc., New Orleans, LA	CPIF	March 1997	41,704	41,704	0	6,170	25,431	6,372	2,020	41704
ARDEC, Picatinny, NJ	MIPR	Oct 1996	N/A	N/A	1,200	2,027	2,480	2,700	CONT	CONT
ARDEC, Picatinny, NJ (SSEB)	MIPR	Oct 1996	4494	4494	3,825	669	0	0	0	4494
Misc Government Accounts	MIPR	Various	N/A	N/A	4,992	416	980	837	CONT	CONT
ARDEC, Picatinny, NJ	MIPR	Various	N/A	N/A	0	0	0	2,056	CONT	CONT
ARDEC, Picatinny, NJ	MIPR	Various	N/A	N/A	0	0	0	3,600	CONT	CONT
Support and Management Organizations										
PMO LW 155, Picatinny, NJ	MIPR	Oct 1996	N/A	N/A	5,719	1,843	2,484	3,500	CONT	CONT

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE: February 1998
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems — PROJECT: C2112

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Test and Evaluation Organizations										
Misc Government Activities	MIPR	Varies	N/A	N/A	3,219	157	0	1,344	Cont	Cont
Yuma Proving Ground, Yuma, AZ (Shoot-off)	MIPR	Feb 1996	1,900	1,900	1,530	370	0	0	0	1900
Yuma Proving Ground, Yuma AZ	MIPR	Oct 1996	N/A	N/A	250	487	2,280	2,600	CONT	CONT

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Product Development Property									
Benet Labs, WVA NY	MIPR	Various	Various	686	1,425	3,980	2,400	CONT	CONT
Support and Management Property									
Test and Evaluation Property									

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Subtotal Product Development	10,703	10,707	32,871	17,965	CONT	CONT
Subtotal Support and Management	5,719	1,843	2,484	3,500	CONT	CONT
Subtotal Test and Evaluation	4,999	1,014	2,280	3,944	CONT	CONT
Total Project	21,421	13,564	37,635	25,409	CONT	CONT

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2113

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C2113 Predator Short Range Assault Weapon (SRAW)	26542	2311	9827	0	0	0	0	0	124065
Quantity of RDT&E Articles	125	103							

A. (U) Mission Description and Budget Item Justification:

(U) Predator (SRAW) will provide the Marine Corps with a lethal, disposable, fire and forget, top-attack, soft launch for firing from enclosed spaces, proliferable, accurate, night vision capable, lightweight, main battle tank killer. Modularity of the system will allow development of optimal warheads (flame, bunker-busting, multi-purpose) to fit on the flight module.

(U) FY 1997 Accomplishments:

- (U) $ 18,735 Continued EMD phase of program.
- (U) $ 2,700 Engineering/Technical support services for Developmental Testing (DT).
- (U) $ 811 Began preparation for Operational Test (OT).
- (U) $ 4,296 Forward Financed efforts within this project for FY98 to continue EMD phase.

(U)Total $ 26,542

(U) FY 1998 Planned Program:

- (U) $ 180 Continue EMD phase of program. This effort partially financed with $4,296 of FY 1997 funds from this project.
- (U) $ 2,131 Engineering/Technical support services for DT.

(U)Total $ 2,311

(U) FY 1999 Planned Program:

- (U) $ 1,800 Conduct operational Testing.
- (U) $ 5,577 Complete EMD phase.
- (U) $ 300 Achieve Milestone III approval for service use.
- (U) $ 2,150 Engineering/Technical services to complete DT

(U)Total $ 9,827

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	27,716	730	0

	DATE
	February 1998

BUDGET ACTIVITY	PE NUMBER AND TITLE
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems

(U) Adjustments to Previous President's Budget	-1,174	1,581	9,827
(U) Current Budget Submit	26,542	2,311	9,827

(U) Change Summary Explanation:

(U) Funding: Decrease of $1,174 thousand in FY 1997 was due to SBIR taxes ($555 thousand), transfer to operational testing activity ($229 thousand), a reprogramming to another ground weapons project ($400 thousand), and minor affordability changes(+ $10 thousand). Increase of $1,581 thousand in FY 1998 and $9,827 thousand in FY 1999 due to technical adjustments stemming from developmental testing results.

(U) Schedule: Operational Testing (OT) delayed to 2nd Qtr FY 1999 from 1st Qtr FY 1998 due to contractor facilities transition and EMD program extension with MS III delayed to 4thQtr FY 1999.

(U) Technical: Missile sensor problems resulted in additional evaluation, correction and testing.

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Compl	Total Cost
(U) PMC, 308900, Predator (SRAW)	0	0	0	26,564	27,444	26,925	27,808	229,321	338,062

(U) Related RDT&E: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

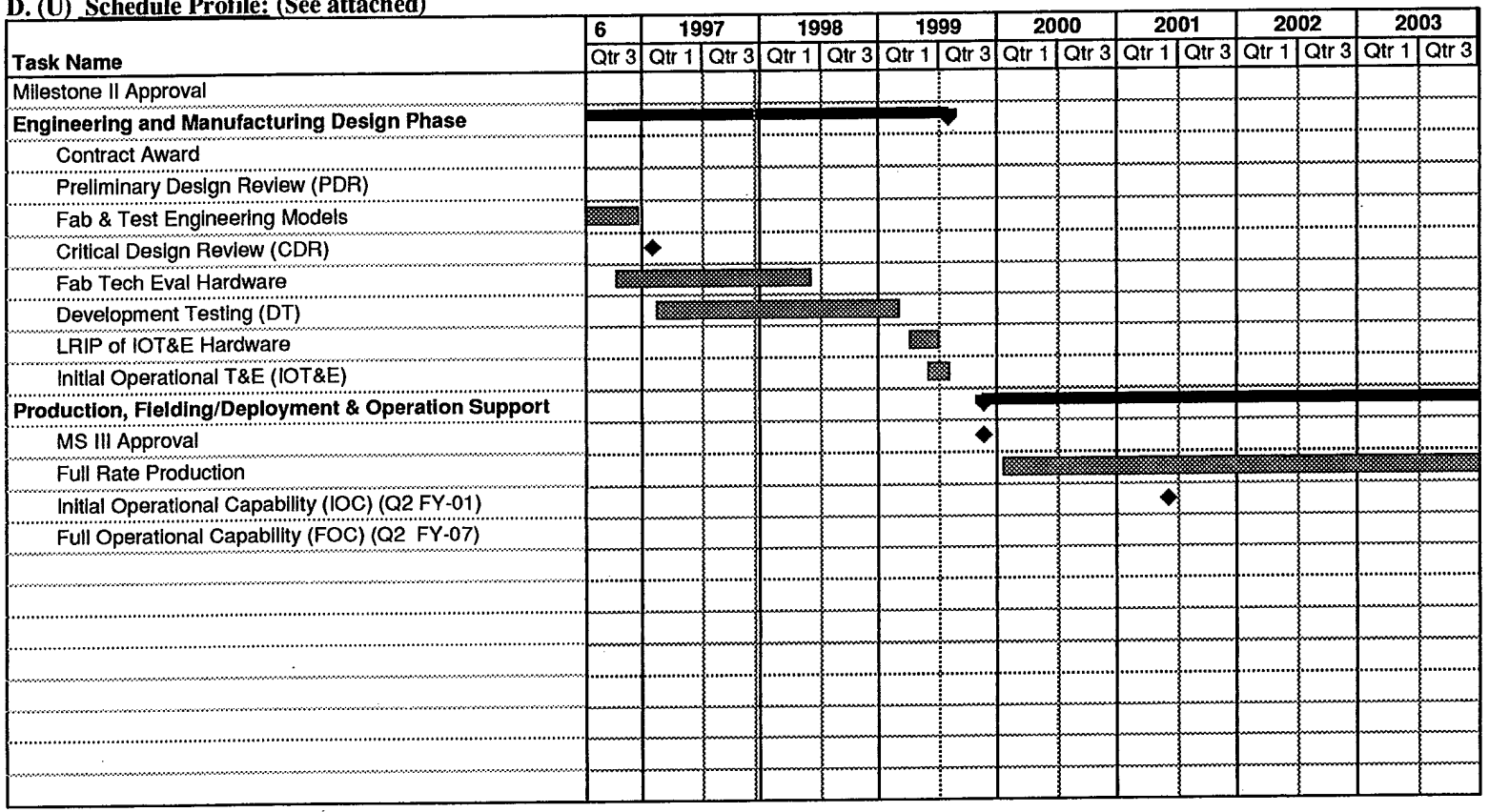
DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2113

D. (U) Schedule Profile: (See attached)



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2113

A. (U) Project Cost Breakdown	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	276	0	0
Airframe & Launcher	156	0	0
Electronics	120	0	0
Propulsion & Ordnance	0	0	0
System Integration	0	0	0
b. Materials and Subcontracting	6,503	0	475
c. Test Evaluation and Equipment in Support of Product Development	6,615	304	550
Support Equipment	455	0	0
Development Tests	1,815	0	0
Qualification Tests	3,776	243	440
Government Support	569	61	110
d. Production Support	4,080	430	2,575
Engineering Support	100	0	100
First Article Inspection and Test	0	0	2,015
Manufacturing and Process Engineering	3,980	430	460
e. Program Support	2,125	0	1,000
Quality Assurance	1,000	0	500
Procurement	550	0	240
ILS Support	575	0	260
f. System Engineering	1,016	0	400
g. Project/Technical Management	1,900	0	700
h. PM/In-house Support	3,216	1,577	2,327
i. Operational Testing	811	0	1,800
Total	26,542	2,311	9,827

B. Budget Acquisition History and Planning Information

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2113

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Product Development Organizations										
Lockheed Martin Electronics and Missiles, Orlando	SS/CPIF	2 June 94	99261	99261	71,950	21,429	180	5,750	0	99,309
Support and Management Organizations										
NSWC Dahlgren, VA	WR	1 Oct 96	20,194	20,194	11,502	4,192	2,031	2,177	0	19,902
Miscellaneous	Various	Various	2243	2243	1,933	110	100	100		2243
Test and Evaluation Organizations										
Marine Corps Operational Test Activity			2,800	2,800	0	125	0	1,800	0	1925
CECOM	MIPR		686	686	0	686	0	0	0	686

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Product Development Property									
Support and Management Property									
Test and Evaluation Property									

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)		DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems	PROJECT C2113

	Total Prior to FY 1997	FY 1997	FY 1998	FY 1999	Budget to Complete	Total Program
Subtotal Product Development	71,950	21,429	180	5,750	0	99,309
Subtotal Support and Management	13,435	4,192	2,131	2,277	0	22,035
Subtotal Test and Evaluation	0	921	0	1,800	0	2,721
Total Project	85,385	26,542	2,311	9,827	0	124,065

C. (U) **Funding Profile:** **Not Applicable**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2251

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C2251 JT ADV AMPHIBIOUS LOGISTICS/COMBAT SERVICE SUPPORT (JT AAL/CSS) TECHNOLOGY	0	0	734	1219	1457	1692	1927	Continuing	Continuing
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification:

This program develops, demonstrates and validates key advanced equipment and enabling technologies for Logistics/Combat Service Support of future amphibious and expeditionary missions across the crisis/operational spectrum encompassing Other Expeditionary Operations (OEO), Operations Maneuver from the Sea (OMFTS), and Sustained Operation Ashore (SOA). Multiple transitions from 6.3 technology development and demonstration are planned. Equipment development is focused on Marine Corps Combat Service Support Command and Control (MCSSC2) with integrated recording and tracking technologies for Total Asset Visibility (TAV), expeditionary container transporter concepts for fielding of an Improved Tactical Container Handler (ITCH), enabling concepts for sea-basing logistics that improve both sea-surface Logistics Container Transporter (LCT) and aerial resupply transport mechanisms. Enhanced capabilities for execution of amphibious/naval expeditionary logistics/CSS are vital to the readiness of the Marine Corps as our nations forward deployed contingency force.

(U) FY 1997 Accomplishments:

(U)Total $ 0 FY 1997 funding is contained in PE 0603640M.

(U) FY 1998 Planned Program:

(U)Total $ 0 FY 1998 funding is contained in PE 0603640M.

(U) FY 1999 Planned Program:

- (U) $ 300 Transition mature joint program concepts for aerial resupply from a sea-based platform to advanced development, at MS-I. Establish baseline performance specification for Logistics Container Transporter (LCT) and Improved Tactical Container Handler (ITCH) for LCT concepts. Prepare for MCPDM MS-I for LCT and ITCH concepts.
- (U) $ 434 Award Advanced Development Model (ADM) contract.

(U)Total $ 734

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2251

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	0	0	744
(U) Adjustments to Previous President's Budget	0	0	-10
(U) Current Budget Submit	0	0	734

(U) Change Summary Explanation:

(U) Funding: FY 1999 decrease of $10k is due to inflation adjustment.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

C. (U) Other Program Funding Summary

	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Complete	Total Cost

(U) Not Applicable

(U) Related RDT&E:

(U) PE 0602131M (Marine Corps Landing Force Technology)

(U) PE 0603640M (Marine Corps Advanced Technology Demonstration)

D. (U) Schedule Profile: Not Applicable

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2251

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C2256 21 CENTURY LAND WARRIOR	0	0	734	853	729	0	0	0	2316
Quantity of RDT&E Articles									

A. (U) **Mission Description and Budget Item Justification:** (U) This program is an integrated infantry combat system for dismounted combat Marines. The program will enhance the Marine's battlefield capabilities through the development and integration of an assortment of Marine systems/components and technologies into a cohesive, timely and combat effective system. These systems/components include weapon, integrated helmet assembly, protective clothing, communications and target acquisition technologies. This will provide the infantryman with increased lethality, survivability and situational awareness enhancements.

(U) FY 1997 Accomplishments:

(U)Total $ 0 FY 1997 funding is contained in PE 0603640M.

(U) FY 1998 Planned Program:

(U)Total $ 0 FY 1998 funding is contained in PE 0603640M.

(U) FY 1999 Planned Program:

- (U) $ 123 Transition from the Technology Demonstration Phase to the Dem/Val phase. Participate fully in the Joint Army/Marine Corps program. Develop Marine unique sub-systems and aspects.
- (U) $ 250 Begin test and evaluation.
- (U) $ 361 Studies, analysis and support services.

(U)Total $ 734

B. (U) Project Change Summary	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	0	0	744
(U) Adjustments to Previous President's Budget	0	0	-10
(U) Current Budget Submit	0	0	734

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1998
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems PROJECT C2256

(U) Change Summary Explanation:

(U) Funding: Increase of $3 thousand in FY 1999 due to Navy Working Capital Fund surcharge followed by a decrease of $13k in FY 99 due to commercial purchases inflation adjustment.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

C. (U) **Other Program Funding Summary**

	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Complete	Total Cost
(U) Not Applicable									
(U) Not Applicable									

(U) Related RDT&E:

(U) PE 0602131M (Marine Corps Landing Force Technology)

(U) PE 0603640M (Marine Corps Advanced Technology Demonstration)

D. (U) **Schedule Profile:** Not Applicable

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUALS	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0377 Joint Service Explosive Ordnance Disposal System	3,657	4,543	5,251	6,109	6,233	6,338	6,459	CONT.	CONT.
Q1317 Explosive Ordnance Disposal Diving Systems	2,923	5,758	5,505	5,091	4,772	2,999	2,752	CONT.	CONT.
TOTAL	6,580	10,301	10,756	11,200	11,005	9,337	9,211	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This is a Joint Service Program. This program provides for the development of Explosive Ordnance Disposal tools and equipment for use by all military services. The responsibility is assigned to the Navy as single service manager, by Department of Defense Directive 5160.62 of 26 April 1989, for management of the Joint Service Explosive Ordnance Disposal Research and Development Program. Increasing types of foreign and domestic weapons necessitate a continuing development program to provide Explosive Ordnance Disposal personnel of all military services with the special equipment and tools required to support this mission. This program also provides life support related equipment necessary to support the performance of Navy Explosive Ordnance Disposal tasks underwater. This equipment must have inherently low acoustic and magnetic signatures in order to allow the Explosive Ordnance Disposal technician to safely approach, render safe and dispose of sea mines and other underwater ordnance.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0377 Joint Service Explosive Ordnance Disposal System	3,657	4,543	5,251	6,109	6,233	6,338	6,459	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Provides Explosive Ordnance personnel of all military services with the specialized equipment and tools required to support their mission of detection, location, identification, rendering safe, recovery, field and laboratory evaluation, and final disposal of nuclear, conventional, chemical, and biological munitions, including improvised explosive devices.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($1,385) Continued development of Remote Ordnance Neutralization System (RONS) and Classified Project I.
- (U) ($1,086) Initiated DT-II on Advanced Radiographic System (ARS) project.
- (U) ($1,161) Initiated DT-IB on Lightweight Disposable Disrupter (LIDD) and DT-II on Main Charge Disrupter (MCD) projects.
- (U) ($25) Improved Ordnance Locator (IOL) project.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT NUMBER: Q0377 PROJECT TITLE: Joint Service Explosive Ordnance Disposal System

2. (U) FY 1998 PLAN:

- (U) ($1,460) Obtain Milestone III decision for ARS project and Classified Project I and Milestone II decision for LIDD.
- (U) ($2,570) Continue development of the RONS and MCD projects.
- (U) ($513) Initiate the Classified Project II project.

3. (U) FY 1999 PLAN:

- (U) ($1,924) Obtain Milestone III decision for RONS and MCD projects.
- (U) ($2,168) Continue development of the Classified Project II and LIDD projects.
- (U) ($1,159) Conduct Analysis of Alternatives studies for the Explosive Safe/Arm Monitor, and Large Improvised Explosive Device(IED) Neutralization projects. Initiate the Improved (Standoff) Disrupter Tool project.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT NUMBER: Q0377 PROJECT TITLE: Joint Service Explosive Ordnance Disposal System

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,683	4,720	6,152
(U) Appropriated Value:	2,370	4,720	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget:			
a. Near Term Mine Warfare Campaign Plan	+1,500		
b. NWCF/General Adjustments	-213	-177	-60
c. Funding realignments and general adjustments			-841
(U) FY 1999 PRESBUDG Submit:	3,657	4,543	5,251

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Increase in FY 97 due to general adjustments. FY98 decreases are due to general adjustments. FY99 decrease due to general adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT NUMBER: Q0377 PROJECT TITLE: Joint Service Explosive Ordnance Disposal System

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM	
(U) OPN Line 550900 (portion)	0	0	200	1,477	1,856	2,113	750	0	CONT.	CONT.

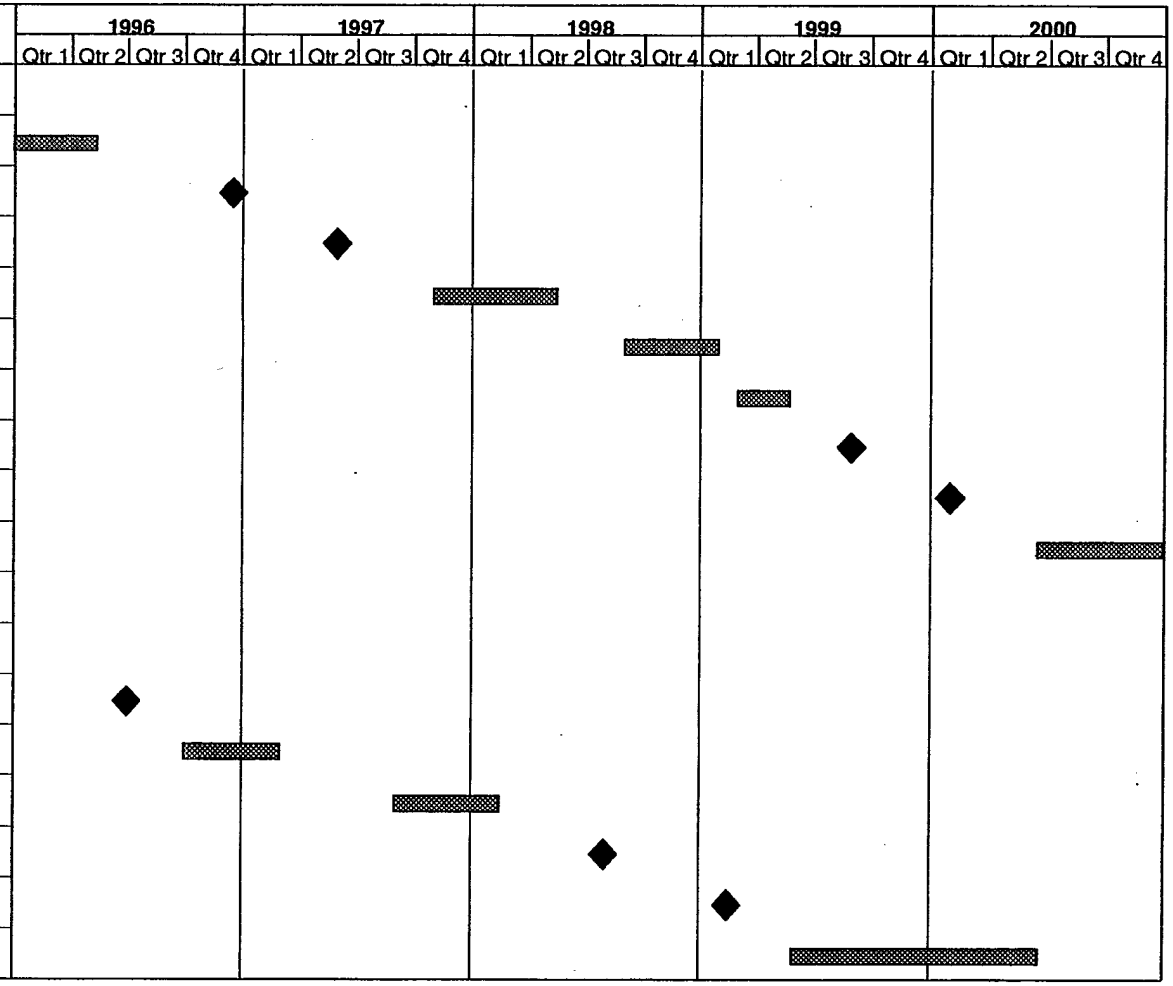
(U) RELATED RDT&E:

(U) PE 0602315N (MCM, Mining & Special Warfare Technology) Provides for the development of new technologies which show promise and the transition to advanced development.
(U) PE 0604654N (Joint Service Explosive Ordnance Disposal Development) Provides for the integration of specialized tools and equipment into specified procedures required for individual weapons and ordnance items.

D. (U) SCHEDULE PROFILE: See Attached.

Q0377 Joint Service EOD Systems

ID	Task Name
1	**RONS**
2	Testing (DT-I)
3	Milestone II
4	EMD Contract Award
5	Testing (DT-IIA)
6	Testing (DT- IIB)
7	Testing (DT- IIC)
8	Milestone III
9	Production Option Award
10	Production/Deliveries
11	**ARS**
12	Milestone I/II
13	EMD Contract Award
14	Testing (DT-IIA)
15	Testing (DT-IIB)
16	Milestone III
17	Production Option Award
18	Production/Deliveries

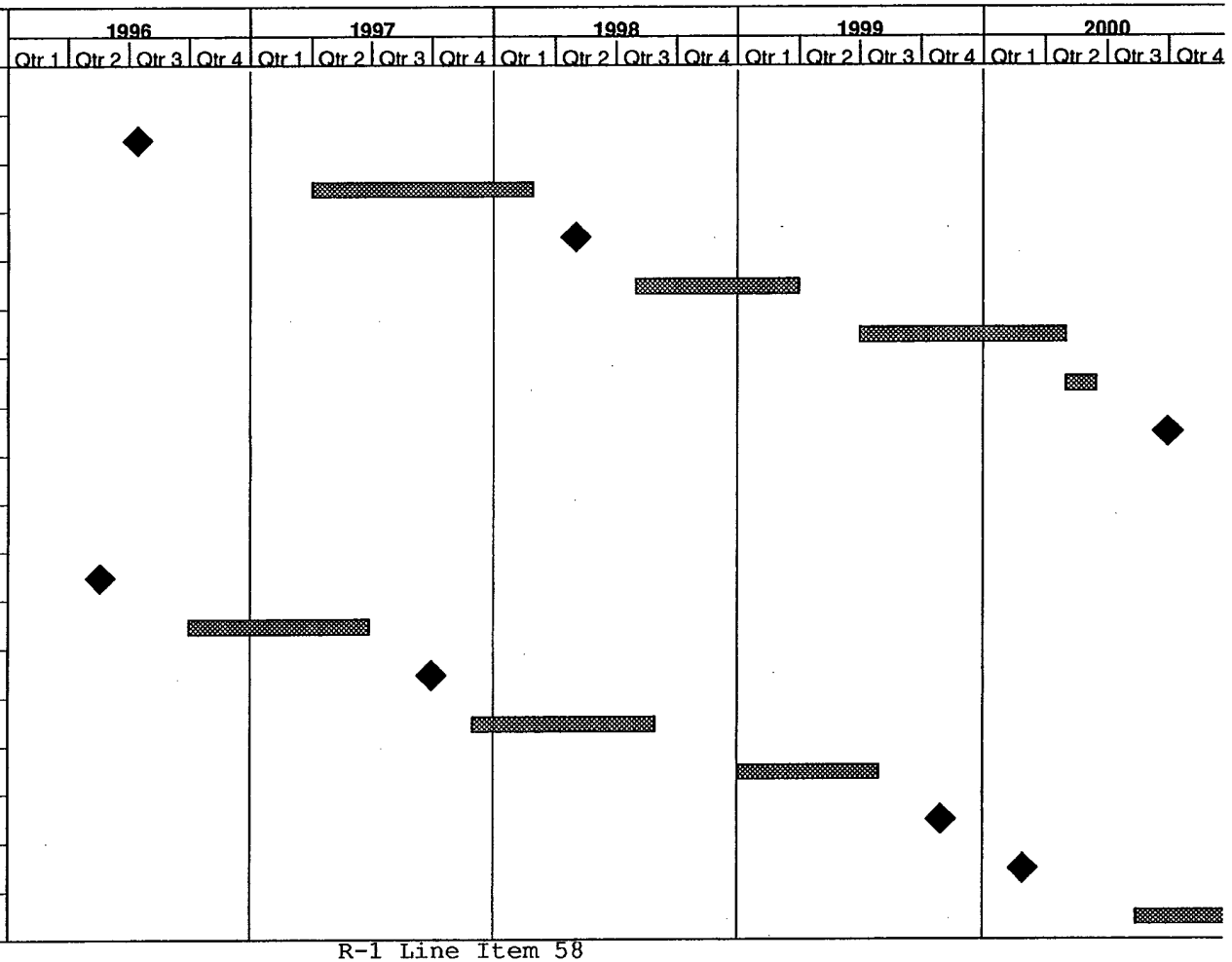


R-1 Line Item 58

Budget Item Justification
(Exhibit R-2, Page 6 of 20)

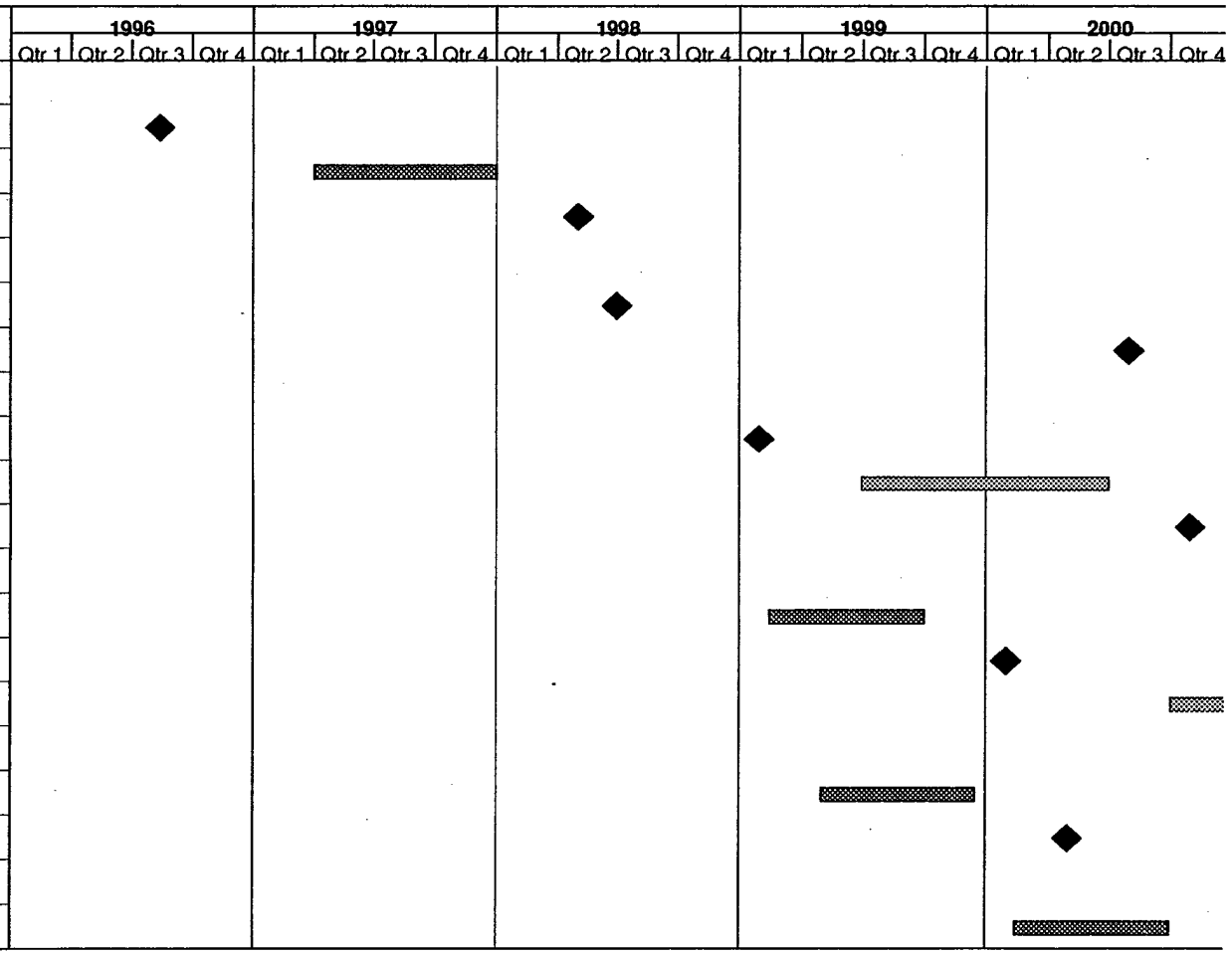
RDT&E MILESTONE CHART

ID	Task Name
19	**LIDD**
20	Milestone I
21	Testing (DT-IB)
22	Milestone II
23	Testing (DT-IIA)
24	Testing (DT-IIB/OT-II)
25	Testing (OPEVAL)
26	Milestone III
27	Production Contract Award
28	**MCD**
29	Milestone 0
30	Testing (DT-I)
31	Milestone I/II
32	Testing (DT-IIA)
33	Testing (DT-IIB)
34	Milestone III
35	Production Contract Award
36	Production/Deliveries



RDT&E MILESTONE CHART

ID	Task Name
37	**CLASSIFIED PROJECT I**
38	Milestone I/II
39	Testing (DT/OT-II)
40	Milestone III
41	**CLASSIFIED PROJECT**
42	Milestone 0
43	Milestone I
44	**IMPROVED DISRUPTER TOOL**
45	Milestone 0
46	Testing (DT-I)
47	Milestone I/II
48	**EXP. SAFE/ARM MONITOR**
49	Anaylsis of Alternatives (AOA) Study
50	Milestone 0
51	Testing (DT-I)
52	**LARGE IED**
53	Anaylsis of Alternatives (AOA) Study
54	Milestone 0
55	**ADVANCED ORD**
56	Anaylsis of Alternatives (AOA) Study



R-1 Line Item 58

Budget Item Justification
(Exhibit R-2, Page 8 of 20)

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development

PROJECT NUMBER: Q0377
PROJECT TITLE: Joint Service Explosive Ordnance Disposal System

A. (U) PROJECT COST BREAKDOWN: ($in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	1,100	1,510	1,688
b. Software Development	0	150	50
c. ILS	690	780	840
d. Developmental T&E	995	1,035	1,398
e. Operational T&E	0	0	0
f. Program Management Support	230	300	340
g. Program Management Personnel	200	200	220
h. Miscellaneous	442	568	715
Total	3,657	4,543	5,251

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROJECT NUMBER: Q0377
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT TITLE: Joint Service Explosive Ordnance Disposal System

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NAVEODTD IH	WR	10/96	CONT.	CONT.	158,113	2,871	4,243	4,911	CONT.	CONT.
MISC	MIPR/WR	1/96	877	877	684	556	0	0	0	877
Support and Management										
Dynamic Sys	CPFF	1/93	1,757	1,757	1,527	230	0	0	0	1,757
TBD	CPFF	1/98	CONT.	CONT.	0	0	300	340	CONT.	CONT.
Test and Evaluation	Not applicable.									

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development	Not applicable.								
Support and Management	Not applicable.								
Test and Evaluation	Not applicable.								

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development
PROJECT NUMBER: Q0377
PROJECT TITLE: Joint Service Explosive Ordnance Disposal System

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	158,797	3,427	4,243	4,911	CONT.	CONT.
Subtotal Support and Management	1,527	230	300	340	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	160,324	3,657	4,543	5,251	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q1317 Explosive Ordnance Disposal Diving Systems	2,923	5,758	5,505	5,091	4,772	2,999	2,752	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Provides for development of diving equipment and explosive charges to support Explosive Ordnance Disposal (EOD) underwater operation. The equipment must have inherently low acoustic and magnetic signatures in order to allow the EOD technician to safely approach, render safe, and dispose of sea mines and other underwater ordnance. Provides support for the Navy's high priority mission of Very Shallow Water Mine Countermeasures, including clandestine reconnaissance, in support of amphibious operations.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($1,611) Developed equipment which improves diver capability and endurance.
- (U) ($565) Developed a non-magnetic acoustic firing device.
- (U) ($747) Developed, tested and gained approval for fleet use of specialized equipment to support the Very Shallow Water Mine Countermeasures unit.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT NUMBER: Q1317 PROJECT TITLE: Explosive Ordnance Disposal Diving Systems

2. (U) FY 1998 PLAN:
   - (U) ($845) Continue developing equipment which improves diver capability and endurance.
   - (U) ($604) Continue developing a non-magnetic acoustic firing device.
   - (U) (475) Develop non-magnetic diver held underwater equipment to detect objects in the water column.
   - (U) ($270) Develop non-magnetic diver underwater navigation system compatible with Global Positioning System (GPS).
   - (U) ($3,564) Develop, test and gain approval for fleet use of specialized equipment to support the Very Shallow Water Mine Countermeasures unit.

3. (U) FY 1999 PLAN:
   - (U) ($323) Continue developing equipment which improves diver capability and endurance.
   - (U) ($400) Continue developing a non-magnetic acoustic firing device.
   - (U) ($796) Continue developing non-magnetic diver held underwater equipment to detect objects in the water column.
   - (U) ($300) Continue developing non-magnetic diver underwater navigation system compatible with GPS.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROJECT NUMBER: Q1317
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT TITLE: Explosive Ordnance Disposal Diving Systems

3. (U) FY 1999 PLAN: (Cont.)

- (U) ($309) Develop low influence underwater diver mounted display which will provide video interface with other EOD systems (Underwater Imaging System, Underwater Navigation System and MK 16 UBA).
- (U) ($464) Develop non-magnetic underwater vehicle to transport EOD diver and assocated equipment in support of EOD operations.
- (U) ($2,913) Continue to develop, test and gain approval for fleet use of specialized equipment to support the Very Shallow Water Mine Countermeasures unit.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,161	5,981	5,606
(U) Appropriated Value:	2,269	5,981	
(U) Adjustments to FY 1997/98 Appropriated Value/FY 1998 President's Budget			
a. NWCF/General Adjustments	+654	-223	-101
(U) FY 1999 PRESBUDG SUBMIT:	2,923	5,758	5,505

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROJECT NUMBER: Q1317
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT TITLE: Explosive Ordnance Disposal

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Increase in FY 97 due to General adjustments. Decreases in FY 98 & FY 99 due to General adjustments.
(U) Schedule: Not applicable.
(U) Schedule: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

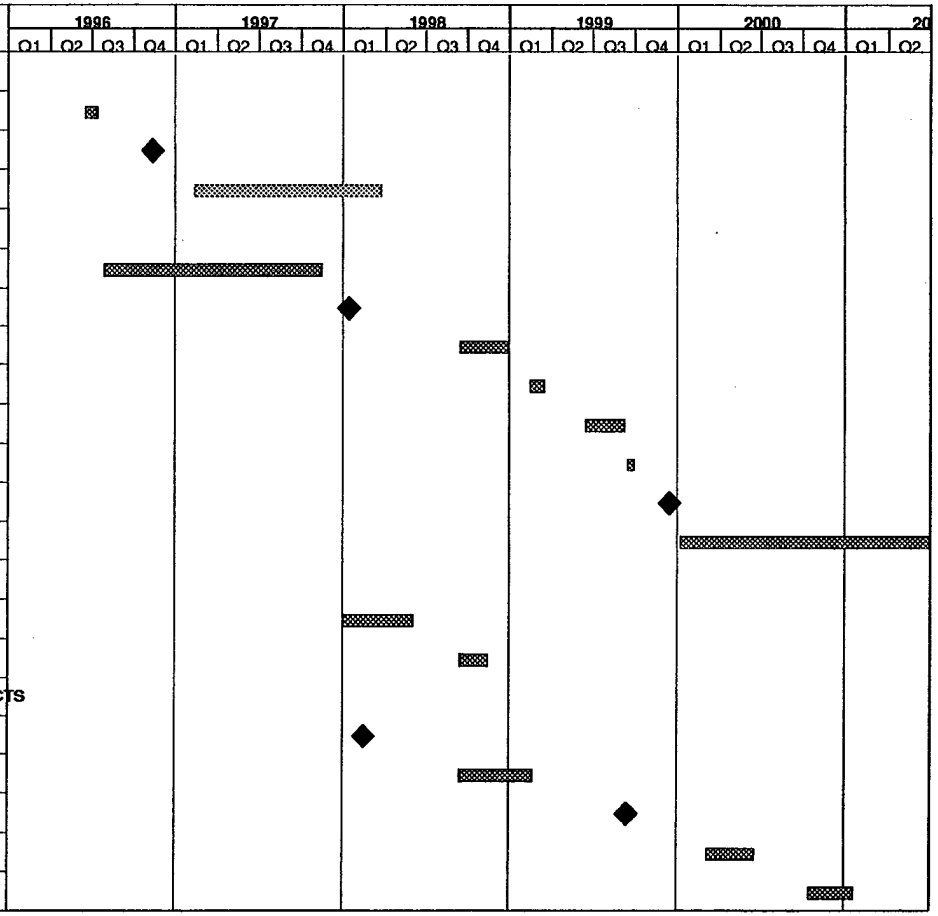
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line 114000 (portion)									
	722	4,726	4,080	5,398	3,656	4,160	3,910	CONT.	CONT.

(U) RELATED RDT&E: Not applicable.

D. (U) SCHEDULE PROFILE: See next page.

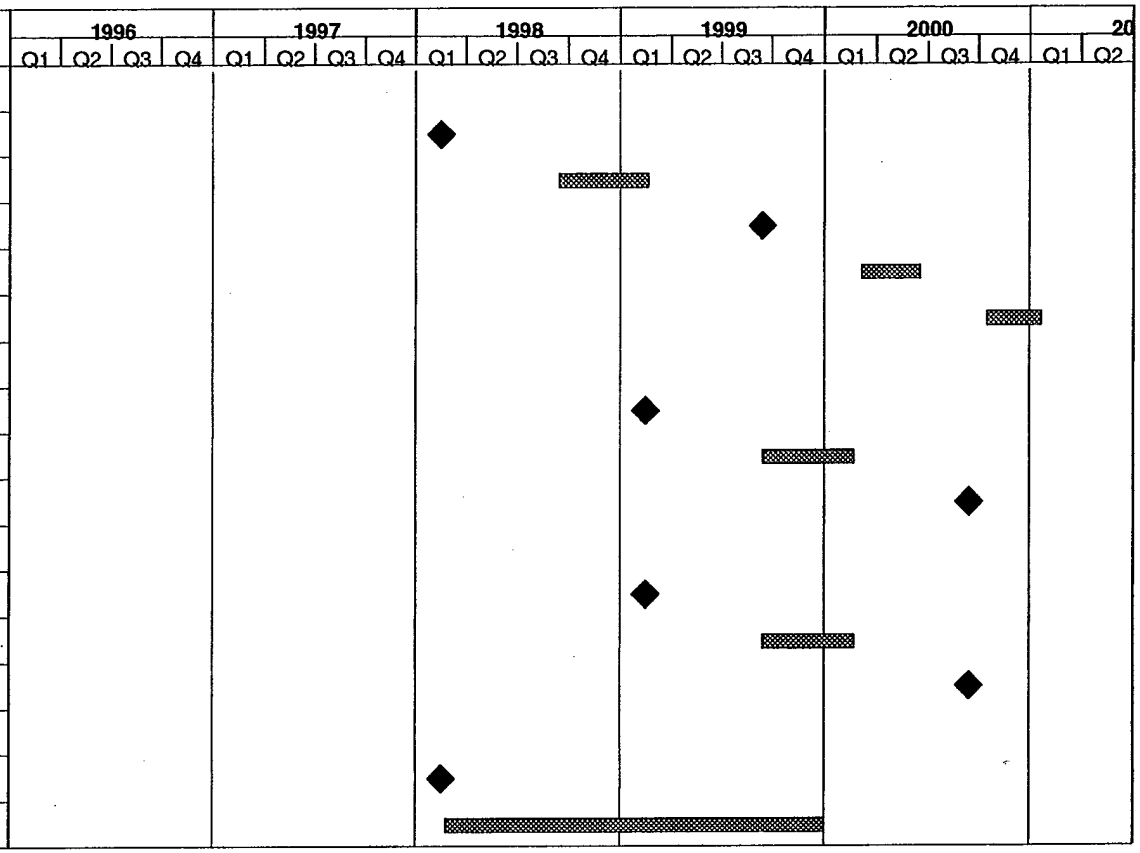
Q1317 EOD Diving Systems MS Chart

ID	Task Name
1	LIFT SYSTEM
2	Testing (OT-II)
3	Milestone III
4	Production
5	ACOUSTIC FIRING DEVICE
6	Testing (DT-I)
7	Milestone I/II
8	Testing (DT-IIA)
9	Testing (DT-IIB)
10	Testing (DT-IIC) TECHEVAL
11	Testing (OT-II) OPEVAL
12	Milestone III
13	Production
14	IMPROVING DIVER CAPABILITY
15	Developmental Testing
16	Operational Testing
17	UNDERWATER EQUIP. TO DETECT OBJECTS
18	Milestone 0
19	Testing (DT-I)
20	Milestone I/II
21	Testing (DT-IIA)
22	Testing (DT-IIB)



RDT&E MILESTONE CHART

ID	Task Name
23	**UNDERWATER NAVIGATION SYSTEM**
24	Milestone 0
25	Testing (DT-I)
26	Milestone I/II
27	Testing (DT-IIA)
28	Testing (DT-IIB)
29	**DIVERS HEADS-UP DISPLAY**
30	Milestone 0
31	Testing (DT-I)
32	Milestone I/II
33	**DIVER SUPPORT VEHICLE**
34	Milestone 0
35	Testing (DT-I)
36	Milestone I/II
37	**VERY SHALLOW WATER**
38	Milestone 0
39	Primary Hardware Development



R-1 Line Item 58

Budget Item Justification
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FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROJECT NUMBER: Q1317
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT TITLE: Explosive Ordnance Disposal Diving Systems

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	887	3,247	2,558
b. Software Development	0	80	133
c. Systems Engineering	386	456	441
d. ILS	326	284	538
e. Developmental T&E	311	585	720
f. Operational T&E	326	96	150
g. Program Management Support	255	361	428
h. Program Management Personnel	334	480	467
i. Miscellaneous	98	169	70
Total	2,923	5,758	5,505

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROJECT NUMBER: Q1317
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT TITLE: Explosive Ordnance Disposal Diving Systems

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION:

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NAVEODTD IH	WR	1/98	10,354	10,354	660	0	2,877	1,949	4,868	10,354
MISC	Various	1/96	CONT.	CONT.	29,481	2,718	2,520	3,128	CONT.	CONT.
Support and Management										
Dynamic Sys	CPFF	1/93	1,057	1,057	852	205	0	0	0	1,057
TBD	CPFF	1/98	2,000	2,000	0	0	361	428	CONT.	CONT.
Test and Evaluation	Not applicable.									

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development	Not applicable.								
Support and Management	Not applicable.								
Test and Evaluation	Not applicable.								

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603654N PROJECT NUMBER: Q1317
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development PROJECT TITLE: Explosive Ordnance Disposal Diving Systems

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	30,141	2,718	5,397	5,077	CONT.	CONT.
Subtotal Support and Management	852	205	361	428	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	30,993	2,923	5,758	5,505	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U2039 Cooperative Engagement Capability (CEC)	*224,281	206,851	131,623	82,704	64,692	77,920	53,677	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture having fire control quality. CEC distributes sensor data from each ship and aircraft, or cooperating unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system. CEC will significantly improve our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC will provide critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

(U) CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and Combat System Modifications. The DDS encodes and distributes ownship sensor and engagement data, is a high capacity, jam resistant, directive system providing a precision gridlocking and high throughput of data. The CEP is a high capacity distributed processor which is able to process force levels of data in a timely manner that allows its output to be considered real-time fire control data. This data is passed to the ship's combat system as fire control quality data for which the ship can cue its onboard sensors or use the data to engage targets without actually tracking them.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)
PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability (CEC)

(U) Project U2039 transferred from Program Element 0603755N beginning in FY 1998.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ENGINEERING AND MANUFACTURING DEVELOPMENT because it encompasses engineering and manufacturing development of new end-items prior to production approval decision.

***NOTE: FY 1997 and prior are in Program Element 0603755N (Project U2039) and is also reflected in this budget as reference.**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($125,017) Continued development of shipboard Common Equipment Set (CES).
- (U) ($60,000) Continued development of airborne integration.
- (U) ($22,219) Continued integration with Naval systems.
- (U) ($17,045) Continued field support.

2. (U) FY 1998 PLAN:

- (U) ($77,669) Continue development of shipboard CES.
- (U) ($58,603) Continue development of airborne integration.
- (U) ($45,265) Continue integration with Naval systems.
- (U) ($25,314) Continue field support.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)
PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability (CEC)

3. (U) FY 1999 PLAN:
   - (U) ($50,904) Complete system development of shipboard CES.
   - (U) ($38,700) Continue development of airborne integration.
   - (U) ($31,419) Continue integration with Naval systems.
   - (U) ($10,600) Continue field support.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	224,829	139,229	87,556
(U) Appropriated Value:	234,503	213,229	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	-10,222	-6,378	+44,067
(U) FY 1999 PESBUDG Submit:	224,281	206,851	131,623

U) CHANGE SUMMARY EXPLANATION:
(U) Funding: FY 1997 change is due to due to Congressional Undistributed Reductions and minor pricing adjustments. FY 1998 decrease is due to Congressional undistributed reductions. The FY1999 change is due to additional programming of funds for E-2C airborne integration; conversion of LAMPS frequency band; Low Cost CES; HAWK/TPS-59 integration and participation in fleet exercises, and a decrease for revised economic assumptions and minor pricing adjustments.
(U) Schedule: FOT&E of the integrated CEC/E-2C aircraft is scheduled for FY 2001.
(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)

PROJECT NUMBER: U2039 PROJECT TITLE: Cooperative Engagement Capability (CEC)

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN 260600	0	73,255	47,332	107,894	94,333	173,171	175,768	635,909	1,307,662
SCN Various	0	23,100	6,000	12,200	34,600	35,300	36,000	69,403	216,603
O&M 1D4D	10,911	15,150	22,024	21,862	26,077	26,491	26,606	CONT.	CONT.
APN (BA-5,1) 330000	500	1,400	29,700	36,800	29,100	53,400	45,000	271,440	467,340
R&D (0204152N)	4,000	5,109	0	0	0	0	0	0	9,109

NOTE: Program Element 0603755N (Project U2039) contains CEC program for FY 1997 and prior, reflected in this budget for reference.

(U) RELATED RDT&E:

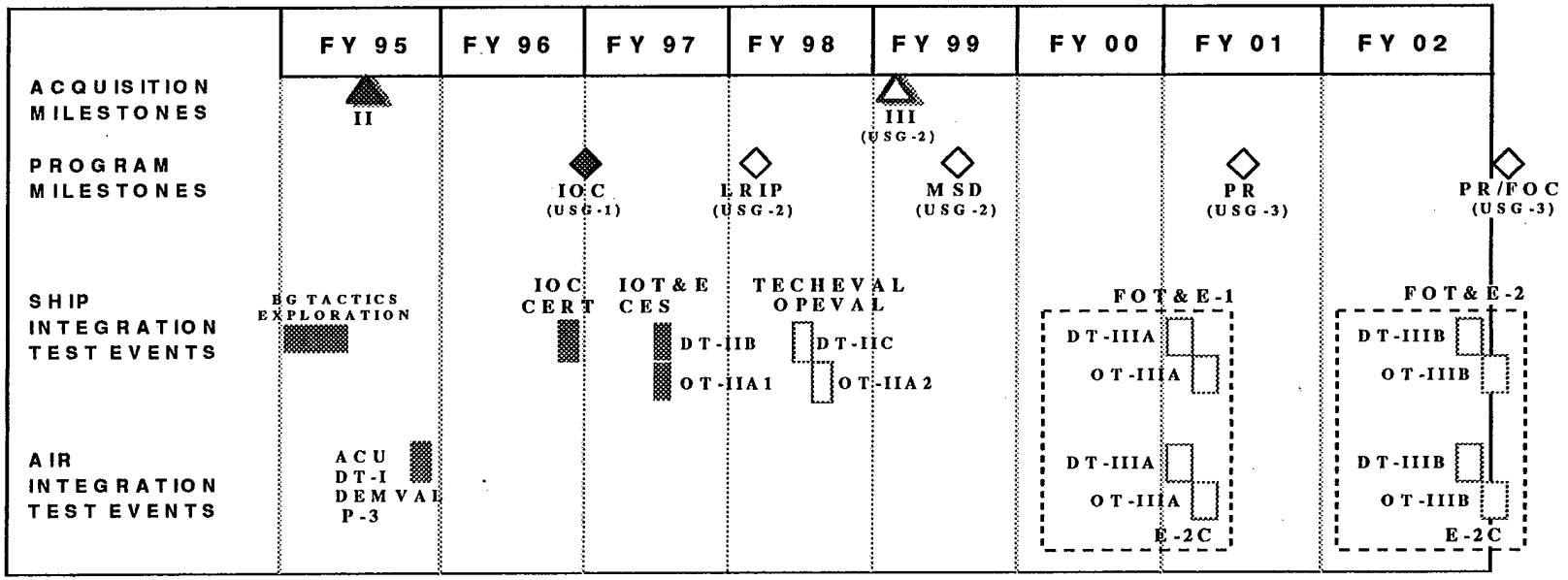
(U) PE 0205604N (Tactical Data Links)
(U) PE 0604307N (AEGIS Combat System Engineering)
(U) PE 0604366N (Standard Missile Improvements)
(U) PE 0604518N (Combat Information Center Conversion)
(U) PE 0204152N (E-2C Improvements)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)
PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability (CEC)

D. (U) SCHEDULE PROFILE:

CEC Program Structure



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Budget Item Justification
(Exhibit R-2, Page 5 of 9)

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N PROJECT NUMBER: U2039
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC) PROJECT TITLE: Cooperative Engagement Capability (CEC)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Program Management	12,400	5,378	5,274
b. Systems Engineering	49,811	51,999	26,967
c. Equipment Assembly	31,775	18,880	15,800
d. Software Development	33,500	17,725	15,213
e. Integration	62,242	76,197	51,669
f. Installation	9,975	5,455	4,200
g. Test	7,220	6,585	7,000
h. Technical Data	3,415	2,205	2,000
i. Integrated Logistics Support	13,943	22,427	3,500
Total	224,281	206,851	131,623

* Note: Project U2039 transferred from PE 0603755N beginning in FY 1998, reflected in budget exhibit for reference.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC) PROJECT NUMBER: U2039 PROJECT TITLE: Cooperative Engagement Capability (CEC)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

Performing Organizations

Contractor/ Government Performing Activity	Contract Method/Type or Funding Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Compl	Total Program
Product Development										
E-Systems St. Petersburg, FL	SS/CPFF	10/97	CONT.	CONT.	261,704	63,057	56,593	31,134	CONT.	CONT.
JHU/APL Laurel, MD	SS/CPFF	2/98	CONT.	CONT.	98,920	25,230	47,204	14,000	CONT.	CONT.
NAVAIR PMA-231 Washington, DC	PD	Various	221,040	221,040	13,340	42,000	32,000	38,800	98,000	221,040
LOCKHEED AEROSYS Marietta, GA	C/FFP	10/97	49,283	49,283	11,000	29,783	6,500	0	2,000	49,283
NAVSURFWARCENDIV Crane, IN	WR	Various	CONT.	CONT.	10,067	5,838	4,071	2,618	CONT.	CONT.
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	19,361	5,634	3,631	3,627	CONT.	CONT.
NAVSURFWARCENDIV Port Hueneme, CA	WR	Various	CONT.	CONT.	23,171	5,573	3,418	2,555	CONT.	CONT.
NORFOLK NSY Norfolk, VA	SS/CPFF	Various	CONT.	CONT.	7,915	241	5,481	0	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC) PROJECT NUMBER: U2039 PROJECT TITLE: Cooperative Engagement Capability (CEC)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

Performing Organizations

Contractor/ Government Performing Activity	Contract Method/Type or Funding Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Compl	Total Program
Product Development (Cont'd)										
DRPM, AEGIS Washington, DC	PD	Various	156,013	156,013	71,115	21,498	19,800	9,647	30,353	156,013
Northrup/Grumman Bethpage, NY	C/CPFF	03/96	9,295	9,295	4,795	4,500	0	0	0	9,295
Loral Corp. Eagan, MN	C/CPFF	03/96	5,075	5,075	5,075	0	0	0	0	5,075
AWACS SPO Hanscom AFB, MA	MIPR	03/96	3,017	3,017	3,017	0	0	0	0	3,017
NCCOSC, RDTE DIV San Diego, CA	WR	Various	CONT.	CONT.	19,051	2,589	0	0	CONT.	CONT.
Hughes Aerospace Los Angeles, CA	C/CPFF	3/96	18,104	18,104	12,542	5,562	0	0	0	18,104
UNISYS, INC St. Paul, MN	C/CPIF	11/94	17,101	17,101	17,101	0	0	0	0	17,101
Miscellaneous	Various	Various	CONT.	CONT.	15,354	5,376	12,663	15,367	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 5 PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)
PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability (CEC)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

Performing Organizations

Contractor/ Government Performing Activity	Contract Method/Type or Funding Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Compl	Total Program
Support and Management										
Miscellaneous	Various	Various	CONT.	CONT.	11,454	4,550	5,490	3,875	CONT.	CONT.
Test and Evaluation										
Miscellaneous	Various	Various	CONT.	CONT.	6,821	2,850	10,000	10,000	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY - Not applicable.

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	593,528	216,881	191,361	122,748	CONT.	CONT.
Subtotal Support and Management	11,454	4,550	5,490	3,875	CONT.	CONT.
Subtotal Test and Evaluation	6,821	2,850	10,000	5,000	CONT.	CONT.
Total Project	611,803	224,281	206,851	131,623	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603713N
PROGRAM ELEMENT TITLE: Ocean Engineering Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0099 Deep Submergence Biomedical Development	3,446	0	0	0	0	0	0	0	50,945
S0099 Deep Submergence Biomedical Development	0	3,919	4,014	3,845	3,893	3,862	4,033	CONT.	CONT.
S0394 Shallow Depth Diving Equipment	4,556	6,364	11,243	13,258	12,863	12,847	10,912	CONT.	CONT.
TOTAL	8,002	10,283	15,257	17,103	16,756	16,709	14,945	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Developments in this program will enable the U.S. Navy to overcome deficiencies which constrain underwater operations in the areas of search, location, rescue, recovery, salvage, construction, and protection of offshore assets. This program develops medical technology, diver life support equipment, and the vehicles, systems, and tools to permit manned underwater operations.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT NUMBER: S0099 PROJECT TITLE: Deep Submergence Biomedical Development

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0099 Deep Submergence Biomedical Development	0	3,919	4,014	3,845	3,893	3,862	4,033	CONT.	CONT.

*Funding in FY 1997 is budgeted in Project M0099.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Develops biomedical technology to increase diver safety and effectiveness; supports deeper, longer, safer, more flexible dives. Requirements: NAPDD #429-873, Deep Submergence Biomedical Development, 29 March 95.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($450) Submarine Rescue: Developed PC based submarine escape and rescue algorithm. Wrote a USN version of the Royal Navy "Guard Book" to be used in the interim until the PC algorithm is in place. Evaluated and recommended alternative carbon dioxide scrubbing methods for DISSUB use.

- (U) ($2,626) Decompression/Diver Work Performance: Performed research into the control and measurement of contaminants in diving and submarine environments, specifically focusing on DISSUB scenarios. Prepared a plan and initiated necessary research to solve deficiencies that exist for rescuing DISSUB personnel. Specifically focused on Deep Submergence Rescue (DSR), Dry Deck Shelter, Rescue Chamber issues and pharmacological preventive or treatment strategies for severe decompression sickness.

- (U) ($370) Underwater Sound: Designed, developed and evaluated a prototype instrument for coupling sound level meters to microphones and hydrophones which will permit direct onsite measurement of noise levels within the diving environment.

2. (U) FY 1998 PLAN:

- (U) ($3,079) Plan for Decompression/Diver Work Performance Research: Validate nitrox decompression tables for 1.3 Atmosphere Absolute (ATA) Oxygen. Develop models to predict decompression stress from available data from human and animal diving database. Identify the effect of increased partial pressure of oxygen on incidence of decompression sickness. Define variables required to calculate optimal decompression procedures. Develop tables of pulmonary and Central Nervous System (CNS) oxygen toxicity and identify methods to prevent CNS oxygen toxicity, extend disabled submarine crew survival time. Using pig and sheep models of decompression sickness, investigate risk associated with delay of recompression on air divers. Investigate alternative decompression protocols for air saturated divers with emphasis on the early/aggressive use of oxygen. Validate existing procedures for surface decompression using oxygen.

- (U) ($480) Plan for Submarine Rescue: Investigate non-electrical methods for improvement of carbon dioxide scrubbing efficiency; review/extend 24 hour limits for contaminant exposure in disabled submarine environments, develop submarine escape and rescue algorithm, perform functional testing of submarine atmosphere monitoring equipment in a disabled submarine environment.

- (U) ($360) Plan for Underwater Sound: Develop dive site capability to measure underwater sound exposure. Deliver standards for exposure to non-impulsive underwater sound. Deliver unmanned underwater tool noise procedures.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT NUMBER: S0099 PROJECT TITLE: Deep Submergence Biomedical Development

3. (U) FY 1999 PLAN:

- (U) ($3,164) Plan for Decompression/Diver Work Performance Research:
  Define standard measurement of decompression stress. Develop methods to record variables (e.g. time, depth, water temp, decompression stress) during operational dives. Deliver tables of pulmonary and CNS oxygen toxicity and identify methods to prevent CNS oxygen toxicity. Continue work on nitrox decompression and efforts to develop alternative decompression protocol for air saturated divers described in FY 98 plan. Develop one-atmosphere treatment protocols for decompression sickness.

- (U) ($500) Plan for Submarine Rescue:
  Deliver Submarine escape and rescue algorithm, investigate impact of hypothermia on crew survival in disabled submarine, refine estimates of crew escape time in disabled submarine scenario, investigate effects of low oxygen and high carbon dioxide on oxygen consumption.

- (U) ($350) Plan for Underwater Sound:
  Deliver dive site capability to measure underwater sound exposure. Develop procedures for assessing underwater blast/impulse noise hazards.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT NUMBER: S0099 PROJECT TITLE: Deep Submergence Biomedical Development

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997*	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,725	4,038	4,177
(U) Appropriated Value:	3,883	4,038	0
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
a. Deep Submergence BIOMED Development Reduction	0	0	-109
b. SBIR Transfer	-37	0	0
c. NWCF Surcharge Correction	0	0	17
d. DD 1002: March 97 Update BTRs	-237	0	0
e. Undistributed Reductions	-163	-119	-71
(U) FY 1999 PRESBUDG Submit:	3,446	3,919	4,014

*FY 1997 budgeted in Project M0099.

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Redistribution within program element by resource sponsor from project M0099. The FY 97 decrease of $437K results from SBIR(-$37K), undistributed reductions(-$163K) and BTRs(-$237K). The FY 98 decrease of $119K results from undistributed reductions. The FY 99 net decrease of $163K results from Deep Submergence Biomedical Development (-$109K), NWCF surcharge correction($17K) and undistributed reductions (-$71K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT NUMBER: S0099 PROJECT TITLE: Deep Submergence Biomedical Development

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0099
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Deep Submergence Biomedical Development

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997*	FY 1998	FY 1999
a. Product development	3,346	3,809	3,904
b. Program management support	100	110	110
Total	3,446	3,919	4,014

*FY 1997 budgeted in Project M0099.

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996* & Prior	FY 1997* Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:										
NEDU	WR	10/97	CONT.	CONT.	0	387	800	1,420	CONT.	CONT.
NSMRL	WR	10/97	CONT.	CONT.	1,888	820	840	850	CONT.	CONT.
NMRI	WR	10/97	CONT.	CONT.	6,933	1,740	1,390	650	CONT.	CONT.
Misc.	Various	Various	CONT.	CONT.	1,693	499	781	994	CONT.	CONT.
Support and Management:										
Misc.	Various	Various	CONT.	CONT.	51	0	108	100	CONT.	CONT.
Test and Evaluation:		Not applicable								

*FY 1996 and FY 1997 budgeted in Project M0099.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT NUMBER: S0099 PROJECT TITLE: Deep Submergence Biomedical Development

GOVERNMENT FURNISHED PROPERTY: Not applicable.

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996* & Prior	FY 1997* Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
Support and Management									
Test and Evaluation									

	FY 1996* & Prior	FY 1997* Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	10,514	3,446	3,811	3,914	CONT.	CONT.
Subtotal Support and Management	51	0	108	100	CONT.	CONT.
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	10,565	3,446	3,919	4,014	CONT.	CONT.

*FY 1996 and FY 1997 budgeted in Project M0099.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0394 Shallow Depth Diving Equipment	4,556	6,364	11,243	13,258	12,863	12,847	10,912	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project is to develop systems to support submarine rescue missions and conventional diver operations to depths of 300 feet. Diver operations include ship husbandry, salvage/recovery, and submarine rescue operations to support national, as well as, Navy needs around the world. Modern certifiable diving systems which ensure diver safety and allow maximum work efficiency will replace currently antiquated systems. All efforts are currently focused on the following submarine rescue systems:

(U) Submarine Rescue Diving and Recompression System (SRDRS) is to provide a new rapidly-deployed emergency submarine rescue system. SRDRS will fill the gap created by the decommissioning of USS PIGEON (ASR 21) and USS ORTOLAN (ASR 22) and provide a new capability of pressurized transportation of rescuees from a stricken submarine directly to the decompression system eliminating the requirement for DSRV's, MOSUB's and SRC's. SRDRS is to include an air transportable rapid assessment/underwater work system, a decompression chamber system and a pressurized rescue module. The SRDRS will provide a global rapid response capability to support submarine rescue missions with an increase in capability at a fraction of the cost of the currently available systems.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT NUMBER: S0394 PROJECT TITLE: Shallow Depth Diving Equip

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($4,556) Submarine Rescue Diving and Recompression System: Based on results of the FY 1995 testing and evaluation, completed detailed design and awarded contract for manufacture of prototype Assessment/Underwater Work System. Completed detailed design of Submarine Decompression System. Solicited contract for Submarine Decompression System.

2. (U) FY 1998 PLAN:

- (U) ($6,364) Submarine Rescue Diving and Recompression System: Continue acquisition of and acceptance testing of the prototype Assessment/Underwater Work System. Award contract for fabrication of prototype Submarine Decompression System. Complete preliminary design of Pressurized Rescue Module.

3. (U) FY 1999 PLAN:

- (U) ($11,243) Submarine Rescue Diving and Recompression System: Complete acquisition of and acceptance testing of the prototype Assessment/Underwater Work System. Continue fabrication of the prototype Submarine Decompression System. Solicit and award contract for detailed design and fabrication of the Pressurized Rescue Module.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	4,531	8,620	5,419
(U) Appropriated Value:	4,723	8,620	0
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
a. Submarine Rescue Restructuring	0	0	4,000
b. SBIR Transfer	-93	0	0
c. NWCF Surcharge Correction	0	0	22
d. DD 1002: March 97 BTRs	124	0	0
e. SHALLOW WATER DIVING EQUIPMENT REPROGRAMMING	0	-2,000	2,000
f. Undistributed Reductions	-198	-256	-198
(U) FY 1999 PRESBUDG Submit:	4,556	6,364	11,243

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 97 net decrease of $167K results from SBIR(-$93K), undistributed reductions(-$198K) and BTRs (+$124K). The FY 98 decrease of $2,256K results from undistributed reductions(-$256K), and shallow water diving equipment reprogramming (-$2,000K). The FY 99 net increase of $5,824K is for the Submarine Rescue Restructuring (+$4,000K), NWCF surcharge correction(+$22K), shallow water diving equipment reprogramming (+$2,000K) and undistributed reductions(-$198K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

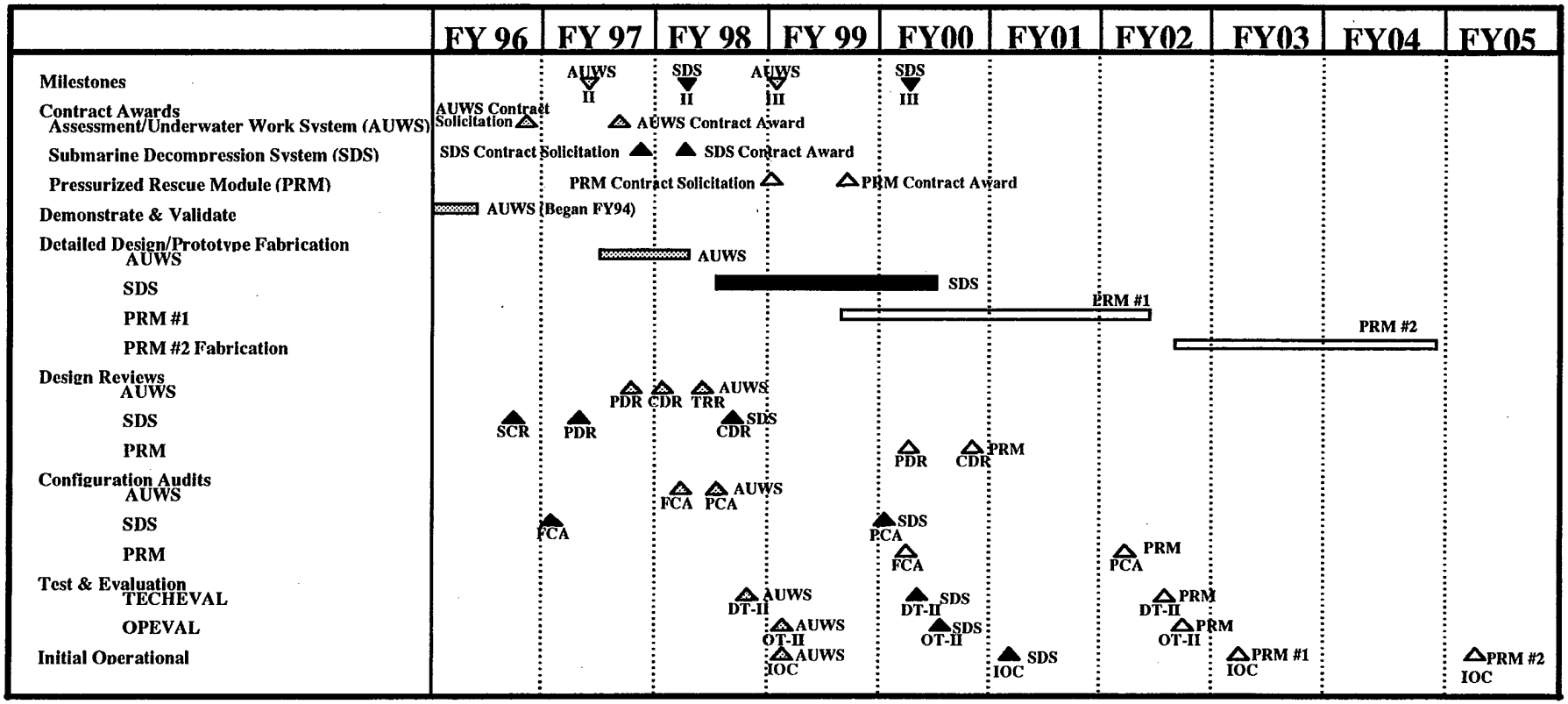
BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: Not applicable.

D. (U) SCHEDULE PROFILE:

Submarine Rescue Diving and Recompression Schedule



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

A. (U) PROGRAM COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	3,850	5,082	9,843
b. Systems Engineering	500	900	1,000
c. Operational Test & Evaluation	150	300	300
d. Program Management Support	56	82	100
Total	4,556	6,364	11,243

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Oceaneering	C/CPAF	Various	9,079	9,079	8,749	330	0	0	0	9,079
CSS	WR	Various	12,489	12,489	9,081	3,408	0	0	0	12,489
Misc.	Various	Various	CONT.	CONT.	1,117	612	5,982	10,843	CONT.	CONT.
Support and Management										
Misc.	Various	Various	CONT.	CONT.	315	56	82	100	CONT.	CONT.
Test and Evaluation										
Misc.	Various	Various	CONT.	CONT.	232	150	300	300	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

GOVERNMENT FURNISHED PROPERTY: Not applicable.

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
Support and Management									
Test and Evaluation									

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	18,947	4,350	5,982	10,843	CONT.	CONT.
Subtotal Support and Management	315	56	82	100	CONT.	CONT.
Subtotal Test and Evaluation	232	150	300	300	CONT.	CONT.
Total Project	19,494	4,556	6,364	11,243	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0401 Shipboard Waste Management	36,543	40,044	46,304	55,454	48,352	26,627	25,342	CONT	CONT
W2210 Environmental Compliance	1,401	2,517	4,439	4,719	4,959	5,271	5,565	CONT	CONT
Y0817 Pollution Abatement Ashore	9,938	7,302	8,695	9,384	10,015	10,626	11,237	CONT	CONT
Y2402 Asbestos Removal	0	1,941	0	0	0	0	0	0	1,941
Y2403 Resource Recovery Technology Center	0	3,881	0	0	0	0	0	0	3,881
TOTAL	47,882	55,685	59,438	69,557	63,326	42,524	42,144	CONT	CONT

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program develops processes, prototype hardware, systems and operational procedures that will allow the Navy to operate in the U.S., foreign and international waters, air, space, and land areas while complying with U.S. statutes and international agreements. The program also includes efforts to improve the Navy's response to salvage-related pollution incidents. Projects support the Navy's requirement to meet environmental standards outlined by Environmental Protection Agency Executive Order 12088 of October 1978, The Act to Prevent Pollution from Ships, Endangered Species Act (ESA), Mammal Protection Act, Clean Air Act, Clean Water Act, 1993 Amendment and DoD Directive 6050.4 of 16 March 1982, DoD Directive 4210.15 of 27 July 1989, DoD Directive 6050.15 of 14 June 1985, and DoD Directive 6050.9 of 13 February 1989. Project S0401 supports RDT&E efforts that allow the Navy to be in compliance with existing and anticipated laws with regard to four major areas: 1) ozone depleting substances, 2) solid waste, 3) liquid waste, and 4) hazardous and other ship wastes. Project W2210 supports development of environmental systems for naval aviation operations to enable compliance with environmental laws and regulations and minimize the cost associated with environmental compliance. Project Y0817 supports and validates development of technologies to enable facilities to comply with environmental laws and regulations in a cost effective manner.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test and evaluation related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Shipboard Waste Management

(U) COST (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0401 Shipboard Waste Management	36,543	40,044	46,304	55,454	48,352	26,627	25,342	CONT	CONT

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Project develops equipment and procedures for managing shipboard waste. Emphasis is on developing shipboard systems to enable compliance with national, state, and international regulations and on achieving an affordable pollution-free profile for future ships and submarines. This program also develops conservation technologies and ozone-safe replacement chemical technologies for Navy solvents and shipboard refrigeration and firefighting systems.

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($10,000) Ozone Depleting Substances - Converted first submarine CFC-12 refrigeration plant to HFC-134a and related equipment modifications for at-sea testing and evaluation. Continued development of backfit modification kits for two surface ship 200-ton CFC-114 air conditioning plant designs. Continued development of backfit modification kits for a 300-ton surface ship CFC-114 air conditioning plant design. Continued development of the backfit modification kit for the surface ship 125-ton CFC-114 air conditioning plant design. Continued development of backfit modifications for other surface ship air conditioning systems. Initiated efforts to perform one-year at-sea ship test and evaluation of HFC-236fa backfit modifications on shipboard 200-ton CFC-114 plants. Completed effort to develop future fleet non-chlorofluorocarbon 125-ton twin screw air conditioning plant prototype. Continued development of future fleet non-chlorofluorocarbon 200-ton centrifugal air conditioning plant and 1.5-ton refrigeration plant; completed manufacturer's qualification testing of prototype hardware. Continued development of alternate solvents and processes for oxygen systems cleaning applications. Continued development of Alternative Fire Fighting Agent Delivery Systems (AFFADS) for new ship construction.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Shipboard Waste Management

- (U) ($18,323) Integrated Liquid Wastes - Continued support of rulemaking process with the Environmental Protection Agency (EPA) in the development of Uniform National Discharge Standards (UNDS) for liquid waste discharges for Navy vessels. Continued development of shipboard integrated liquid waste treatment system including the following: continued development of Oily Waste Polishing Systems (OWPS) for new ships; continued development of advanced oil content monitor; continued test and evaluation of breadboard non-oily wastewater treatment system; continued testing upgraded vortex sewage incinerator system; continued investigating design fixes for shipboard compensated fuel ballast systems and initiated development of sectional full scale model system. Completed testing of improved bilge cleaning detergents. Initiated testing of Non-Seeping Grease Seal (NSGS) on submarine dive and steering gear.

- (U) ($4,636) Solid Wastes - Completed and issued report on efforts supporting Report to Congress on plan to comply with special area provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL), Annex V. Continued effort concerning Report to Congress for submarine solid waste management. Initiated development of management practices and systems for managing plastics for submarine application. Completed support for Environmental Impact Statement (EIS) for Navy Solid Waste Management Plan for surface ships. Completed Environmental Assessment (EA) for Navy Solid Waste Management plan for submarines. Continued test and evaluation of prototype solid waste processing equipment on surface ships.

- (U) ($3,584) Hazardous and Other Major Ship Wastes - Continued shipboard hazardous waste substitution and elimination task and continued T&E of pollution prevention equipment aboard ship. Continued investigation of non-asbestos substitutes. Continued quality assurance testing on reformulated commercial paint systems. Continued development of recovered oil logistics system; computer based contingency planning system, and the oil outflow and salvage response analysis program.

2. (U) FY 1998 PLAN:

- (U) ($12,000) Ozone Depleting Substances - Continue at-sea evaluation of first submarine refrigeration plants converted to HFC-134a. Complete development of backfit modification kits for two surface ship 200-ton CFC-114 air conditioning plant designs. Complete development of a backfit modification kit for surface ships 300-ton CFC-114 air conditioning plant designs. Continue development of backfit modification kit for the surface ship 125-ton CFC-114 air conditioning plant design. Initiate development of backfit modification kit for surface ship 150-ton CFC-

114 air conditioning plant design. Continue development of backfit modifications for other surface ship air conditioning plant designs. Modify shipboard 200-ton CFC-114 air conditioning plants onboard one ship to HFC-236fa for one-year at-sea ship test and evaluation. Begin laboratory evaluations of future fleet non-chlorofluorocarbon, 200-ton centrifugal air conditioning plant and 1.5-ton refrigeration plant prototypes. Continue development of alternative solvents and processes for oxygen systems cleaning applications. Continue development of AFFADS for new ship construction.

- (U) ($19,091) Integrated Liquid Wastes - Continue support of rulemaking process with the Environmental Protection Agency (EPA) in the development of Uniform National Discharge Standards (UNDS) for liquid waste discharges from Navy vessels. Continue development of integrated liquid waste treatment system including: continue development of Oily Waste Polishing Systems (OWPS) including a 10 gal/min unit (OWS-10 Polisher) and a 50 gal/min unit (OWS-50 Polisher); continue development of Engineering Development Model (EDM) non-oily wastewater treatment system; continue development of advanced oil content monitor; continue test and evaluation of upgraded shipboard vortex sewage incinerator with emphasis on evaporation/incineration of all concentrated ship liquid wastes (multifunctional) and continue development of design fixes for compensated fuel ballast systems. Continue testing of Non-Seeping Grease Seal (NSGS) on submarine dive and steering gear. Complete testing of High Capacity Oil Water Separator (HCOWS).

- (U) ($3,837) Solid Wastes - Continue development of management processes and systems for plastics for submarine application. Complete evaluation of prototype solid waste processing equipment on surface ships. Complete and issue report on efforts supporting Report to Congress on plan to comply with special area provisions of the International Convention for the Prevention of Pollution from submarines (MARPOL Annex V).

- (U) ($5,116) Hazardous and Other Major Ship Wastes - Continue shipboard hazardous waste substitution and elimination task and continue T&E of pollution prevention equipment aboard ship. Complete investigation of Non-Asbestos Substitutes (NAS). Continue quality assurance testing on reformulated commercial paints. Continue development of Recovered Oil Logistics System; computer based contingency planning system, and the oil outflow and salvage response analysis program. Continue development of in-situ oil burning system after one year delay. Initiate oil and skimmer tracking system development.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROGRAM ELEMENT TITLE: Environmental Protection PROJECT NUMBER: S0401 PROJECT TITLE: Shipboard Waste Management

3. (U) FY 1999 PLAN:

- (U) ($14,500) Ozone Depleting Substances - Complete evaluation of first submarine refrigeration plants converted to HFC-134a. Complete development of backfit modification kit for the surface ship 125-ton CFC-114 air conditioning plant design. Continue development of backfit modification kit for surface ship 150-ton CFC-114 air conditioning plant design. Continue development of backfit modification kits for surface ship 250-ton and 363-ton CFC-114 air conditioning plant design. Continue development of backfit modifications for remaining surface ship 250-ton CFC-114 air conditioning plants design. Complete one-year at-sea ship test and evaluation of HFC-236fa backfit modifications in 200-ton CFC-114 air conditioning plants. Complete development of alternative solvents and processes for oxygen systems cleaning applications. Complete development of AFFADS for new ship construction.

- (U) ($19,458) Integrated Liquid Wastes - Continue support of rulemaking process with the Environmental Protection Agency (EPA) in the development of Uniform National Discharge Standards (UNDS) for liquid waste discharges from navy vessels. Continue development of integrated liquid waste treatment system including: Continue development of Oily Waste Polishing Systems (OWPS); complete development of Oily Waste Polishing System (OWS-10 Polisher); continue development of large ship oily waste polishing system (OWS-50 Polisher); initiate shipboard evaluation of advanced development model non-oily wastewater treatment system; continue development of advanced oil content monitor; continue development of multifunctional shipboard evaporation/incineration system for all concentrated ship liquid wastes and continue development of design fixes for compensated fuel ballast systems. Complete development of High Capacity Oil/Water Separator (HCOWS). Complete testing of non-seeping grease seal on submarine dive and steering gear.

- (U) ($7,000) Solid Wastes - Continue development of management processes and systems for plastics for submarine application. Initiate development of a pulper for submarine application.

- (U) ($5,346) Hazardous and Other Major Ship Wastes - Continue quality assurance testing on reformulated commercial paints. Continue shipboard hazardous waste substitution and elimination task and continue T&E of pollution prevention equipment aboard ship. Complete investigation of Non-Asbestos Substitutes (NAS) and issue final report. Continue quality assurance testing on reformulated commercial paints. Continue development of Recovered Oil Logistics System; computer based contingency planning system, and the oil outflow and salvage response analysis program. Continue development of in-situ oil burning system. Initiate development of marine mammals protection program.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: S0401 PROJECT TITLE: Shipboard Waste Management

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	38,828	42,281	44,844
(U) Appropriated Value:	40,484	42,281	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
a. Adjustments	-3,941	-2,237	+1,460
(U) FY 1999 PRESBUDG Submit:	36,543	40,044	46,304

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $3,941K reflects SBIR transfer (-$238K), general undistributed reductions (-$1,656K), FY 1997 Revised Economic Assumptions (-$47K), and minor execution changes/reprogrammings (-$2,000K).

FY 1998: Decrease of $2,237K reflects CST/BEWT adjustment of (-$1,000K), general undistributed reductions (-$1,133K) and minor pricing adjustments (-$104K).

FY 1999: Increase of $1,460K reflects cancellation of Dry-Low Emissions Project (-$9,700K),PR-99 Environmental BAM Adjustments (+$3,200K), FY 1999 Shipboard Waste Program Restoral ($9,400K), and minor pricing adjustments (-$1,440K).

(U) Schedule Changes: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not Applicable.

(U) RELATED RDT&E:

(U) Defense Research Sciences/Shipboard Processes (PE 61153N/R3162)
(U) Readiness, Training, and Environmental Quality/Logistics and Environmental Quality (PE 62233N)
(U) Environmental Quality and Logistics Advanced Technology/Environmental Requirements Advanced Technology (PE 63712N/R2206)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Shipboard Waste Management

D. (U) SCHEDULE PROFILE:

Program Milestone	FY 1997	FY 1998	FY 1999
OZONE DEPLETING SUBSTANCE	3Q Comp Dev 125-ton HFC-134a AC Plant	2Q Comp Dev 200-ton CFC-114 AC Mod Kits 4Q Comp of 300-ton CFC-114 AC Mod Kits	4Q Comp Dev of 3rd 200-ton & 125-ton CFC-114 AC Mod Kits 4Q Comp Solvent Dev 4Q Comp Dev of AFFADS
INTEGRATED LIQUID WASTES	1Q Init Dev of NSGS 4Q Comp T&E of Bilge Cleaning Detergents	3Q Comp Tests of HCOWS	4Q Comp Dev of OWS-10 Polisher 4Q Comp Dev of HCOWS 4Q Comp Tests of NSGS
SHIPBOARD SOLID WASTES	1Q Init Dev Sub Plastic Sys 1Q Report to Congress Surface Ship SW 2Q Comp SW EIS 4Q Comp SW EA	1Q Report to Congress (Addendum) Submarine SW 2Q Init Dev of OWS-50 Polisher 4Q Comp Tests of Prototype SW Equipment	
Hazardous and Other Major Ship Wastes		4Q Comp Investigation of Non-Asbestos Substitutes (NAS)	

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Shipboard Waste Management

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Ozone Depleting Subst	10,000	12,000	14,500
b. Integr Liquid Waste	18,323	19,091	19,458
c. Solid Wastes	4,636	3,837	7,000
d. Hazardous & Other Major Ship Wastes	3,584	5,116	5,346
TOTAL	36,543	40,044	46,304

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Shipboard Waste Management

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:										
Westinghouse, Machinery Technology Division										
Pitts., PA	C/CPFF	8/86	20,000	20,000	14,580	0	0	0	0	14,580
Geo-Centers, Inc.										
Boston, MA	C/CPFF	1/96	20,000	20,000	0	3,000	3,000	3,000	11,000	20,000
York International Corporation										
York, PA	SS/CPFF	12/92	7,300	7,300	2,700	0	0	0	0	2,700
York International Corporation										
York, PA	SS/CPFF	5/97	25,000	19,000	0	2,000	2,500	2,500	12,000	19,000
Northern Research and Engineering Corporation, Inc.										
Woburn, MA	C/CPFF	3/94	2,200	2,200	1,200	0	0	0	0	1,200
John J. McMullen & Associates										
Pitts., PA	C/CPFF	11/95	10,000	10,000	0	800	1,000	1,000	7,200	10,000
Rosenblatt & Son										
NewYork,NY	C/CPFF	10/95	13,000	19,000	0	3,377	4,500	4,500	6,623	19,000
Misc. Contr	Various	N/A	N/A	N/A	12,510	900	1,500	1,000	N/A	N/A
Support & Management:		N/A	N/A	N/A	70	0	0	0	0	70
Test and Evaluation:										
NAVSURFWARCEN CARDEROCK DIV										
Bethes.,MD	WR	N/A	N/A	N/A	31,289	18,500	18,481	22,006	Cont	Cont

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: S0401 PROJECT TITLE: Shipboard Waste Management

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
NRL Wash., DC	WR	N/A	N/A	N/A	8,805	3,730	3,000	3,000	Cont	Cont
SPAWAR CTR SnDiego,CA	WR	N/A	N/A	N/A	2,050	460	1,000	1,000	Cont	Cont
NNSY Norfolk,VA	WR	N/A	N/A	N/A	3,658	0	1,000	1,000	Cont	Cont
Misc Government Labs	WR	N/A	N/A	N/A	14,325	500	1,000	1,000	Cont	Cont
York International Corportion York, PA	C/CPFF	Various	22,000	22,000	12,000	0	0	0	0	12,000
Geo-Centers, Inc. Boston, MA	C/CPFF	1/96	15,000	15,563	4,875	1,776	2,063	1,500	5,349	15,563
Misc. Contr	C/CPFF	Various	Various	Various	4,419	1,500	1,000	4,798	Cont	Cont

GOVERNMENT FURNISHED PROPERTY: Not applicable.

Item Description	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Production Development	30,990	10,077	12,500	12,000	Cont	Cont
Subtotal Support and Management	70	0	0	0	0	70
Subtotal Test and Evaluation	81,421	26,466	27,544	34,304	Cont	Cont
Total Program	112,481	36,543	40,044	46,304	Cont	Cont

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: W2210
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Environmental Compliance

(U) COST (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2210 Environmental Compliance	1,401	2,517	4,439	4,719	4,959	5,271	5,565	CONT	CONT

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project supports development and implementation of technologies which will lead to environmentally safe naval aviation operations and support; compliance with international, federal, state, and local regulations and policies; reduction of increasing compliance costs and personal liability; and enhancement of naval aviation mission effectiveness. Naval aviation pollution prevention efforts were previously supported by Project Y0817, Pollution Abatement Ashore. This project will support that part of project Y0817 that addressed aviation pollution prevention technologies as well as additional operational and shipboard aviation requirements previously unsupported.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($1,200) Continued to develop and test: Alternatives for cadmium, chromium, nonchromate coatings, surface pretreatments, non-hazardous aircraft paint stripping processes; compliant solvents and cleaners; and nonchromated sealants.

- (U) ($121) Evaluated alternative aircraft materials and processes to eliminate or reduce the emission of hazardous materials. Transitioned low Volatile Organic Compound (VOC) aircraft exterior cleaner and a wheel well cleaner through a materials reformulation and specification change. Performance based specification resulted (MIL-PRF-85570) replacing prior military specification.

- (U) ($80) Continued to demonstrate performance of water-borne topcoat. Continued to develop and test hazardous operational chemical and material alternatives. Initiated advanced development, demonstration/validation of low VOC non-chromated adhesive bond primer and HVOF as a hard chrome project alternative.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROGRAM ELEMENT TITLE: Environmental Protection PROJECT NUMBER: W2210 PROJECT TITLE: Environmental Compliance

2. (U) FY 1998 PLAN:

- (U) ($1,664) Continue to develop and test: Alternatives for cadmium, chromium, and plating nonchromate aluminum pretreatments, and sealants; non-hazardous paint stripping processes; alternative non-hazardous solvents and cleaners. Initiate development and test of low/non-volatile organic compound coatings; and non-hazardous corrosion control materials and processes.

- (U) ($345) Continue to evaluate alternative aircraft materials, processes, and systems to eliminate or reduce the emission of hazardous materials.

- (U) ($508) Continue to demonstrate performance of water-borne topcoats. Continue to develop and test hazardous operational chemical and material alternatives.

3. (U) FY 1999 PLAN:

- (U) ($2,522) Continue to develop and test: Alternatives for cadmium, chromium, and cyanide plating nonchromate aluminum pretreatments, and sealants; non-hazardous chemical paint stripping processes; alternative non-hazardous solvents and cleaners; low/non-volatile organic compound coatings; and non-hazardous corrosion control materials and processes.

- (U) ($944) Continue to evaluate alternative aircraft systems to eliminate or reduce the emission of hazardous materials.

- (U) ($973) Continue to demonstrate performance of water-borne topcoats. Develop and test hazardous operational chemical and material alternatives. Develop and demonstrate technologies for control of ordnance and composite material emissions.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: W2210 PROJECT TITLE: Environmental Compliance

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,477	2,594	4,225
(U) Appropriated Value:	1,477	2,594	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
(a) Adjustments	-76	-77	+214
(U) FY 1999 PRESBUDG Submit:	1,401	2,517	4,439

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $76K reflects an SBIR transfer (-$15K) and minor pricing adjustments (-$61K).
FY 1998: Decrease of $77K represents general undistributed reductions.
FY 1999: Increase of $214K reflects minor pricing adjustments.

(U) Schedule Changes: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE 0602233N (Readiness/Training/Environmental Quality)
(U) PE 0603716D (Strategic Environmental R&D Program)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: W2210
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Environmental Compliance

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Pollution Prevention Technology	1,401	2,517	4,439
TOTAL	1,401	2,517	4,439

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:										
Various Field Activities	WR	NA	NA	NA	1,752	1,401	2,517	4,439	CONT	CONT

Support and Management: Not applicable.

Test & Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

ACTIVITY: 4

PROGRAM ELEMENT: 0603721N

PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: W2210

PROJECT TITLE: Environmental Compliance

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	1,752	1,401	2,517	4,439	CONT	CONT
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	1,752	1,401	2,517	4,439	CONT	CONT

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Y0817 Pollution Abatement Ashore	9,938	7,302	8,695	9,384	10,015	10,626	11,237	CONT	CONT

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project develops and validates new technologies needed to address pervasive Navy shoreside environmental requirements imposed on Naval shore activities by the need to comply with environmental laws, regulations, orders, and policies. The goal of the program is to minimize personnel liabilities, operational costs, and regulatory oversight while preserving or enhancing the ability of Naval shore activities to accomplish their required missions and functions. Each project task addresses one or more of the requirements from the Navy Environmental Quality RDT&E Strategic Plan dated October 1994.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($1,803) Ship Repair/Deactivation Operations - Completed validation of a closed cycle Ultra High Pressure Waterjet System for ship paint removal and surface preparation with on-demand garnet abrasive injection and recovery. Conducted evaluation testing of alternative technologies for the cost effective removal and disposal of polychlorinatedbiphenyl (PCB) contaminated materials from deactivated Navy submarines. Began a broader analysis to determine best removal processes and disposal technologies for hazardous materials removed during ship deactivations. Materials include: Lead and chrome in paints, asbestos, and a variety of fluids used in shipboard machinery.

- (U) ($1,150) Ordnance Manufacture/Testing Operations - Completed validation of a 5 pound/second capacity Rocket Motor Exhaust Gas Scrubber prototype. Continued development of the Confined Burn Facility.

- (U) ($1,195) Other Industrial Operations - Completed validation of: a) leak detection system for the 12 million gallon capacity underground fuel storage tanks at the Fleet and Industrial Supply Center (FISC) Red Hill facility; b) leak detection and locating (LDL) systems for underground high capacity fuel distribution pipelines;

c) new low Volatile Organic Compound (VOC) lining systems for use in concrete and steel POL tanks.

- (U) ($1,257) Non-Industrial Processes - Completed validation of: a) alternative affordable capping methods for coastal landfills in high precipitation areas where contaminated leachate production is a problem; b) DOD noise model enhancements for Navy-unique operational scenarios; c) the use of X-Ray Fluorescence for the on-site measurement of metal contaminated sediments; d) a system for the direct in-situ measurement of contaminant transport between marine sediments and the overlying water mass; and e) Aqueous Film Forming Foam (AFFF) control and disposal system for wastes generated by firefighting equipment testing. Began development of: a) a sensor and analysis program for the Site Characterization and Analysis Probe System (SCAPS) that will enable the system to be used to assess the subsurface transport characteristics of a contaminated site; and b) a concept from the Navy Exploratory Development R&D program for a premixing combustion technique that will minimize air emissions from Fire Fighter Training Facilities without sacrificing training realism.

- (U) ($720) Hazardous Waste Minimization/Disposal - Completed: a) shoreside hazardous waste destruction analysis that will identify the characteristics of Navy hazardous waste streams, capabilities of emerging technologies, and the suitability of alternative acquisition plans; b) validation of the process of using physical separation techniques to reduce the volume of contaminated dredge spoil; and c) treatability testing of the Molten Salt Oxidation process. Continued participation in the Environmental Security Technology Certification Program's shoreside Plasma Arc project.

- (U) ($3,813) Environmental Quality Test Bed at Puget Sound Naval Shipyard - Developed and validated technologies required to justify and implement a watershed approach to the complex storm water management issues of a Naval shipyard, including water contaminated with metals. Developed and validated technologies required to reliably and economically treat contaminated bilge water, particularly water contaminated by AFFF, detergents, and sludge.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

ACTIVITY: 4

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: Y0817
PROJECT TITLE: Pollution Abatement Ashore

2. (U) FY 1998 PLAN:

- (U) ($1,880) Ship Repair/Deactivation Operations - Complete validation of: a) alternative technologies for the cost effective removal and disposal of polychlorinatedbiphenyl (PCB) contaminated materials from deactivated Navy submarines; and b) system to recycle derusting chemicals used for ship bilges and tanks. Conduct evaluation testing of alternative hazardous material removal processes and disposal technologies for ship deactivations. Begin Automated Paint Application System with overspray collector.

- (U) ($1,468) Ordnance Manufacture/Testing Operations - Complete validation of a 10 pound capacity Confined Burn Facility prototype. Continue development of the Rocket Motor Exhaust Gas Scrubber. Complete analysis of Navy non-demil ordnance waste treatment technologies.

- (U) ($1,665) Other Industrial Operations - Complete validation of a ceramic crossflow ultrafiltration (CCF) system for contaminated aqueous degreasing agents. Continue development of a low air emission fire simulator for Fire Fighter Training Facilities. Begin: a) analysis of nitrous oxide and noise emission reducing alternative for jet engine test cells, and b) advanced VOC control system for painting operations.

- (U) ($1,293) Non-Industrial Processes - Complete validation of: a) rapid cost effective assessment approach for marine contaminants by measuring sublethal cellular level indicators of contaminant exposure; b) a monitoring system to rapidly detect pierside oil spills; c) the use of constructed coastal wetlands to control nonpoint source pollution control for Naval activities; d) sublethal biochemical toxicity indicators for rapid cost-effective marine bioassays; and e) DoD noise model enhancement for Navy-unique operational scenarios. Begin development of: a) non-polluting method for the cleaning of electrical switchgear while still energized; and b) an integrated approach to the contamination assessment and treatability characterization of coastal and harbor sediments.

- (U) ($996) Hazardous Waste Minimization/Disposal - Complete participation in the Environmental Security Technology Certification Program's shoreside Plasma Arc project. Begin closed loop washrack recycle system for vehicle and aircraft cleaning.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

ACTIVITY: 4

PROGRAM ELEMENT: 0603721N

PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: Y0817

PROJECT TITLE: Pollution Abatement Ashore

3. (U) FY 1999 PLAN:

- (U) ($2,288) Ship Repair/Deactivation Operations - Complete validation of alternative hazardous material removal processes and disposal technologies for ship deactivations that can be provided based on commercial off the shelf (COTS) alternatives. Continue development of removal processes and disposal technologies that cannot be provided based on (COTS) alternatives. Begin Underwater Hull Cleaning and Surface Preparation System.

- (U) ($2,409) Ordnance Manufacture/Testing Operations - Complete validation of a 80 pound/second capacity Rocket Motor Exhaust Gas Scrubber prototype and a 100 pound capacity Confined Burn Facility prototype.

- (U) ($1,682) Other Industrial Operations - Complete development of non-polluting method for the cleaning of energized electrical switchgear. Complete development of a low air emission fire simulator for Fire Fighter Training Facilities. Complete jet engine test cell emission reduction analysis.

- (U) ($1,367) Non-Industrial Processes - Complete validation of: a) a modified QWIKLITE rapid marine bioassay system for marine sediments; and b) the subsurface transport sensor and analysis program for the SCAPS. Continue development of integrated contamination assessment and treatability characterization approaches for marine sediments. Complete pierside oil spill detection system.

- (U) ($949) Hazardous Waste Minimization/Disposal - Complete development of: a) aircraft fuel and oil leak containment systems and airfield. Validation of shoreside general hazardous waste destruction technologies. Complete development of latex paint waste dewatering system.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	6,178	7,526	9,112
(U) Appropriated Value:	6,440	7,526	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
(U) (a) Adjustments	+3,498	-224	-417
(U) FY 1999 PRESBUDG Submit:	9,938	7,302	8,695

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Increase of $3,498K reflects a SBIR transfer (-$33K); general undistributed reductions (-$262K);revised economic adjustments(-$8K); Below Threshold Reprogramming(-$12K); and an increase of $3,813K authorized in the FY 1997 DOD Appropriation Conference Report to establish a test bed at Puget Sound Naval Shipyard in Bremerton, Wash. for treatment and removal of high concentrations associated with complex waste waters.

FY 1998: Decrease of $224K reflects general undistributed reductions.

FY 1999: Decrease of $417K reflects minor pricing adjustments.

(U) Schedule Changes: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: This project transitions shoreside pollution abatement technologies from two Navy Science and Technology programs and the Strategic Environmental Research and Development Program (SERDP). Project funding is leveraged by transitioning technologies to the Environmental Security Technology Certification Program (ESTCP) for final certification and by providing funding for Navy participation in ESTCP projects. Execution of this project is coordinated with related Army and Air Force programs by the Tri-Service Environmental Quality R&D Strategic Plan developed under the leadership of the Joint Engineers Management Panel (JEMP).

(U) PE 0602233N, Readiness, Training, and Environmental Quality Technology Development

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817

PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

(U) PE 0603712N, Environmental Quality, Logistics Advanced Technology Demonstrations
(U) PE 0603716D, Strategic Environmental Research & Development Program (SERDP)
(U) PE 0603851D, Environmental Security Technology Certification Program (ESTCP)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

ACTIVITY: 4

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: Y0817
PROJECT TITLE: Pollution Abatement Ashore

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. System Engineering	938	1,148	1,380
b. Prototype Development/ Acquisition	1,050	1,223	1,471
c. Testing & Evaluation	6,734	3,407	4,051
d. Technical Doc.	1,216	1,524	1,793
TOTAL	9,938	7,302	8,695

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:										
NFESC										
PrtHuen.,CA	WR	11/95	N/A	N/A	23,192	2,331	2,300	2,783	CONT	CONT
NAVAIRWARCENACDIV										
Warmin.,PA	WR	10/94	N/A	N/A	1,870	0	0	0	CONT	CONT
NAVSURFWARCEN DET										
Annap., MD	WR	1/96	N/A	N/A	2,632	660	1,100	1,713	CONT	CONT
NAVSURFWARCENDIV										
Ind Hd, MD	WR	3/96	N/A	N/A	3,366	935	1,569	1,554	CONT	CONT
NCCOSC										
SanDiego,CA	WR	11/95	N/A	N/A	14,805	1,957	1,160	1,769	CONT	CONT
NRL										
Wash., DC	WR	12/95	N/A	N/A	1,590	578	350	339	CONT	CONT
Navshipyd										
Pdgt Snd,WA	WR	08/97	N/A	N/A	0	350	150	0	CONT	CONT
ARDEC										
IEC, NJ	MIPR	08/97	N/A	N/A	0	2,773	0	0	CONT	CONT
Var Activ.					10,122	354	673	537	CONT	CONT

Support & Management: Not applicable.

Test & Evaluation: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

ACTIVITY: 4

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: Y0817
PROJECT TITLE: Pollution Abatement Ashore

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	57,577	9,938	7,302	8,695	CONT	CONT
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	57,577	9,938	7,302	8,695	CONT	CONT

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0829 Energy Conservation (ADV)	2,670	2,137	2,506	2,695	2,665	2,793	2,852	CONT.	CONT.
R0838 Mobility Fuels (ADV)	1,229	1,900	2,086	2,201	2,199	2,236	2,279	CONT.	CONT.
TOTAL	3,899	4,037	4,592	4,896	4,864	5,029	5,131	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports projects to evaluate, adapt, and demonstrate energy related technologies for ship, aircraft, and land-based operations to: (a) increase fuel-related weapons systems capabilities such as range and time on station; (b) conserve energy and reduce energy costs; (c) reduce dependence on petroleum fuels and apply energy technologies that improve environmental compliance; (d) relax unnecessarily restrictive fuel specification requirements to reduce cost and increase availability worldwide; (e) provide guidance to fleet operators for the safe use of commercial grade or off-specification fuels when military specification fuels are unavailable or in short supply; and (f) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems. Through 1995, the Navy Energy R&D Program, of which this program element is a part, had produced energy cost avoidance estimated at $130M per year (compared to 1985 consumption rates). As currently funded, additional savings of $25M per year are projected to be achieved by FY 2000.

(U) This program, and the companion PE 0604710N, Navy Energy Program (ENG), support the achievement of Executive Department, DOD, and Navy Energy Management Goals; and also the Office of the Secretary of Defense, the Secretary of the Navy and the Chief of Naval Operations direction to make up-front investment in technologies that reduce future cost of operation and ownership of the fleet and supporting infrastructure.

(U) Joint Mission Areas/Warfare Areas (JMA/WA): This program directly supports the following JMA's: Littoral Warfare, Sea and Air Superiority, Strategic Mobility, Readiness and Support and Infrastructure.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0829 Energy Conservation	2,670	2,137	2,506	2,695	2,665	2,793	2,852	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project improves the energy efficiency of Navy ships, aircraft, and shore facilities and thereby contributes to reduced operating costs and improved fleet sustainability and performance. Major efforts include work to increase the efficiency of aircraft engines; develop improved hull drag reducing technologies and more efficient energy conversion systems for ships; and develop energy conservation technologies, and renewable/alternative energy resources for Navy shore facilities.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:
   - (U) ($625) Aircraft: Completed altitude tests of advanced Performance Seeking Control (PSC) system on F414 test engine. Began program planning for flight worthy F414 PSC system for in-depth simulator and eventual flight testing (joint with General Electric (GE)). Completed conceptual design of advanced High Pressure Turbine (HPT) to meet F414 growth requirements (joint with GE). Initiated detailed HPT design (joint with GE) and fabrication for demonstration on the GE-23a technology demonstrator engine.

- (U) ($2,045) Ships: Analytically screened bow bulb and stern/propeller hydrodynamic enhancements for a TAO-187 class oiler to demonstrate reduced powering requirements. Model tested stern flap retrofit for early DDG-51's (28 ships). Continued screening tests of advanced anti-fouling (AF) materials/coating systems (expanded testing of ablative copper/cobiocide paints). Supported design optimization of HFC 134a air conditioning plants for new construction. Supported compressor design for new 125 ton HFC-236fa plant in support of R114 replacement program. Evaluated high efficiency, low emission power generation concept.

2. (U) FY 1998 PLAN:
   - (U) ($850) Aircraft: Conduct simulator testing of developmental PSC system to ensure flight worthiness. Participate in conceptual design of advanced fan for F414 engine to ensure efficiency gains. Continue cooperative effort with GE to design and fabricate a prototype advanced HPT to meet F414 growth requirements. Evaluate F404 variant technologies to identify cost effective, fuel efficient, retrofit candidates for the F404-400.
   - (U) ($1,287) Ships: Model test bow bulb and stern/propeller hydrodynamic enhancements for TAO-187 class to demonstrate reduced powering requirements. Complete detailed design and drawings for DDG-51 retrofit stern flap (first 28 ships). Conduct model tests of simple hydrodynamic mods for additional ships. Continue laboratory to bilge-keel panel tests of emerging AF coatings. Optimize tool designs for hull inspection remotely operated vehicle (ROV) for fouling assessment and spot cleaning. Develop unified Navy approach to fuel cell power generation of ship service electrical power (ensured attention is paid to: reformation of F76 diesel fuel, desulfurization and marinization requirements).

3. (U) FY 1999 PLAN:
   - (U) ($944) Aircraft: Continue cooperative demonstrator engine program (with GE and Navy F414 program office) to develop advanced components to meet F414 growth requirements: HPT demonstration, detailed fan design and fabrication, and low pressure turbine conceptual design. Energy program participation provides incentives for these efforts and ensures that efficiency, as well as performance gains are pursued. Flight test PSC advanced engine control system on F/A-18E/F.
   - (U) ($1,562) Ships: Complete detailed design and drawings for hydrodynamic refinements for TAO-187 class. Select ablative copper/cobiocide paint for full hull application. Assist fleet introduction of Hull Inspection/Cleaning ROV. Continue model tests of hydrodynamic refinements to reduce powering requirements of existing/future ships.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation

Support fuel cell technology demonstration for ship service power generation, emphasizing fuel reformation and efficiency issues.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,726	2,202	2,543
(U) Appropriated Value:	-	2,202	-
(U) Adjustments from FY 1998 PRESBUDG:	+944	-65	-37
(U) FY 1999 President's Budget Request:	2,670	2,137	2,506

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 adjustment is due to SBIR assessment (-51), revised economic assumptions (-2) and update to reflect actual execution (+997). FY 1998 adjustment is due to Congressional Undistributed reductions (-60) and economic assumptions (-5). FY 1999 adjustment is due to Navy Working Capital Fund (NWCF) surcharge correction (-8), other NWCF adjustments (+9) and other minor adjustments (-36).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602121N (Surface Ship and Submarine HM&E Technology)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

PROJECT NUMBER: R0829
PROJECT TITLE: Energy Conservation

- (U) PE 0602122N (Aircraft Technology)
- (U) PE 0602234N (Materials, Electronics, and Computer Technology)
- (U) PE 0603217N (Air Systems and Weapons Advanced Technology)
- (U) PE 0603712N (Environmental Quality and Logistics Advanced Technology)
- (U) PE 0603721N (Environmental Protection)
- (U) PE 0604710N (Navy Energy Program (ENG))

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N RAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. System Development and Integration	2,670	2,137	2,506

FY 1999 RDT&E,N RAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT NUMBER: R0829 PROJECT TITLE: Energy Conservation

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NSWC/CD Annapolis					39,639	2,045	1,287	1,562	CONT.	CONT.
NAWC/AD, Patuxent					7,790	625	850	944	CONT.	CONT.

Support and Management: Not applicable.

Test and Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

FY 1999 RDT&E,N RAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	47,429	2,670	2,137	2,506	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	47,429	2,670	2,137	2,506	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0838 Mobility Fuels (ADV)	1,229	1,900	2,086	2,201	2,199	2,236	2,279	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides data through engine and fuel system tests which relate the effects of changes in Navy fuel procurement specification properties to the performance and reliability of Naval ship and aircraft engines and fuel systems. This information is required to: (a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; (b) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military specification fuels are unavailable or in short supply; and (c) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry. Recent problems with fuel quality have adversely affected ship and aircraft system performance and reliability and resulted in degradation of fuel in storage. The resulting readiness impacts, additional maintenance costs, and the cost of lost equipment, although difficult to quantify, are many times the cost of this project. Over the next decade, the potential for fuel quality related problems will increase because of changing industry practices required to comply with new environmental regulations. This project represents the only investment designed to maintain the Navy's ability to operate as a "smart" customer for fuels that costs over $2B per year to procure, transport, store and consume and are essential to fleet operations.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT NUMBER: R0838 PROJECT TITLE: Mobility Fuels (ADV)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:
   - (U) ($649) Ships: Completed fuel sample collection and characterization of commercial distillate marine fuels worldwide to determine quality, availability and cost. Completed evaluation for ignition, flame stability, and thermal performance of broadened specification test fuels in the 60-degree combustion test rig representing the Allison 501-K17/34 ship gas turbine engine (GTE). Completed experiments to determine the impact that moisture and seawater in fuel has on laboratory fuel lubricity measurements. Completed test plan development to determine the impact that red-dyed commercial distillate marine fuel has on gas turbine hot section materials coatings in an atmospheric burner rig.
   - (U) ($580) Aircraft: Initiated evaluation of +100 thermal stability improving additive containing fuels at an air station. Completed full scale testing of non-toxic, environmentally friendly fuel system icing inhibitors (FSII). Developed full scale prototype of fuel copper contamination removal system. Continued development of +100 additive compatible fuel/water separation systems.

2. (U) FY 1998 PLAN:
   - (U) ($863) Ships: Complete test to determine the impact that red-dyed commercial distillate marine fuel has on gas turbine hot section materials coatings. Complete evaluation to determine the effects that severely hydrotreating (i.e. low lubricity) Navy MILSPEC F-76 fuels have on laboratory fuel lubricity measurements. Initiate tests to determine the effects that low lubricity F-76 fuels have on diesel engine fuel injection systems. Initiate fuel injector experiments to quantify high-speed diesel engine (HSDE) response to fuel thermal stability characteristics.
   - (U) ($1,037) Aircraft: Complete evaluation of +100 fuel additives on P-3 and C-130 engine systems. Field test environmentally friendly FSII. Field test fuel copper contamination removal system. Initiate test and evaluation of prototype +100 additives fuel/water separators.

3. (U) FY 1999 PLAN:
   - (U) ($936) Ships: Complete tests to determine the effects that low lubricity F-76 fuels have on diesel engine fuel injection systems, and initiate full-scale HSDE validation. Initiate GTE fuel pump test to validate fuel lubricity

specification recommendations. Complete HSDE fuel injector test and initiate GTE fuel nozzle fouling thermal stability experiments. Continue tests to evaluate the impact of fleet use of red-dyed diesel fuels.

- (U) ($1,150) Aircraft: Complete evaluation of effects of +100 fuel additives on SH-60 helicopter and AV-8B aircraft engine systems. Complete development of fuel copper contamination removal system. Complete test and evaluation and select +100 additive fuel/water separator for field evaluation.

B. (U) PROGRAM CHANGE SUMMARY

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,229	1,957	2,086
(U) Appropriated Value:	-	1,957	-
(U) Adjustments from FY 1998 PRESBUDG:	0	-57	0
(U) FY 1999 President's Budget Request:	1,229	1,900	2,086

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1998 adjustment is due to Congressional Undistributed reductions (-53) and revised economic assumptions (-4).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE 0601152N (In-House Lab Independent Research)
(U) PE 0602234N (Materials, Electronics, and Computer Technology)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

PROJECT NUMBER: R0838
PROJECT TITLE: Mobility Fuels (ADV)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT NUMBER: R0838 PROJECT TITLE: Mobility Fuels (ADV)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Reliability, Maintainability, and Availability	1,224	1,900	2,086

(U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
NSWC/CD Annapolis					39,117	649	863	936	CONT.	CONT.
NAWC/AD Trenton					47,484	580	1,037	1,150	CONT.	CONT.

Support and Management: Not applicable.

Test and Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)
PROJECT NUMBER: R0838
PROJECT TITLE: Mobility Fuels (ADV)

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	86,601	1,229	1,900	2,086	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	86,601	1,229	1,900	2,086	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

PROJECT NUMBER: R0838
PROJECT TITLE: Mobility Fuels (ADV)

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BUDGET ACTIVITY: 4

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
PROGRAM ELEMENT: 0603725
PROGRAM ELEMENT TITLE: FACILITIES IMPROVEMENT

DATE: February 1998

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUALS	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Y0995 Naval Facilities Systems	2,124	1,669	1,861	1,988	1,935	1,761	1,792	CONT.	CONT.
Y2404 Engineering Lumber	0	4,852	0	0	0	0	0	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides the Navy with new civil engineering capabilities that are required to overcome specific performance limitations of Naval shore facilities while reducing the cost of sustaining the Naval shore infrastructure. The program focuses available resources on satisfying facility requirements where the Navy is a major stakeholder, there are no test validated Commercial of the Shelf (COTS) solutions available, and a timely solution will not emerge without a Navy sponsored demonstration and validation. The program completes the development and validation of facilities technologies originating in Navy Science and Technology programs plus a variety of other sources including the National Science Foundation (NSF) and the National Institute of Science and Technology (NIST). Validated technologies are implemented in the Navy's Military Construction (MILCON) and Real Property Maintenance (RPM) Programs. A new project Y2404, Engineering Lumber, is a Congressional increase providing funds to demonstrate and validate engineered lumber products and methods being developed by Office of Naval Research's (ONR) Materials Program using funds from a FY98 Congressional increase. Expected benefits from increased use of engineered lumber will include lower life cycle costs for Navy waterfront structures. This program is addressing three Navy facility requirements during the years FY 1997 through FY 1999:

- (U) THE HIGH PERFORMANCE (HP) MAGAZINE. Based on current magazine technologies, substantial land areas within Naval activities cannot be used for inhabited buildings in order to satisfy Explosives Safety Quantify Distance (ESQD) arcs. The converse is also true, the Navy is not able to construct new magazines where they are needed because of the presence of inhabited buildings. This effort enables a quantification of the specific hazard scenarios capable of causing ordnance detonation, an improved capability to model an ordnance explosion in a magazine, and the innovative use of energy absorbing construction materials to provide the Navy with a new magazine concept in which the ESQD arcs are based on a Maximum Credible Event (MCE) that is not the detonation of the entire magazine but rather the detonation of the contents of one, much smaller, storage cell within the magazine. For a typical magazines with Net Explosive Weight (NEW) capacities of 250,000 pounds, the allowable ordnance storage density is increased from 370 pounds/acre to 2,222 pounds/acre. In addition, the number of incompatible classes of ordnance that can be stored in the same magazine is increased from none to eight. This will lead to lower operational costs for the Receipt, Segregation, Storage, and Issue (RSSI) of ordnance and, for some activities, a reduction in the number of magazines required to accomplish their mission.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603725

PROGRAM ELEMENT TITLE: FACILITIES IMPROVEMENT

- (U) WATERFRONT FACILITIES REPAIR AND UPGRADE. Over 75% of the Navy's waterfront facilities are over 45 years old. They were designed for a service life of no more than 25 years and to satisfy the mission requirements existing at that time of construction. The reinforced concrete used to construct nearly all of them requires costly and repetitive repairs. In addition, they are unable to satisfy new mission requirements, such as the increase in pier deck capacity required to accomplish more extensive pier-side ship maintenance and repair tasks using truck-mounted cranes that have concentrated outrigger loads of up to 120 tons on a pier originally designed for no concentrated deck loading. This effort integrates new advanced structural diagnostic and modeling capabilities with the innovative application of high performance materials and corrosion arrestment techniques to provide new methods to extend the service life of existing waterfront facilities by an additional 15 to 30 years, and to cost-effectively upgrade them to satisfy new mission requirements. Specific benefits include increasing the durability of spalled marine concrete repairs from 3 to 15 years, new longer-lasting low-maintenance fendering systems that eliminate the need for the frequent replacement of timber piles, and providing new pier upgrade alternatives costing about $5M for a typical pier instead of the now required demolish then replace approach costing about $30M.

- (U) FACILITY TECHNOLOGIES TO REDUCE THE REAL PROPERTY MAINTENANCE (RPM) BACKLOG. The Real Property Maintenance(RPM) costs to correct critical facility deficiencies is over $2.0B as reported in the FY 1995 Annual Inspection Summary (AIS). Current Navy RPM funding levels are insufficient to prevent the continued growth of the critical backlog of maintenance and repairs. This effort will validate and accelerate the wide-spread implementation of a broad range of advanced facility technologies needed to overcome design and construction practices that are conservative and remain costly because of the high risk the private sector associates with the utilization of new facility technologies. The effort will accelerate the validation, commercialization, and wide-spread implementation of the facility technologies urgently required to reduce the cost of deficiencies in the Navy's RPM backlog by reducing initial construction costs up to 20% and facility component service lives that are up to 25 years longer.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it completes development of technologies and verifies their application to specific ship, aircraft, or facility requirements.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

   - (U) ($956) Completed construction and quality assurance of the HP Magazine prototype. Conducted operational and certification tests. Compiled and analyze test data, and completed technical documentation required to obtain DOD Explosive Safety Board approval. Applied for DOD Explosive Safety Board approval.

   - (U) ($1,168) Began demonstration and validation of advanced technologies to reduce the life-cycle costs of Navy waterfront facilities. First efforts include: a) validating a new ship berthing force analysis procedure; b) working

cooperatively with manufacturers to develop hybrid fender piles using recycled plastics that can serve as the principle impact resisting component in fendering systems for Naval combatant berthing; and c) validating the use of a falling weight deflectometer to rapidly assess pier deck capacity.

2. (U) FY 1998 PLAN:

- (U) ($1,577) Complete design, component testing, and fabrication of prototypes for advanced fender pile and camel concepts using recycled plastic piles. Award contract for the installation of the prototypes for validation testing. Continue validation of the use of falling weight deflectometer system for load safety certification of piers and wharves.

- (U) ($92) Conduct an analysis of the planned FY 1999 RPM projects to determine best candidates for the FY 1999 validation testing of advanced facility technologies to reduce the RPM backlog. Coordinate with Navy RPM project managers and the Civil Engineering Research Foundation (CERF) to determine the specific objectives and schedule for the FY 1999 validation tests. Technologies to be tested include high strength lightweight concretes for severe and corrosive environments, and early-flaw detection methods and systems used in conjunction with longer-lasting roofing materials and designs.

3. (U) FY 1999 PLAN:

- (U) ($1,000) Complete installation of prototype advanced fender pile and camel concepts, and begin validation testing. Complete validation testing of the falling weight deflectometer for load safety certification. Begin constructability improvement and validation of methods for the structural upgrade of piers and wharves using composite materials.

- (U) ($861) Initiate RPM advanced facility technology validation tests planned in FY 1998. Tests will focus on high performance concrete for structures, high performance roofing systems, and composite materials that can substitute for traditional materials in facility components subject to high maintenance and replacement costs. Analyze FY 2000 technology validation projects proposed by Navy and CERF expert panels to determine highest payoffs to reduction of Navy RPM. Coordinate with Navy RPM project managers and CERF to determine the specific objectives and schedule for the FY 2000 tests. Candidate technologies for validation testing starting in FY 2000 include high performance concrete pavement materials and techniques for improved surface preparation and highly durable coatings for use in severely corrosive environments.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603725

PROGRAM ELEMENT TITLE: FACILITIES IMPROVEMENT

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,149	1,720	2,020
a. SBIR Transfer	-22	-0-	-0-
b. General reductions	-0-	-47	-0-
c. Economic Assumptions	-3	-4	-0-
d. NWCF NFESC	-0-	-0-	-111
e. NWCF Surcharge	-0-	-0-	-19
f. Commercial Purchases Infla Adj	-0-	-0-	-34
g. Mil and Civ Pay Rates Adj.	-0-	-0-	+5
(U) FY 1999 PRESBUDG Budget Submit:	2,124	1,669	1,861

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: FY 1997 funding is decreased for a SBIR transfer (-$22K) and reduced inflation (-$3K); FY 1998 decreased by economic assumptions (-$4K); and general reductions (-$47K); FY 1999 decreased for a NWCF NFESC reduction (-$111K); NWCF surcharge correction (-$19K); commercial purchases inflation adjustment (-$34K); and mil and civ pay rate adjustment (+$5K).

(U) Schedule: Not applicable
(U) Technical: Not applicable

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) Not applicable.

(U) RELATED RDT&E: A DOD Laboratory Infrastructure Capability Study conducted in FY 1994 by the Director of Defense Research and Engineering (DDR&E) identified civil engineering as a Technology area where DOD could not depend on the private sector for satisfaction of its research requirements. However, this program does utilize the capabilities of the private sector to the maximum extent possible. The execution of this program is consistent with the findings and recommendations of two National Academy of Sciences Reports: "The Role of Federal Agencies in Fostering New technology and Innovation in Building" and "Federal Policies to Foster Innovation and Improvement in Constructed Facilities." To ensure that this program focuses on Navy requirements not already being addressed by other programs and uses the results of other programs when it will contribute to the satisfaction of a Navy requirement, the planning and execution of this project

is coordinated with other RDT&E programs in a variety of ways: a) with related Army and Air Force programs by contacts made under the leadership of the Tri-Service Joint Engineers; b) with other Federal agencies through the Federal Facilities Council of the National Academy of Sciences; c) with the private sector through the Civil Engineering Research Foundation (CERF), and a Cooperative Research and Development Agreement (CRADA) with the Composites Institute of the Society of Plastics Industry. This project includes transitions of facility technologies from four Navy Science and Technology programs:

(U) PE 0602233N, Readiness, Training, and Environmental Quality Technology Development
(U) PE 0602234N, Materials, Electronics and Computer Technology Development
(U) PE 0603792N, Advanced Technology Transition
(U) PE 0603712N, Environmental Quality and Logistics Advanced Technology Demonstrations

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603725N PROGRAM ELEMENT TITLE: Facilities Improvement PROJECT NUMBER: Y0995 PROJECT TITLE: Navy Facilities Systems

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Systems Engineering	494	378	430
b. Prototype Development	495	379	430
c. Prototype Fabrication	0	0	0
d. Test and Evaluation	1,050	826	931
e. Technical Documentation	85	86	70
Total	2,124	1,669	1,861

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS
NFESC, Port Hueneme, CA

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development					63,681					
NFESC	WR		N/A	N/A		1,193	474	1,466	CONT.	CONT.
Const. Contractor	FP	N/A	N/A	N/A		931	1,195	395		
Support and Management										
Test and Evaluation										

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement
PROJECT NUMBER: Y0995
PROJECT TITLE: Navy Facilities Systems

GOVERNMENT FURNISHED PROPERTY: Not applicable

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	63,681	2,124	1,669	1,861	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	63,681	2,124	1,669	1,861		

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT:0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement

PROJECT NUMBER: Y2404
PROJECT TITLE: ENGINEERED LUMBER DEVELOPMENT

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUALS	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Y2404 Engineering Lumber Development	0	4,852	0	0	0	0	0		

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATIN: A new project Y2404, Engineering Lumber Development, is a Congressional increase providing funds to demonstrate and validate engineered lumber products and methods being developed by the Office of Naval Research's (ONR) Materials Program using funds from a FY98 Congressional increase. Expected benefits from increased use of engineered lumber will include lower life cycle costs for Navy waterfront structures.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1998 PLAN:

- (U) (4,852) Transition technologies developed under the FY98 Congressional earmarked to the Office of Naval Research Materials Program funding via PE 0602234N. The overall goal of the effort is develop a strong, durable, cost-effective construction material using lower quality wood and waste plastic. Specific efforts include: a) improving the bonding between the wood and plastic using a new bonding agent; b) strengthening the hybrid material by adding carbon fibers; c) demonstrating application of the new material to Navy waterfront infrastructure requirements; and d) developing a means of using manufacturing of this new material as a means of recycling contaminated wood from navy waterfront structures and other sources.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT:0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement

PROJECT NUMBER: Y2404
PROJECT TITLE: ENGINEERED LUMBER DEVELOPMENT

3. (U) FY 1999 PLAN: Not applicable.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Adjustments to FY 1998 PRESBUDG:	0	5,000	0
(U) (a) General Reductions		-137	
(U) (b) Economic Assumptions		-11	
(U) FY 1999 PRESBUDG Budget Submit:	0	4,852	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1998 decreases reflect general reductions (-$137K) and economic assumptions (-$11K).

(U) Schedule Changes: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE 0602234N, Materials, Electronics & Computer Technology

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT:0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement
PROJECT NUMBER: Y2404
PROJECT TITLE: ENGINEERED LUMBER DEVELOPMENT

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Systems Engineering			
b. Prototype Development	0	3,540	0
c. Prototype Fabrication	0	0	0
d. Test and Evaluation	0	1,212	0
e. Technical Documentation	0	100	0
Total	0	4,852	0

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1997 & Prior	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development					0				
NFESC, PTHue, CA	WX	N/A	N/A		0	4,852			

Support and Management

Test and Evaluation

GOVERNMENT FURNISHED PROPERTY: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT:0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement

PROJECT NUMBER: Y2404
PROJECT TITLE: ENGINEERED LUMBER DEVELOPMENT

	Total FY 1997 & Prior	FY 1998 Budget	FY 1999 Budget	TO Complete	Total Program
Subtotal Product Development	0	4,852	0		
Subtotal Support and Management	0	0	0		
Subtotal Test and Evaluation	0	0	0		
Total Project	0	4,852	0		

FY 1999 RDT&E BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE / PROGRAM	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL
U2039 COOP ENGAGEMENT CAPABILITY (CEC)	224,281	0	0	0	0	0	0	CONT.	CONT.
U2133 QUICK REACTION COMBAT CAPABILITY (QRCC)	7,641	3,412	4,550	4,533	4,642	4,730	4,834	CONT.	CONT.
U2136 LINK IRON	28,150	0	0	0	0	0	0	CONT.	CONT.
U2184 FORCE ANTI-AIR WARFARE COORDINATION TECHNOLOGY (FACT)	7,272	6,185	7,787	7,754	7,928	8,060	8,215	CONT.	CONT.
TOTAL	267,344	9,597	12,337	12,287	12,570	12,790	13,049	CONT.	CONT.

Project U2039 transferred to Program Element 0603658N beginning in FY 1998 reflected in this budget as a reference.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program incorporates efforts dedicated to the enhancement of ship self defense against Anti-Air Warfare (AAW) threats. Its primary focus is on the development of technologies, systems, and procedures necessary to defeat the evolving Anti-Ship Cruise Missile (ASCM) threat. These projects focus on ship defense improvements through the development of advanced concepts and capabilities which will enhance both defense in depth of ships in a force and self defense of individual ships in a littoral war-fighting environment. Cooperative Engagement Capability (CEC), Project U2039, develops concepts for coordinating all Battle Force sensors into a single, real-time, composite track picture having fire control quality. Project U2039 transfers to Program Element 0603658N beginning in FY 1998. Quick Reaction Combat Capability (QRCC), Project U2133, provides advanced concepts and technology developments for the multi-sensor integration of ship detection equipment, integration and coordination of ship self defense weapons, and coordination of hardkill and softkill assets to improve individual ship self defense capabilities against the ASCM threat. Force Anti-Air Warfare Coordination Technology (FACT), Project U2184, demonstrates Force Anti-Air Warfare (AAW) concepts and capabilities which will enhance the AAW war-fighting ability of ships and aircraft and enable the coupling

of the Force into a single, distributed AAW weapon system through more effective use of tactical data, and force sensors and weapons. A description of Project U2136, LINK IRON, is not included due to a higher level of classification.
(U) JUSTIFICATION FOR BUDGET ACTIVITY: These projects are funded under Demonstration and Validation because they develop and integrate hardware and software for experimental demonstrations and tests related to specific ship or aircraft applications.
(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U2133 Quick Reaction Combat Capability (QRCC)	7,641	3,412	4,550	4,533	4,642	4,730	4,834	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The QRCC project implements an evolutionary acquisition of improved ship self defense capabilities against anti-ship cruise missiles for selected ships by integrating existing and programmed anti-air warfare stand-alone systems. It provides an automated quick reaction and multi-target engagement capability emphasizing performance in the littoral environment. Integration focuses on coordinating existing sensor information, providing threat identification and evaluation, assessing defensive readiness, and recommending an optimized defensive tactical response to counter single and multiple anti-ship cruise missile attacks. Subsequent modifications and upgrades will optimize the Ship Self Defense System (SSDS) and provide enhanced self defense capabilities while allowing for insertion of advanced technologies during Engineering and Manufacturing Development and Production and Deployment Phases. System design emphasizes use of nondevelopmental items, commercial standards, Next Generation Computer Resources, computer program re-use, and open architecture. QRCC replaces manual control of several different ship self defense systems with a single integrated capability under the computer aided control of ship operators. Improvements to current system performance for short range anti-air ship self defense will implement the SSDS, incorporate multi-sensor integration of existing sensors, improve ship defense local command and control functions by automation of the detect through engagement sequence under the control of flexible embedded doctrine, integrate and coordinate weapon systems, and provide hardkill/softkill integration. The current focus of this project is the development of the SSDS which leverages recent critical experiments, the Rapid Anti-Ship Missile Integrated Defense System (RAIDS) program efforts, and the SSDS demonstration on USS WHIDBEY ISLAND (LSD 41) in June 1993. System architecture centers on a distributed processing concept which uses a fiber optic local area network (LAN), LAN access units, advanced Display System workstations, and software to integrate existing sensors and weapons. The initial effort will focus on the LSD 41 class of ships to integrate existing LSD 41 class sensors, the Rolling Airframe Missile (RAM), Phalanx Close-in Weapon System (CIWS), and Electronic Countermeasures System (AN/SLQ-32). Other ship systems such as ship support, navigation, and Identification Friend or Foe will also be integrated into the system via the LAN. The distributed architecture allows the incremental evolution and implementation of follow-on modification to the SSDS which will integrate other ship self

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Quick Reaction Combat Capability

defense elements, such as the NATO Seasparrow missile system, AN/SPQ-9 radar, and other sensors, as well as the RAM, CIWS, CIFF-SD, and AN/SLQ-32 installations on other ship classes. Ships with Advanced Combat Direction System (ACDS) will also have those systems integrated with SSDS to optimize the use of offboard track data in ship self defense and to transmit SSDS track data to other ships.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:
   - (U) ($213) Continued ISD adaptation/risk reduction studies for LHA and CVN class ships.
   - (U) ($3,098) Continued analysis and requirements efforts to update impact of Littoral Warfare environment and continued ASCM evolution on Ship Self Defense elements, including associated upgrades to the operation of the SDTS. Commence efforts to focus on Next Generation Ship Systems analysis. Initiated three phase Integrated Ship Defense Modeling and Simulation Distributed Architecture Pilot Program.
   - (U) ($720) Forward financing of FY 1998 SDTS requirements due to low execution rates in FY 1996.
   - (U) ($1,000) Continued Combat Identification Friend or Foe-Ship Defense (CIFF-SD) efforts per Congressional direction.
   - (U) ($2,610) Conducted multi-sensor diffusion efforts in conjunction with CEC.

2. (U) FY 1998 PLAN:
   - (U) ($1,861) Continue Integrated Ship Defense Modeling and Simulation Pilot. Complete phase I.
   - (U) ($1,551) Continue analysis and requirements efforts to update impact of Littoral Warfare environment, threat jamming and continued ASCM evolution on Ship Self Defense elements, including associated upgrades to the operation of the SDTS.

3. (U) FY 1999 PLAN:
   - (U) ($2,289) Continue Integrated Ship Defense Modeling and Simulation Pilot. Complete phase II.
   - (U) ($2,261) Continue analysis and requirements efforts to update impact of Littoral Warfare environment, threat jamming and continued ASCM evolution on Ship Self Defense elements, including associated upgrades to the operation of the SDTS.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Quick Reaction Combat Capability

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 Presidents Budget:	7,687	3,587	4,659
(U) Appropriated Value	6,077	3,587	
(U) Adjustments to FY 1997/98 Appropriated Value / FY 1998 Presidents Budget.	+1,564	-175	-109
(U) FY 1999 President's Budget:	7,641	3,412	4,550

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Changes in FY 1997 are due to increase for Near Term Mine Warfare Plan (+2,000) and decrease for minor pricing adjustments and undistributed reductions (-436). Decrease in FY 1998 is due to Congressional undistributed reductions (-175). Decrease in FY 1999 is due to minor pricing adjustments (-109).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Quick Reaction Combat Capability

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line 523900 (SSDS)	18,013	17,468	22,944	57,876	60,479	64,205	63,464	CONT.	CONT.
(U) O&MN 14D90 WPN Maint. QRCC	4,161	5,278	7,003	6,430	6,296	6,414	6,487	CONT.	CONT.

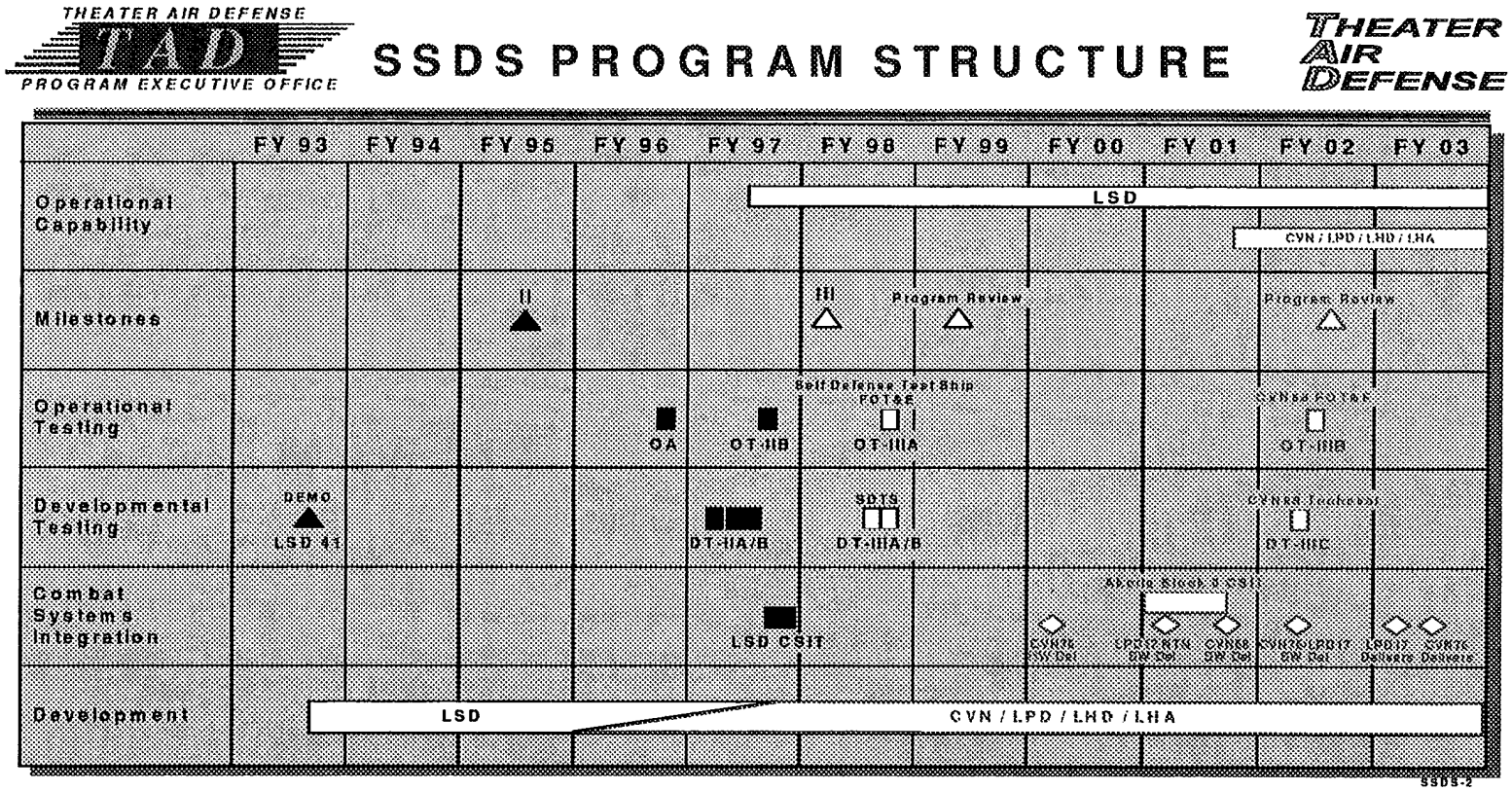
(U) RELATED RDT&E:

(U) PE 0604755N (SHIP SELF DEFENSE) See attached.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Quick Reaction Combat Capability

D. (U) SCHEDULE PROFILE:



R-1 line Item 69

Budget Item Justification
(Exhibit R-2, Page 6 of 15)

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE:February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
PROJECT TITLE: Quick Reaction Combat Capability

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Systems Engineering	3,810	1,569	2,051
b. Test and Evaluation	1,300	0	0
c. Government Engineering Support	1,477	1,368	2,074
d. Program Management Support	954	237	225
e. Documentation	100	200	200
f. Travel	0	38	0
Total	7,641	3,412	4,550

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Quick Reaction Combat Capability

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)
PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ FundType Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Product Development										
Hughes Tucson, AZ	SS/FP	05/94	17,575	17,575	17,575	0	0	0	0	17,575
NAVSURFWARCENDIV Port Hueneme, CA	WR	Various	6,065	6,065	6,015	0	25	25	0	6,065
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	21,230	21,230	17,315	1,257	1,079	1,579	0	21,230
JHU/APL Laurel, MD	SS/FP	various	CONT.	CONT.	1,946	1,017	670	1,120	CONT.	CONT.
NRL Washington, MD	WR	various	CONT.	CONT.	CONT.	458	361	461	CONT.	CONT.
NWAD Corona, CA	WR	various	CONT.	CONT.	CONT.	0	160	160	CONT.	CONT.
NAWC China Lake, CA	WR	various	CONT.	CONT.	CONT.	0	230	230	CONT.	CONT.
MISC.	Various	various	CONT.	CONT.	CONT.	964	650	750	CONT.	CONT.
Support and Management										
Techmatics, Inc. Arlington, VA	SS/FP	01/93	CONT.	CONT.	3,150	335	137	125	CONT.	CONT.
JHU/APL Laurel, MD	SS/FP	10/93	CONT.	CONT.	11,865	0	0	0	CONT.	CONT.
NAVELEXACT St. Inigoes, MD	WR	Various	CONT.	CONT.	3,800	3,610	0	0	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	7,106	0	100	100	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
PROJECT TITLE: Quick Reaction Combat Capability

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

Test and Evaluation										
NAVSURFWARCENDIV Port Hueneme, CA	WR	Various	CONT.	CONT.	12,200	0	0	0	CONT.	CONT.
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	3,000	0	0	0	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	2,228	0	0	0	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
PROJECT TITLE: Quick Reaction Combat Capability

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	42,851	3,696	3,175	4,325	CONT.	CONT.
Subtotal Support and Management	25,921	3,945	237	225	CONT.	CONT.
Subtotal Test and Evaluation	17,428	0	0	0	CONT.	CONT.
Total Project	86,200	7,641	3,412	4,550	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U2184 Force Anti-Air Warfare Coordination Technology (FACT)	7,272	6,185	7,787	7,754		7,928	8,060	8,215	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Force Anti-Air Warfare Coordination Technology (FACT) Program is an advanced development effort designed to demonstrate Force Anti-Air Warfare (AAW) concepts and capabilities which will significantly improve our Force defense in depth, including both local area and self defense capabilities against current and future AAW threats. FACT improvements are designed to enhance the AAW warfighting ability of ships and aircraft and to enable coupling of the Force into a single, distributed AAW weapon system and towards more effective use of tactical data and the cooperative use of all the force sensors and weapons. These capabilities will provide the ship defense flexibility needed to meet the threat brought about by increasing numbers of highly sophisticated weapons held by potentially hostile third world countries. FACT defines requirements and develops prototype systems or modifications to existing systems to test new concepts for the coordination of Force AAW operations. Some examples of prototype systems now in production are AN/SPS-48C Detection Data Convertor, AN/SPS-48E Environmental Control Feature, Shipboard Gridlock System Automatic Correlation (SGS/AC) and Dial-a-Track Link-11 Quality Selection. Other FACT developments nearing production stages are the Automatic Identification System (Auto-ID) and the Multifrequency Link-11 capability; Dual Net Multifrequency Line (DNMFL); Force Threat Evaluation Weapons Assignment (FTEWA); and Precision Electronic Surveillance Measures (ESM) Tracking to Non-Cooperative Detect, Track and ID Targets. Short and long term objectives will be phased in to produce higher degrees of ship defense and battle coordination and effectiveness.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT NUMBER: U2184 PROJECT TITLE: Force Anti-Air Warfare Coordination Technology (FACT)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:
   - (U) ($3,394) Continued advanced development of FTEWA and planned integration with Joint Maritime Command Information System (JMCIS) and Contingency Theater Planning System (CTAPS).
   - (U) ($1,600) Developed capability to integrate DNMFL and Joint Tactical Information Distribution System (JTIDS) into Cooperative Engagement Capability (CEC) to produce unified, coherent Battle Group picture.
   - (U) ($1,000) Continued Remote Data Engagement (RDE) development and integration with FTEWA and CEC.
   - (U) ($500) Supported Remote Magazine Launch (RML) and Forward Pass.
   - (U) ($483) Supported Link interoperability between Joint and Allied Forces, including multiple, simultaneous links with emphasis on track ID, command and control in support of FTEWA.
   - (U) ($295) Continued experiments to determine feasibility of integrating non-organic data to ID organic Battle Group air tracks in real time.

2. (U) FY 1998 PLAN:
   - (U) ($2,700) Continue advance development of FTEWA for Theater Ballistic Missile Defense (TBMD).
   - (U) ($1,485) Continue development of capability to integrate DNMFL and JTIDS into CEC to produce a unified, coherent Battle Group picture.
   - (U) ($1,050) Continue RDE development and integration with FTEWA and CEC.
   - (U) ($450) Support RML and Forward Pass.
   - (U) ($500) Support Link-11, Link-16 and CEC interoperability between Joint and Allied Forces, including multiple, simultaneous links.

3. (U) FY 1999 PLAN:
   - (U) ($3,800) Continue advanced development of FTEWA for Theater Ballistic Missile Defense (TBMD).

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2184
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Force Anti-Air Warfare Coordination Technology (FACT)

- (U) ($1,717) Continue development of capability to integrate DNMFL and JTIDS into CEC to produce unified, coherent Battle Group picture.
- (U) ($1,300) Continue RDE development and integration with FTEWA and CEC.
- (U) ($470) Support RML and Forward Pass.
- (U) ($500) Support Link-11, Link-16 and CEC interoperability between Joint and Allied Forces, including multiple, simultaneous links.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	7,478	6,374	7,842
(U) Appropriated Value:	7,795	6,374	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	-523	-189	-55
(U) FY 1999 PRESBUDG Submit:	7,272	6,185	7,787

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: Decrease in FY1997 is due to Congressional Undistributed Reductions (-317) and minor pricing adjustments (-206). The decrease in FY 1998 is due to Congressional Undistributed Reductions (-189). The decrease in FY 1999 is due to minor pricing adjustments (-55).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2184
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Force Anti-Air Warfare Coordination Technology (FACT)

(U) RELATED RDT&E:
- (U) PE 0205604N (Tactical Data Links)
- (U) PE 0604307N (AEGIS Combat System Engineering)
- (U) PE 0604366N (Standard Missile Improvements)
- (U) PE 0604518N (Combat Information Center Conversion)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE:Ship Self Defense
PROJECT NUMBER: U2184
PROJECT TITLE: Force Anti-Air Warfare Coordination Technology (FACT)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Equipment Development and Test	7,272	6,185	7,787
Total	7,272	6,185	7,787

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION : Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R/X0120 Advanced Environmental Acoustic Support (AEAS)	4,429	3,500	0	0	0	0	0	0	28,014
R/X2017 Advanced Underwater Acoustic Modeling Project (AUAMP)	1,262	1,464	0	0	0	0	0	0	6,670
V/X0823 Sensor Performance Prediction (SPP)	7,196	6,368	0	0	0	0	0	0	82,670
TOTAL	12,887	11,332	0	0	0	0	0	0	117,354

Note: Beginning in FY99 Projects R0120, R2017 and V0823 are transferred to SPAWAR and merged with existing Projects in PE 0603207N Air/Ocean Tactical Applications. These projects are ongoing and outyear data appears in PE 0603207N.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Combat Systems Oceanographic Performance Assessment (CSOPA) Program Element provides oceanographic/atmospheric research and development for expanded knowledge and improved understanding of the environment and its impact on combat systems performance. Its purpose is to assess, predict and enhance the performance of current and proposed undersea surveillance, tactical and mine warfare and weapons systems. This effort is accomplished through at-sea experimentation, numerical model and data base development, development and evaluation of stand-alone and Command, Control, Communications, Computers, and Intelligence (C^4I)-system-embedded prediction/tactical decision aid products, fleet technical support, and system and area technical assessments. Emphasis is placed on shallow water and other harsh environments, and regional conflict and crisis response scenarios. The Advanced Environmental Acoustic Support (AEAS) Project conducts complex oceanographic and acoustic measurements, develops computer prediction products, models and simulations, data bases, and conducts analyses in support of undersea warfare and mine warfare systems. The Advanced Underwater Acoustic Modeling Project (AUAMP) is focused on the development of a family of acoustic system performance prediction products beginning with active system models and data bases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products. The Sensor Performance Prediction Project develops computer-based, on-board capabilities to provide system performance predictions, operating mode selection guidance and tactical decision aids for tactical platforms based on AEAS and AUAMP-developed models and historical data bases using *in situ* measurements and synoptic data. These guidance products are essential to maximize the effective employment of combat

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

systems and weapons in highly complex regional conflict littoral warfare areas. The CSOPA Program products are being tailored for, and assimilated into, the onboard Combat Systems and the Joint Maritime Command Information System to operationally provide accurate system performance predictions and into fleet trainers to provide realistic ocean environments in support of warfare simulations. Direct support to existing fleet systems is provided in the Combatant Data Collection thrust which focuses on *in situ* measurements through operational weapon systems and provides direct, real-time feedback to optimize system performance in tactical situations. The CSOPA Program supports the Joint Mission Areas of Joint Littoral Warfare and Joint Surveillance.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware and software for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT NUMBER: R/X0120 PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R/X0120 Advanced Environmental Acoustic Support (AEAS)	4,429	3,500	0	0	0	0	0	0	28,014

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Department of Defense has turned its focus from the global threat of the Soviet Union to the future regional conflict scenarios outlined in the Defense Planning Guidance (DPG). Most of the DPG scenarios require operating naval forces in the earth's littoral waters which are shallow, have highly variable (in space and time) oceanographic conditions and confined maneuvering space. Of key concern to the U.S. Navy is the dual threat posed by very quiet diesel submarines capable of opposing U.S. naval forces and sea mines which will dramatically restrict force mobility and hamper or curtail amphibious operations. To counter these threats, there is an urgent and continuing need for the Navy to fully understand the ocean areas in which they will operate in the future. This project provides the necessary research and development to: a) rapidly and automatically acquire a broad array of meteorological and oceanographic (METOC) data in littoral areas using organic sensors on fleet platforms and use these data to optimize system performance; b) accurately predict the performance of warfighting systems under development or employed in those areas; c) develop new capabilities in environmental acoustic models and data bases to support assessments of regional conflict ocean areas; d) develop a synthetic environment module which will drive future simulations, and e) provide real-time and remote METOC data collection modeling and analysis capabilities.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($1,065) Continued integration of ocean and atmosphere representation, including effects on platforms, weapons and sensor systems into DOD simulation systems for mission rehearsal, training

and analysis. Evaluated Navy systems performance in surrogate environment and extrapolate to foreign sites of interest.

- (U) ($2,500) Completed verification and validation of rapid real-time data acquisition capabilities in two littoral environments. Continued development of DAMPS, used to permit real-time characterization of the battlespace environment. Began development of airborne-remote METOC data acquisition, data base and modeling capabilities in direct support of crisis response, regional conflicts and peace-time scenarios.

- (U) ($864) Conducted technical feasibility evaluations in data assimilation techniques for real-time and shore-based processing/applications. Conducted technical assessment on the existing data assimilation techniques. Conducted technical feasibility evaluations in data inversion techniques applied to the ocean environment for Navy applications and the identification of the realistic operational applications. Conducted technical assessment on the existing data inversion techniques.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT NUMBER: R/X0120 PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

2. (U) FY 1998 PLAN:

- (U) ($1,600) Continue integration of ocean and atmosphere environmental effects on battlespace platforms, weapons and sensor systems, including simulation for mission rehearsal, training and analysis. Continue assessment of Navy system performance in surrogate environment. Develop data inversion measurement and test plans and identify fleet assets required for test conduct.

- (U) ($1,900) Perform assessment of temporal/spatial variability of littoral environments, and assess various inversion and assimilation techniques to obtain ocean/atmosphere temporal/spatial variability of littoral environments. Integration of DAMPS into airborne unmanned vehicles (UAV's). Develop Battlespace characterization techniques to measure environmental data in-situ and transmit to Fleet assets.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	4,508	3,607	6,852
(U) Adjustments from FY 1998 PRESBUDG:	-79	-107	-6,852
(U) FY 1999 President's Budget Submit:	4,429	3,500	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

(U) FY 1997: (-$73) SBIR adjustment. (-$1) Minor Navy adjustments.

(U) FY 1998: (-$107) Minor Navy adjustments.

(U) FY 1999: (-$6,852) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDTE under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT NUMBER: R/X0120 PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0205620N (Surface ASW Combat System Integration) - Transition of surface ship CDC efforts.
(U) PE 0602702E (Tactical Technology) - Advanced Research Projects Agency simulation development program.
(U) PE 0603254N (Anti-Submarine Warfare Systems Development) - Environmental support to the Extended Echo Range sonobuoy.
(U) PE 0603502N (Surface and Shallow Water MCM) - Integration of MEDAL into combat systems.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R/X0120
PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998
a. Software Development	3,624	2,800
b. Ancillary Hardware Development	0	0
c. Development Support Equipment	0	0
d. Miscellaneous	805	700
Total	4,429	3,500

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands):

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:											
NRL, Wash, DC	WR	11/02/93	N/A	N/A	150	100	1,790	1,350	0	0	3,390
PSI, McLean, VA	C/CPFF	05/03/93	N/A	N/A	350	1,865	1,723	1,143	0	0	5,076
SAIC, McLean, VA	C/CPFF	11/02/94	N/A	N/A	0	600	100	200	0	0	900
Loral, Manassass and Reston, VA											

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R/X0120
PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

C/CPFF	12/24/92	N/A	6,736	6,736	1,690	0	0	0	0	8,426
NAWC, Warminister, VA WR	11/02/95	N/A	N/A	300	544	350	200	0	0	1,394
NUWC, Newport, RI WR	11/02/93	N/A	N/A	110	0	24	0	0	0	134
CSS,Panama City,FL WR	11/15/95	N/A	N/A	0	150	0	100	0	0	250
Miscellaneous:				5,108	2,382	442	507	0	0	8,439

Support and Management: Not Applicable
Test and Evaluation: Not Applicable

GOVERNMENT FURNISHED PROPERTY: Not Applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R/X0120
PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	12,754	7,331	4,429	3,500	0	0	28,014
Subtotal Support and Management	0	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0	0
Total Project	12,754	7,331	4,429	3,500	0	0	28,014

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

PROJECT NUMBER: R/X2017
PROJECT TITLE: Advanced Underwater Acoustic Modeling Project (AUAMP)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R/X2017 Advanced Underwater Acoustic Modeling Project (AUAMP)	1,262	1,464	0	0	0	0	0	0	6,670

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: As Navy sonar systems become more sophisticated and their use in shallow water is increasing, there is an urgent and continuing need to understand underwater sound boundary interactions and propagation through the oceanic medium. The shallower waters of the earth's littoral regions are characterized by extreme variability in time as well as space. This project is focused on the development of a family of acoustic models which will predict the performance of existing and future Navy sonar systems. Initial efforts have concentrated upon the development of a multi-source, multi-receiver, Anti-Submarine Warfare (ASW) system performance prediction capability in support of active ASW systems currently being planned and developed for use in the 1990s. Further efforts are directed toward the stochastic prediction of performance of mid- and high-frequency tactical and mine warfare sonars, with an eventual goal of high fidelity simulation.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($365) Completed upgrade of existing Navy Standard Low Frequency Bottom Loss model/database to 5Khz, completed interim shallow water clutter prediction models.

- (U) ($335) Transitioned the Acoustic Sonar Propagation Model to the Oceanographic and Atmospheric Master Library as a Navy Standard model/database, developed a broadband propagation model for Fleet use, begin development of shallow water geo-acoustic inversion technique that make use of time spread functions.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

PROJECT NUMBER: R/X2017
PROJECT TITLE: Advanced Underwater Acoustic Modeling Project (AUAMP)

- (U) ($415) Completed development of bottom scattering model upgrade for low frequencies (less than 500 Hz) and began initial development of bottom scattering model valid to frequencies of 20 Khz, consistent with existing LFBL.

- (U) ($147) Verified and validated high to mid-frequency models for Surface Ship Combatants, and provided upgrades for model deficiencies.

2. (U) FY 1998 PLAN:

- (U) ($1,105) Complete development of clutter prediction model, continue development of high frequency bottom/loss scatter model/database, continue development of shallow water geoacoustic inversion algorithms using real-time data, continue development of broadband prediction model for Fleet use, begin development of an Operational Sensitivity model to predict the sensitivity of system performance to environmental factors, and develop improvements to mine warfare acoustic models.

- (U) ($100) Begin extending LFBL from the 50 M contour water depth to very shallow water.

- (U) ($259) Perform independent verification and validation of models being developed and upgraded.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,295	1,509	1,969
(U) Adjustments from 1998 PRESBUDG:	- 33	-45	-1,969
(U) FY 1999 President's Budget Submit:	1,262	1,464	0

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

PROJECT NUMBER: R/X2017
PROJECT TITLE: Advanced Underwater Acoustic Modeling Project (AUAMP)

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

(U) FY 1997: (-$31) SBIR assessment. (-$2) Minor Navy adjustments.

(U) FY 1998: (-$45) Minor Navy adjustments.

(U) FY 1999: ($-1,969K) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE 0602435N (Oceanographic and Atmospheric Technology) - Joint efforts in boundary interaction physics.
(U) PE 0603747N (Undersea Warfare Advanced Technology) - Evaluation of ASPM during Critical Sea Tests.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

PROJECT NUMBER: R/X2017
PROJECT TITLE: Advanced Underwater Acoustic Modeling Project (AUAMP)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998
a. Software Development	912	1,099
b. Ancillary Hardware Development	0	0
c. Development Support Equipment	350	365
d. Miscellaneous	0	0
Total	1,262	1,464

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands):

PERFORMING ORGANIZATIONS

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

PROJECT NUMBER: R/X2017
PROJECT TITLE: Advanced Underwater Acoustic Modeling Project (AUAMP)

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development:											
NRL, Wash, DC	WR	11/02/93	N/A	N/A	150	40	250	50	0	0	490
PSI, McLean, VA	C/CPFF	05/03/93	N/A	N/A	350	250	250	250	0	0	1100
SAIC, McLean, VA	C/CPFF	11/02/94	N/A	N/A	898	700	550	650	0	0	2798
NAWC, Warminister, PA	WR	11/02/95	N/A	N/A	65	50	0	50	0	0	165
NUWC, Newport RI	WR	11/02/93	N/A	N/A	110	0	0	0	0	0	110
Miscellaneous:					837	494	212	464	0	0	2007
Support and Management:					0	0	0	0	0	0	0
Test and Evaluation:					0	0	0	0	0	0	0

GOVERNMENT FURNISHED PROPERTY: Not Applicable

	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

PROJECT NUMBER: R/X2017
PROJECT TITLE: Advanced Underwater Acoustic Modeling Project (AUAMP)

Subtotal Product Development	2,410	1,534	1,262	1,464	0	0	6,670
Subtotal Support and Management	0	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0	0
Total Project	2,410	1,534	1,262	1,464	0	0	6,670

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: V/X0823
PROJECT TITLE: Sensor Performance Prediction (SPP)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V/X0823 Sensor Performance Prediction (SPP)	7,196	6,368	0	0	0	0	0	0	28,027

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The SPP program develops on-board software capabilities that provide sensor performance predictions and Tactical Decision Aids (TDA) for all tactical platforms using in-situ measurements, synoptic data and new/high resolution environmental data bases. SPP maximizes the full performance potential of complex sensor systems by increasing their detection/tracking performance. The program is focused on the development of new combat system and mine warfare performance prediction and tactical decision aid capabilities for highly complex littoral environments to support regional conflict scenarios. It addresses the multi-warfare areas, particularly Mine Warfare, shallow water ASW and missile and air defense/strike capabilities that are critical to operate in the littoral and hinterland and includes all platforms (i.e. surface, submarine and air).

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($2,052) Completed initial development of the Joint Littoral/Multi-Mission TDA capability for use in shallow water against diesel submarines/low flying missiles. Fully integrated the best available METOC Battlespace Analysis including in-situ, remotely sensed, synoptic and climatological data into the Joint Littoral/Multi-Mission TDA. Evaluated at-sea during Fleet Regional Conflict/Littoral exercises.

- (U) ($1,455) Completed development of MCM tactics and optimization algorithms initiated by the AEAS Program (R0120). Incorporated more robust environmental analysis capability. Began minefield planning module. Incorporated Mine Warfare capabilities in the Joint Littoral/Multi-Mission TDA. Evaluated at-sea.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT NUMBER: V/X0823 PROJECT TITLE: Sensor Performance Prediction (SPP)

- (U) ($1,657) Developed new functionality and corrections for the Electro-Magnetic/Electro-Optic Performance Prediction/Decision Support System based on initial at-sea use and Fleet feedback. Developed required combat system connectivity to measure systems performance. Tested at-sea.

- (U) ($2,032) Developed new functionality for the submarine, air and surface ship ADM to further address the requirements for Tactical Control in the multi-threat, multi-warfare scenarios. This new functionality includes predictions for advanced combat systems, greater use of highly variable in-situ/remotely sensed and synoptic METOC data, increased connectivity/integration with the shipboard tactical decision process and "greater automation/event triggering" to reduce manning requirements. Tested at-sea.

3. (U) FY 1998 PLAN:

- (U) ($1,950) Develop performance prediction capability for additional Electro-Magnetic/Electro-Optic sensors. Address new sensor suites scheduled for incorporation on New Attack Submarine (NSSN), SQQ-89 Block III Ships and LAMPS helicopter upgrades (SH-60R). Incorporate new capability based on Shipboard Tactical Atmospheric Forecast Capability (STAFC) developments and in-situ/remote measurement techniques. Evaluate at-sea.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: V/X0823
PROJECT TITLE: Sensor Performance Prediction (SPP)

- (U) ($2,029) Initiate development of sensor performance prediction and employment TDAs which address new generation undersea warfare systems (Airborne Low Frequency Sonar (ALFS), Towed Active Receive Subsystem (TARS), High Frequency Sonar Program (HFSP)). Maximize use of in-situ collected environmental data fused with synoptic data. Ensure connectivity to both organic combat system and remote sites in support of Joint Littoral Operations. Integrate into platform ADMs and evaluate at-sea.

- (U) ($1,120) Based on submarine security and survivability developments, initiate development of automated vulnerability assessment tactical decision aid capabilities and integrate them with emerging COTS combat systems. Update automatic event triggering capabilities based on evaluation of previous years efforts. Integrate into platform ADMs and evaluate at-sea.

- (U) ($1,269) Develop atmospheric and oceanographic data acquisition and application capabilities. Provide real time capability to utilize environmental parameters and distribute these to other Fleet combatants and shore sites. Support Oceanographer of the Navy's Battlespace METOC Data Acquisition, Assimilation and Application strategy. Test initial implementation at-sea.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	7,276	6,590	8,847
(U) Adjustments from FY 1998 PRESBUDG:	-80	-222	-8,847
(U) FY 1999 President's Budget Submit:	7,196	6,368	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

(U) FY 1997: (-$71) SBIR adjustment. (-$9) Minor Navy adjustments.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT NUMBER: V/X0823 PROJECT TITLE: Sensor Performance Prediction (SPP)

(U) FY 1998: (-$222) Minor Navy adjustments.

(U) FY 1999: (-$8,847) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: V/X0823
PROJECT TITLE: Sensor Performance Prediction (SPP)

(U) RELATED RDT&E:

(U) PE 0603207N (Air/Ocean Tactical Applications)
(U) PE 0603504N (Advanced Submarine Combat Systems Development)
(U) PE 0603553N (Surface ASW)
(U) PE 0604218N (Air/Ocean Equipment Engineering)
(U) PE 0101224N (SSBN Security/Survivability Program)
(U) PE 0603561N (Advanced Submarine Systems Development)

D. (U) SCHEDULE PROFILE: Not Applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: V/X0823
PROJECT TITLE: Sensor Performance Prediction (SPP)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998
a. Development Support Equipment Acquisition	100	100
b. Software Development	4,096	3,540
c. Systems Engineering	1,125	1,100
d. Configuration Management	150	150
e. Development Test & Evaluation	1,100	953
f. Contractor Engineering Support	100	100
g. Government Engineering Support	350	250
h. Program Management Support	150	150
i. Travel	25	25
Total	7,196	6,368

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: V/X0823
PROJECT TITLE: Sensor Performance Prediction (SPP)

B. (U) BUDGET ACQUISITION

HISTORY AND PLANNING INFORMATION ($ in thousands):

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total* FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development											
NUWC Division Newport, RI	WR	11/95	3,827	3,827	950	1,052	900	925	0	0	3,827
Integrated Performance Decisions, Inc., Middletown, RI	CPFF	3/96	9,673	9,673	0	2,011	4,067	3,498	0	0	9,576
Analysis & Tech. Inc., Middletown, RI	CPFF	11/93	2,193	2,193	2,193	0	0	0	0	0	2,193
Sonalysts Inc., Waterford, CT	CPFF	11/89	3,726	3,726	2,526	1,200	0	0	0	0	3,726
Miscellaneous	N/A	N/A	2,277	2,277	788	465	504	520	0	0	2,277

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total* FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Miscellaneous Test and Evaluation	N/A	N/A	2,532	2,532	662	720	625	500	0	0	2,507

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT NUMBER: V/X0823 PROJECT TITLE: Sensor Performance Prediction (SPP)

Miscellaneous	N/A	N/A	4,021	4,021	996	900	1,100	925	0	0	3,921

GOVERNMENT FURNISHED PROPERTY: Not Applicable

Total*

	FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	6,457	4,728	5,471	4,943	0	0	21,599
Subtotal Support and Management	662	720	625	500	0	0	2,507
Subtotal Test and Evaluation	996	900	1,100	925	0	0	3,921
Total Project	8,115	6,348	7,196	6,368	0	0	28,027

* Only FY 1995 dollars are shown

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603790N
PROGRAM ELEMENT TITLE: NATO Research and Development

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2293	NATO Cooperative Research and Development (R&D)								
	9,381	9,672	11,004	10,922	11,580	11,747	11,911	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides funding for the continuation of on-going research and development projects that were initiated between the U.S. Navy and allies under the Office of the Secretary of Defense (OSD) NATO Cooperative Research and Development (R&D) program (Program Element (P.E.) 0603790D) in prior years. Each year OSD will provide seed money to initiate worthy R&D projects for which the Navy will provide continuation funding from this P.E.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:
   - (U) ($2,673) Supported on-going work related to the U.S./United Kingdom development of the Intercooled Recuperated (ICR) Gas Turbine Engine.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

- (U) ($2,710) Supported on-going Navy efforts on the U.S./Japanese Cooperative Material Project for Advanced Steel.
- (U) ($1,670) Supported on-going Navy efforts on the U.S./German joint project on Computer Codes for Predicting Underwater Explosion Effects initiated with OSD funding in FY96.
- (U) ($730) Supported on-going work on the U.S./Norway joint project on Composite Hull Embedded Sensor System initiated with OSD funding in FY96.
- (U) ($688) Supported on-going work on the U.S./France High-Performance Protocol Project initiated with OSD funding.
- (U) ($550) Supported on-going work on the U.S./France Software Engineering Tools Project initiated with OSD funding.
- (U) ($300) Supported on-going work on the U.S./France Unmanned Underwater Vehicle Non-Traditional Navigation, Guidance and Control Project initiated with OSD funding.
- (U) ($30) Supported on-going Dynamic Analysis Support System cooperative project between the U.S. and Norway.
- (U) ($30) Supported work related to the U.S./United Kingdom Trimaran Demonstrator Project.

2. (U) FY 1998 PLAN:

- (U) ($2,052) Support on-going Navy efforts on the U.S./Japanese Cooperative Material Project for Advanced Steel initiated with OSD funding.
- (U) ($1,035) Support on-going work on the High-Speed Protocol Project with France initiated with OSD funding.
- (U) ($3,000) Provide support for start-up of the Vector project between the U.S., Germany, and Sweden (non-NATO).
- (U) ($99) Support on-going work on the U.S./Norway joint project on Composite Hull Embedded Sensor System initiated with OSD funding.
- (U) ($2,004) Support on-going Navy work related to the U.S./United Kingdom development of the ICR Gas Turbine Engine.
- (U) ($850) Support work on the Unmanned Undersea Vehicle cooperative R&D project between the U.S. and France initiated with OSD funding.
- (U) ($482) Support on-going work on the U.S./U.K. Trimaran Demonstrator Project initiated with OSD funding.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

- (U) ($150) Support on-going work on the U.S./Germany joint project on Computer Codes for Predicting Underwater Explosion Effects.

3. (U) FY 1999 PLAN:
   - (U) ($1,000) Support on-going work related to the U.S./Australian Anti-Torpedo Torpedo cooperative R&D project.
   - (U) ($1,567) Support on-going work related to the cooperative R&D program between the U.S. and U.K. for Trimaran Hull initiated with OSD funding.
   - (U) ($400) Support on-going work on the U.S./United Kingdom development of the ICR Gas Turbine Engine.
   - (U) ($1,887)Support on-going work on the U.S./Japanese Cooperative Material Project for Advanced Steel.
   - (U) ($250) Support work on the Unmanned Undersea Vehicle cooperative R&D project between the U.S. and France.
   - (U) ($5,000) Support work on the Vector Project between the U.S., Germany and Sweden.
   - (U) ($900) Support efforts on the High Speed Protocol Project with France.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	9,528	13,330	11,267
(U) Appropriated Value:	-	10,000	-
(U) Adjustments from FY 1998 PRESBUDG:	-147	-3,658	-263
(U) FY 1999 President's Budget Request:	9,381	9,672	11,004

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 adjustment is due to SBIR assessment (-131), revised economic assumptions (-12) and update to reflect actual execution (-4). FY 1998 adjustment is due to Congressional Undistributed reductions (-306), economic assumptions (-22) and fiscal contraint reduction (-3,330). FY 1999 adjustment is due to Navy Working Capital Fund (NWCF) surcharge correction (-54), other NWCF adjustments (-20), and other minor adjustments (-189).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.
(U) RELATED RDT&E:
(U) PE 0603790D (NATO Cooperative Research and Development)
(U) PE 0605853N (Management, Technical and International Support)
(U) PE 0605130D (Foreign Comparative Testing)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Cooperative Research and Development	9,381	9,672	11,004

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION:

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Westinghouse	C/CPAF	12/26/91			0	2,646	2,560	0	CONT.	CONT.
NUWC-Newport	WX				0	0	0	2,800	CONT.	CONT.
NSWC-CD	WX	1/31/97			0	2,500	2,380	0	CONT.	CONT.
NCCOSC	WX				0	0	0	2,300	CONT.	CONT.
NRL	WX				0	0	0	1,300	CONT.	CONT.
Miscellaneous					0	4,235	4,732	4,604	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

Support and Management: Not applicable.
Test and Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	0	9,381	9,672	11,004	CONT.	CONT.
Subtotal Support and Management	0	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0	0
Total Project	0	9,381	9,672	11,004	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603790N
PROGRAM ELEMENT TITLE: NATO Research and Development

PROJECT NUMBER: R2293
PROJECT TITLE: NATO Cooperative R&D

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FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

(U) COST: (Dollars in Thousands)

PROJECT NUMBER& TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J2241 Submarine Tactical Missile System	0	0	11,301	10,573	29,302	43,748	48,427	CONT.	CONT.
K2156 Naval Surface Fire Support	52,595	56,087	52,015	38,915	31,132	31,774	32,581	CONT.	CONT.
K2323 Vertical Gun Advanced Ship (VGAS)	0	0	25,169	40,138	42,976	42,776	44,553	CONT.	CONT.
K2325 Naval Surface Fire Support System Integration	0	0	21,619	27,411	31,255	26,249	19,371	CONT.	CONT.
K2326 Land Attack Warfare Center	0	0	0	4,014	4,102	4,083	4,262	CONT.	CONT.
K2409 Land Attack Standard Missile (LASM)	0	2,911*	0	0	0	0	0	0.	2,911
TOTAL	52,595	58,998	110,104	121,051	138,767	148,630	149,194	CONT.	CONT.

* FY-1998 Congressional Plus-up.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Naval Surface Fire Support (NSFS) Mission will be met by munitions related systems in order to meet the range, accuracy, and lethality requirements of established land attack requirements. Gun related systems are to include: a 5" MK 45 modification, a 5" extended range guided munitions with an internal Global Positioning System (GPS) and Inertial Navigation System (INS) able to deliver a submunition payload at ranges exceeding 41 NM (known as the EX-171 Hammer - formerly Precision Guided Munition (PGM)); a gun fire control system; a vertical gun launch system; and ballistic ammunition improvements. Missile related systems include ship launched land attack missile systems reaching out 165+NM. Both gun and missile related systems will require a NSFS Warfare Control System (NWCS) of commensurate capability. These combined weapon systems will provide the required standoff capability to safely destroy shore targets. Technologies which have been developed and funded by other agencies are being leveraged, to ensure that all existing and emerging technologies are maximally exploited. The program will provide critical NSFS capabilities necessary to support all phases of land attack operations. The Acquisition Decision Memorandum for the Naval Surface Fire Support (November 1992) approved initiation of program Phase 0.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: J2241
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT TITLE: NTACMS

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J2241 NTACMS	0*	0	11,301	10,573	29,302	43,748	48,427	TBD	TBD

*Funded in Project K2156.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Army Tactical Missile System (ATACMS) adapted for naval surface ship and submarine use (NTACMS) supports Navy doctrine and provides sea based fire support for the joint land battle. This project supports continued evaluation of the ATACMS into shipboard weapons architecture, including Concept of Operations studies for the ATACMS. The project includes investigations of techniques to mitigate the technical risk of integration of the Army system on surface ships and submarines. The NTACMS program is being built upon a successful technology demonstration accomplished aboard the USS Mount Vernon in February 1995 during which an ATACMS missile launched from an Army M-270 launching system located on the ship's fantail successfully guided to and attacked a target on San Clemente Island. Additionally, the ATACMS prime contractor Lockheed Martin Vought Systems of Dallas Texas launched a modified ATACMS from a tailored MK-41 Vertical Launch System (VLS) canister at the White Sands Missile Range in November 1996.

NTACMS development will be accomplished as a cooperative effort among the Program Executive Office for Surface Combatants (PMS429) for surface ship launcher and weapon system modifications; the Deputy Commander, Submarine Directorate, Naval Sea Systems Command (SEA92) Submarine who will be responsible for all submarine platform integration matters; and the Director, Strategic Systems Programs (DIRSSP) who will assume responsibility for the NTACMS missile and associated canister and capsule for surface and submarine use respectively. Overall program management will be accomplished by an Overarching Integrated Product Team made up of senior management from PMS429, SEA92, DIRSSP, N86 and N87.

The Navy is initiating the NTACMS program as the latest version, Block IA, of the Army ATACMS which is in its second year of Low Rate Initial Production (LRIP) with a planned acquisition Milestone III decision, approval for Full Rate Production, anticipated in FY 1998. ATACMS Block I was very successful in its first operational use during Desert Storm. The Block IA configuration increases range and improves the accuracy achieved by Block I. With NTACMS

production scheduled to begin in FY 2005, all Navy NTACMS will have ATACMS Block IA functionality. The NTACMS will be manufactured on the same production line as the Army ATACMS. Where cost effective and mission compatible, the Army intends to accept changes to the missile required for Navy unique application thereby maximizing missile commonality and, through economies of scale, minimizing production and life cycle support costs for both services.
The missile will be delivered to the Navy as an All-Up-Round (AUR) already loaded into the appropriate canister or capsule and ready for installation into the surface or submarine VLS launcher. Navy support of the missile will make maximum use of the existing Army ATACMS logistics infrastructure including CONUS and overseas depot facilities.
NTACMS has an initial operational capability planned for FY 2006

(U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: Program definition and risk reduction activities have commenced($5,499K-funded in project K2156 Naval Surface Fire Support).

2. (U) FY 1998 PLAN: Funded under Project K2156 Naval Surface Fire Support (NSFS)

3. (U) FY 1999 PLAN:

- (U) Full obligation is projected by June 1999.
- (U) ($8,726K) Develop hardware/test facilities for submarine underwater launch test.
- (U) ($2,575K) Prepare Milestone II documentation.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: J2241
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT TITLE: NTACMS

B. (U) PROGRAM CHANGE SUMMARY:

(U) CHANGE SUMMARY EXPLANATION:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	0
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	0	0	
(U) FY 1999 President's Budget:	0	0	11,301

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1999 funding realignment (+$11,301)
(U) Schedule: Milestone II- 4th quarter, FY 2000. IOC-FY 2006.
(U) Technical: Supports Naval sea-based fire support mission for the land warrior

C. (U) OTHER PROGRAM FUNDING SUMMARY: N/A

FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	TO COMPLETE	TOTAL PROGRAM

(U) RELATED RDT&E: Project K2156 - Naval Surface Fire Support

D. (U) SCHEDULE PROFILE: N/A

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

PROJECT NUMBER: J2241
PROJECT TITLE: NTACMS

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Documentation/Studies			2,675
b. Test Hardware			7,151
c. Test Facilities/Development			1,475
Total			11,301

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: J2241
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT TITLE: NTACMS

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
LMVS (Army)	SS/CPFF	10/98					3,401	TBD	TBD
NGMS	SS/CPFF	10/98					4,250	TBD	TBD
SCI RANGE	WR	10/98					1,300	TBD	TBD
Other Development Activities	VAR						2,350	TBD	TBD
Support and Management							0	TBD	TBD
Test and Evaluation							0	TBD	TBD
GOVERNMENT FURNISHED PROPERTY - Not Applicable.									
Subtotal Product Development							11,301	TBD	TBD
Subtotal Support and Management							0	TBD	TBD
Subtotal Test and Evaluation							0	TBD	TBD
Total Project							11,301	TBD	TBD

*TBD amounts will be completed upon signature of the Acquisition Program Baseline Agreement (APBA).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

PROJECT NUMBER: K2156
PROJECT TITLE: Naval Surface Fire Support

(U) COST: (Dollars in Thousands)

PROJECT NUMBER& TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K2156 Naval Surface Fire Support	52,595	56,087	52,015	38,915	31,132	31,774	32,581	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The NSFS Mission will be met near term by:

(1) a 5" MK 45 gun modification which strengthens the gun mount to accommodate higher firing loads (18 megajoules) than the existing gun mount and to handle and fire the EX 171 Extended Range Guided Munition (ERGM);

(2) the ERGM, an EX-171 5" munition with an internal Global Positioning System (GPS) receiver and Inertial Navigation System (INS) coupled to deliver a submunition payload to targets at ranges exceeding 63 NM;

(3) gun fire control system which updates the MK 160 MOD 7 to a MOD 8 to accommodate the increased tactical requirements imposed by the new munition's capability and to provide direct digital interface with the gun as well as the ERGM targeting requirements; and

(4) ballistic ammunition improvements including upgraded propellant charges to provide/support the higher firing loads.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2156 PROJECT TITLE: Naval Surface Fire Support

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:
   - (U) ($16,449) Continued development of EX-171 EDMs (Extended Range Guided Munition (ERGM)).
   - (U) ($ 2,541) Developed EX-171 Advanced Solid Propellant Charge.
   - (U) ($ 1,000) Continued Risk Reduction efforts for GPS/INS.
   - (U) ($20,513) Exercised Contract Option for development of magazine handling system and funded development effort for 5" MK 54 modification.
   - (U) ($ 6,363) Developed 5" MK 45 Modification Gun Fire Control and investigate required interfaces.
   - (U) ($ 4,499) Conducted development and engineering analysis of the Army ATACM missile integration onto naval platforms to meet Marine Corps requirements.
   - (U) ($ 1,230) Analyzed life cycle costs and evaluate tradeoffs.

2. (U) FY 1998 PLAN:
   - (U) ($23,761) Continue development of EX-171 EDMs for ERGM.
   - (U) ($ 2,301) Continue development of EX-171 Advanced Solid Propellant Charge.
   - (U) ($13,411) Continue development of 5" MK 45 Modification and GFP preparation.
   - (U) ($ 5,483) Continue development of 5" MK 45 Modification Gun Fire Control and investigate required interfaces.
   - (U) ($ 826) Analyze life cycle costs and evaluate tradeoffs.
   - (U) ($ 602) Continue effort on Warfare Mission Planning System to allow effective use of NSFS.
   - (U) ($ 9,703) Continue development and engineerering analysis of the Army ATACM missile integration onto naval platforms to meet Marine Corps requirements.

3. • (U) FY 1999 PLAN:
   - (U) ($33,492) Continue development of EX-171 EDMs for ERGM.
   - (U) ($ 2,592) Continue development of EX-171 Advanced Solid Propellant Charge.
   - (U) ($ 6,414) Continue development of 5" MK 45 Modification and GFP preparation.
   - (U) ($ 3,889) Continue development of 5" MK 45 Modification Gun Fire Control and investigate required interfaces.
   - (U) ($ 1,408) Analyzed life cycle costs and evaluate tradeoffs.
   - (U) ($ 620) Continue effort on Warfare Mission Planning System to allow effective use of NSFS.
   - (U) ($ 3,600) Procure 90 LRIP ERGMs in support of OPEVAL.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2156 PROJECT TITLE: Naval Surface Fire Support

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	50,067	37,809	52,985
(U) Appropriated Value:	52,204	57,809	
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:			
a) Undistributed adjustments	+391	-1,722	-970
(U) FY 1999 PRESBUDG Submit:	52,595	56,087	52,015

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 1997 increase of $ 391K results from undistributed reductions (-$3,200K), and program realignments (+$3,591K). The FY 1998 decrease of $1,722K is due to undistributed adjustments The FY 1999 decrease of $970K is due to undistributed adjustments

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: ($000)

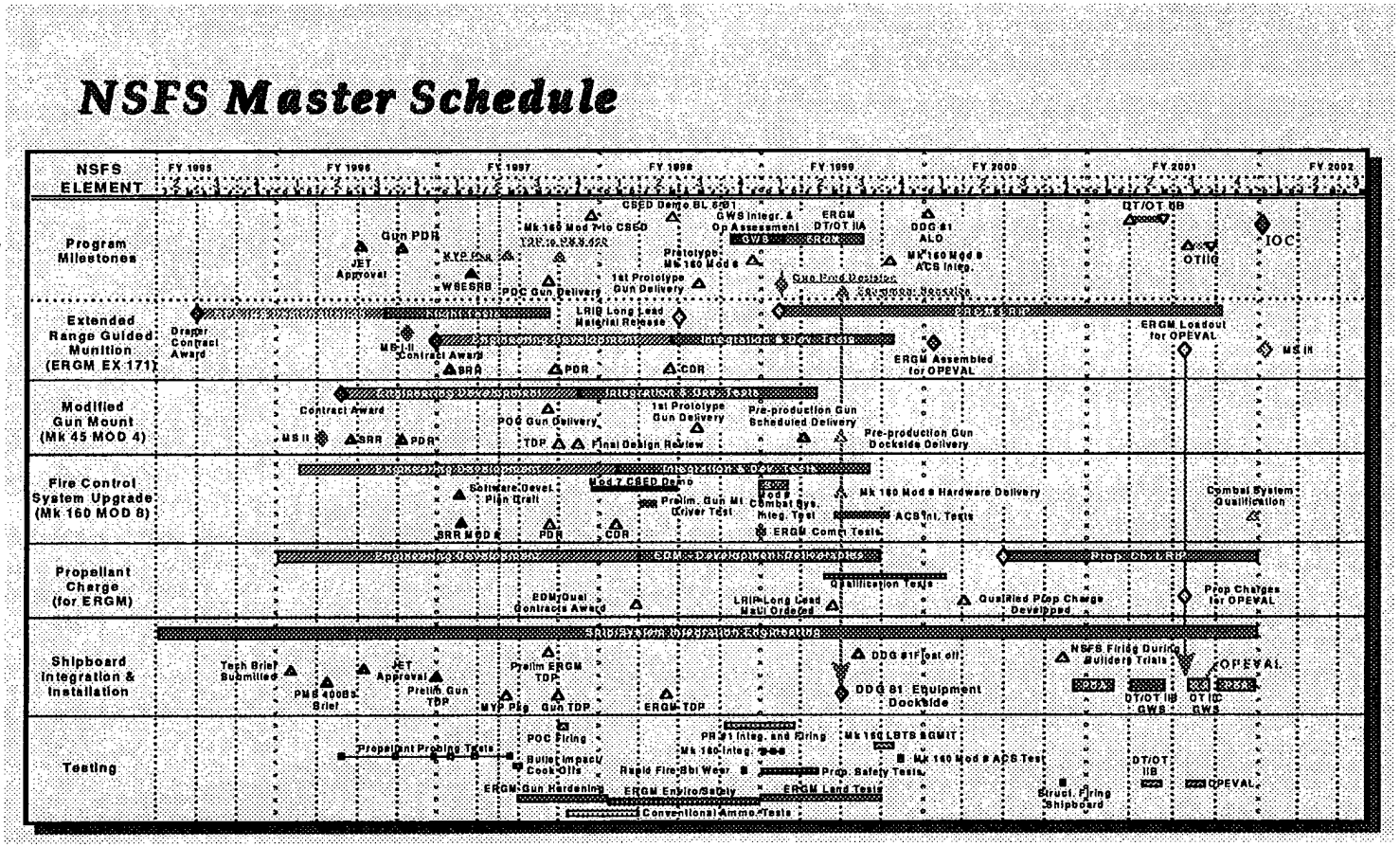
APPN/LI/BLI	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PANMC/11/0253 ERGM	0	0	27,452	8,242	25,354	46,494	72,407	CONT.	CONT.

(U) RELATED RDT&E: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2156 PROJECT TITLE: Naval Surface Fire Support

D. (U) SCHEDULE PROFILE.



R-1 Line Item 73

Budget Item Justification
(Exhibit R-2, Page 11 of 23)

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: K2156
PROJECT TITLE: Naval Surface Fire Support

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	45,002	49,176	46,045
b. Software Development	4,453	5,545	3,132
c. Systems Engineering	2,666	985	2,585
d. Specialty Engineering	474	381	253
Total	52,595	56,087	52,015

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2156 PROJECT TITLE: Naval Surface Fire Support

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
UNITED DEFENSE, MINNEAPOLIS, MN	CP	VAR	CONT.	CONT.	13,270	17,355	13,324	4,500	CONT.	CONT.
TEXAS INSTRUMENTS, LEWISVILLE, TX	CP	VAR	CONT.	CONT.	4,200	10,160	19,618	13,836	CONT.	CONT.
NSWC DAHLGREN, VA	WR	VAR	CONT.	CONT.	20,091	10,478	6,827	20,693	CONT.	CONT.
NSWC CRANE, IN	WR	VAR	CONT.	CONT.	16,444	3,920	403	1,836	CONT.	CONT.
NSWC INDIAN HD, MD	WR	VAR	CONT.	CONT.	4,161	3,050	3,584	2,097	CONT.	CONT.
NSWC PORT HUE, CA	WR	VAR	CONT.	CONT.	250	370	330	1,080	CONT.	CONT.
SSPO/DRAPER LABS BOSTON, MA	PD	VAR	22,136	22,136	8,637	5,499	8,000	0	0	22,136
MISCELLANEOUS	VAR	VAR	CONT.	CONT.	21,790	1,763	4,001	4,373	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: K2156
PROJECT TITLE: Naval Surface Fire Support

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Support and Management:					0	0	0	0	CONT.	CONT.
Test and Evaluation:										
TEXAS INSTRUMENTS LEWISVILLE, TX	CP	01/99			0	0	0	3,600	CONT.	CONT.
GOVERNMENT FURNISHED PROPERTY - Not applicable.										
Subtotal Product Development					88,843	52,595	56,087	48,415	CONT.	CONT.
Subtotal Support and Management					0	0	0	0	CONT.	CONT.
Subtotal Test and Evaluation					0	0	0	3,600	CONT.	CONT.
Total Project					88,843	52,595	56,087	52,015	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2323 PROJECT TITLE: Vertical Guns Advanced Ship (VGAS)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER& TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K2323 Vertical Gun Advanced Ship (VGAS)	0*	0	25,169	40,138	42,976	42,776	44,553	CONT.	CONT.

* Funding was provided in S2196/0603563N

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Vertical Guns for Advanced Ships (VGAS) program will provide the next generation of Naval Surface Combatants (SC-21) a modular larger caliber (155mm or better) dual barrel gun system including an automated magazine handling system and a family of projectiles. The gun system will be designed to meet SC-21 reduced signature (radar cross section, acoustical and infra-red) requirements through either below deck orientation or through the use of fabrication techniques in an above deck configuration. An automated magazine handling system, with a capacity of 1500 rounds, will allow for minimal manning to support gun operations and maintenance. The dual barrel design will allow for a firing rate of 12-24 rounds per minute (6-12 rounds per barrel). Projectiles using a GPS/INS guidance package will have a CEP less than 20 meters while achieving ranges up to 100 nautical miles by using advanced propelling charges and an in-flight propulsion system. Warheads containing submunitions with proximity fuses, anti-armor designs, and penetrators will provide significant enhancement in target effectiveness over the Navy's current 5" gun projectile inventory.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: Not Applicable.

2. (U) FY 1998 PLAN: Not Applicable.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS (con't):

3. (U) FY 1999 PLAN:
- (U) ($ 2,000) Complete development of documentation required for MS I decision.
- (U) ($14,169) Award competitive contract(s) to develop prototype gun system for land-based testing.
- (U) ($ 3,500) Award competitive contract(s) to develop prototype automated magazine handling system.
- (U) ($ 1,000) Complete tradeoff study for signature mitigation design concepts and SC-21 integration issues.
- (U) ($ 2,500) Fabricate and test advanced sub-munition prototypes containing proximity fuses and improved explosives.
- (U) ($ 2,000) Develop 155mm propelling charges.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	0
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	0	0	0
(U) FY 1999 PRESBUDG Submit:	0	0	25,169

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY1999 funding alignment to continue funding for VGAS and associated 155mm projectiles for SC 21 in separate project.
(U) Schedule: Not Applicable.
(U) Technical: Not Applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

PROJECT NUMBER: K2323
PROJECT TITLE: Vertical Guns Advanced Ship (VGAS)

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones			1ST QTR MS I
Contract Milestones			Award DEMVAL Contracts 2ND QTR
Technical Milestones			Complete signature mitigation design concepts study 3RD QTR Produce prototype proximity fuzes for submunitions 4TH QTR

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

PROJECT NUMBER: K2323
PROJECT TITLE: Vertical Guns Advanced Ship (VGAS)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	0	0	19,169
b. Government Engineering	0	0	4,250
c. Systems Engineering	0	0	1,750
Total	0	0	25,169

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2323 PROJECT TITLE: Vertical Guns Advance Ship (VGAS)

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
TBD (Competitive - up to 3)		01/99	CONT.	CONT.	0	0	0	17,919	CONT.	CONT.
NSWC DAHLGREN, VA	WR	VAR	CONT.	CONT.	0	0	0	4,250	CONT.	CONT.
NSWC INDIAN HD,MD	WR	VAR	CONT.	CONT.	0	0	0	2,750	CONT.	CONT.
NSWC LOUIEVILLE,KY	WR	VAR	CONT.	CONT.	0	0	0	250	CONT.	CONT.
Support and Management					0	0	0	0	CONT.	CONT.
Test and Evaluation					0	0	0	0	CONT.	CONT.
GOVERNMENT FURNISHED PROPERTY - Not applicable.										
Subtotal Product Development					0	0	0	25,169	CONT.	CONT.
Subtotal Support and Management					0	0	0	0	CONT.	CONT.
Subtotal Test and Evaluation					0	0	0	0	CONT.	CONT.
Total Project					0	0	0	25,169	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2325 PROJECT TITLE: Naval Surface Fire Support System Integration

(U) COST: (Dollars in Thousands)

PROJECT NUMBER& TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K2325 Naval Surface Fire Support (NSFS) System Integration	0	0	21,619	27,411	31,255	26,249	19,371	CONT.	CONT.

A.(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This is a new start program. Naval Surface Fire Support System Integration covers the Naval Surface Fire Support Warfare Control System (NWCS). NWCS is the planning and control system for future land attack warfare system requirements. NWCS is anticipated to plan and control the firing of weapons for the 5"/62 caliber gun and 155mm caliber of Vertical Gun for Advanced Ships. The software will ultimately be integrated into the existing Advanced TOMAHAWK Weapons Control System (ATWCS) but will initially be hosted on a separate hardware processor as a risk reduction measure. Prototyping and demonstrations will be accomplished in FY-99 for:

1. Hardware Development: To establish a software development environment to support development builds and determine augmentations to the ATWCS architecture to support current and future NWCS requirements.

2. Requirements Engineering: To investigate additional capabilities to add to NWCS land attack weapons as additional requirements are identified by the users.

3. Systems Engineering: To develop with external and internal interfaces for development and testing of linkages with weapons and information systems such as AEGIS, Advanced Field Artillery Tactical Data System (AFATDS), ATWCS, NAVSSI, Joint Maritime Command Information System (JMCIS) and others.

4. Software Engineering: To provide software analysis, independent validation and verification, and updates to migrate existing government and commercial software to the NWCS configuration. Also included will be the definition of SSA requirements.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2325 PROJECT TITLE: Naval Surface Fire Support System Integration

(U) PROGRAM ACCOMPLISHMENTS AND PLANS: ($000)

1. (U) FY 1997 ACCOMPLISHMENTS: Not Applicable.

2. (U) FY 1998 PLAN: Not Applicable.

3. (U) FY 1999 PLAN:
- (U) ($10,000) Software engineering development fo include analysis and integration, or reuse, of existing government and commercial computer programs.
- (U) ($4,619) Identify and configure hardware constellation to support NWCS implementation
- (U) ($3,000) Analyze use requirements to identify user land attack/support scenarios to be supported by the land attack assets.
- (U) ($4,000) Begin interface investigation and analysis to link with C4I and combat systems

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	0	0
(U) Appropriated Value:	0	0	0
(U) Adjustments to FY 1997/98 Appropriated Value/ FY 1998 President's Budget:	0	0	0
(U) FY 1999 PRESBUDG Submit	0	0	21,619

(U) CHANGE SUMMARY EXPLANATION:
- (U) Funding: This is an FY 1999 new start to enable development and integration of NSFS capabilities into existing weapons systems such as AEGIS.
- (U) Schedule: Not Applicable.
- (U) Technical: Not Applicable

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not Applicable.

D. (U) SCHEDULE PROFILE: No near term milestones

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

PROJECT NUMBER: K2325
PROJECT TITLE: Naval Surface Fire Support System Integration

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	0	0	2,619
b. Ancillary Hardware Development	0	0	2,000
c. Government Engineering	0	0	3,000
d. Systems Engineering	0	0	4,000
e. Software Engineering	0	0	8,000
f. Logistics	0	0	2,000
Total	0	0	21,619

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT NUMBER: K2325 PROJECT TITLE: Naval Surface Fire Support System Integration

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
Contract Comp Award	CP	VAR	CONT.	CONT.				7,619	CONT.	CONT.
LOCKHEED/MARTIN	CP	11/98	CONT.	CONT.				1,000	CONT.	CONT.
NSWC DAHLGREN, VA	WR	11/98	CONT.	CONT.				4,500	CONT.	CONT.
NSWC PT HUE, CA	WR	11/98	CONT.	CONT.				2,500	CONT.	CONT.
NCCOSC, CA	WR	11/98	CONT.	CONT.				2,000	CONT.	CONT.
Other Product Development			CONT.	CONT.				4,000	CONT.	CONT.
Support and Management								0	CONT.	CONT.
Test and Evaluation								0	CONT.	CONT.
Government Furnished Property - Not applicable.										
Subtotal Product Development								21,619	CONT.	CONT.
Subtotal Support and Management								0	CONT.	CONT.
Subtotal Test and Evaluation								0	CONT.	CONT.
Total Project								21,619	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603800N PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM PROJECT NUMBER: D2209 PROJECT TITLE: JSF

(U) COST (Dollars in thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
D2209 JSF	243,286	449,674	463,402	244,983	26,158	0	0	0	1,635,724
RDT&E Articles			4						

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike fighter aircraft for the USN, USMC, USAF and allies. Current program emphasis is on facilitating the evolution of fully validated and affordable joint operational requirements, and demonstrating cost leveraging technologies and concepts to lower risk prior to entering Engineering and Manufacturing Demonstration (E&MD) in FY 2001. This is a joint program with no executive service. Navy and Air Force each provide approximately equal shares of annual funding for the program effective in FY 1995. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate. The Defense Advanced Projects Agency (DARPA) is participating in the program through FY 1998.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it integrates hardware for test related to specific ship or aircraft applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS: (Breakout reflects Navy, Air Force, DARPA, UK and Multi-Lateral funding)

- (U) ($409,727) Competitively awarded contracts to Boeing and Lockheed Martin for ground and flight demonstrations and continued concept refinement for a tri-service family of aircraft that meets the Services' needs and optimizes commonality among the variants to minimize life cycle costs (LCC); awarded contract to Pratt & Whitney for supporting propulsion efforts.

- (U) ($ 25,000) Commenced Phase II of the Alternate Engine Program, which continued detailed design and begins hardware testing.

- (U) ($152,784) Continued technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, propulsion, and mission systems. Commenced systems engineering support

for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.

- (U) ($ 7,612) Commenced technology maturation demonstrations and assessments in the area of prognostics and health management.

- (U) ($ 9,629) Continued technology maturation demonstrations and assessments in the area of supportability and training.

- (U) ($ 10,191) Continued modeling and simulation activities to support strike warfare mission area analysis.

- (U) ($ 5,196) Continued requirements analysis efforts including Cost & Operational Performance Trades (COPT) to facilitate the Services' joint requirements definition.

- (U) ($ 13,937) Continued mission support, including program office functions; Congressionally directed OSD Force Structure Analysis.

- (U) ($ 2,097) DARPA general reductions.

- (U) ($636,173) Total

3. (U) FY 1998 PLAN: (Breakout reflects Navy, Air Force, DARPA, UK, Multi-Lateral and Canadian funding)

- (U) ($696,154) Continue Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney for ground and flight demonstrations and continue concept refinement for a tri-service family of aircraft.

- (U) ($ 29,000) Continue the Alternate Engine Program.

- (U) ($181,298) Continue technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, propulsion, and mission systems. Continue systems engineering support for the

Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.

- (U) ($ 14,270) Continue technology maturation demonstrations and assessments in the area of prognostics and health management.

- (U) ($ 8,859) Continue technology maturation demonstrations and assessments in the area of supportability and training.

- (U) ($ 10,790) Continue modeling and simulation activities to support strike warfare mission area analysis.

- (U) ($ 9,551) Continue requirements analysis efforts including COPT to facilitate the Services' joint requirements definition.

- (U) ($ 15,071) Continue mission support, including program office functions.

- (U) ($ 17,128) Anticipated Services' general reductions.

- (U) ($982,121) Total

4. (U) FY 1999 PLAN: (Breakout reflects Navy, Air Force, DARPA, UK, Multi-Lateral and Canadian funding)

- (U) ($702,484) Continue Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney for ground and flight demonstrations and continued concept refinement for a tri-service family of aircraft.

- (U) ($ 23,000) Continue the Alternate Engine Program.

- (U) ($184,995) Continue technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, propulsion, and mission systems. Continue systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.

- (U) ($ 12,467) Continue technology maturation demonstrations and assessments in the area of prognostics and health management.

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603800N PROJECT NUMBER: D2209
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM PROJECT TITLE: JSF

- (U) ($ 15,168) Continue technology maturation demonstrations and assessments in the area of supportability and training.
- (U) ($ 7,591) Continue modeling and simulation activities to support strike warfare mission area analysis.
- (U) ($ 6,984) Continue requirements analysis efforts including COPT to facilitate the Services' joint requirements definition; receive Joint Operational Requirements Document (JORD) from the Services.
- (U) ($ 11,450) Continue mission support, including program office functions.
- (U) ($964,139) Total

B. (U) PROGRAM CHANGE SUMMARY: (Dollars in thousands)

	FY 1997	FY 1998	FY 1999	Total Cost
(U) FY 1998 President's Budget:	$246,076	$448,855	$443,522	$1,621,099
(U) Appropriated Value		$463,855		
(U) Adjustments from PRESBUDG:	-2,790	+819	+19,880	+15,070
(U) FY 1999 President's Budget Submit:	$243,286	$449,674	$463,402	$1,636,169

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 net decrease reflects reprogramming (+$3,999), SBIR transfer (-$6,035) and Service adjustments (-$754). FY 1998 net increase of +$819 reflects Congressional increase for the alternate engine program (+$15,000), offset by 1.5% general reductions (-$6,943), R&D general reductions (-$5,790), A&AS reduction (-$422) and economic adjustments (-$1,026). FY 1999 net increase of +$19,880 reflects the increase to restore funding (+$25,000), increase of NWCF (+ 2,882), service adjustments (+$167), offset by inflation reduction (-$8,169).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603800N PROJECT NUMBER: D2209
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM PROJECT TITLE: JSF

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) This is a joint program with no executive service. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate.

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RDT&E 0603800F	251,626	432,277	456,137	239,659	22,988	0	0	0	1,567,744
(U) RDT&E 0603800E	70,261	22,970	0	0	0	0	0	0	122,148
(U) UNITED KINGDOM	71,000	55,000	34,000	26,000	0	0	0	0	200,000
(U) MULTI-LATERAL		17,900	7,600	5,000	1,700	0	0	0	32,200
(U) CANADA	0	4,300	3,000	2,700	600	0	0	0	10,600

(U) RELATED RDT&E:
Milestone II for E&MD of the Joint Strike Fighter (JSF) is planned in FY 2001.

	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RDT&E 0603800F	0	0	0	0	546,801	1,360,213	1,854,387	TBD*	TBD*
(U) RDT&E 0603800N	0	0	0	0	544,381	1,360,141	1,854,358	TBD*	TBD*

* TBD pending completion of December 1997 Selected Acquisition Report (SAR).

D. (U) SCHEDULE PROFILE:

Dec 94 Commenced Concept Development Phase
Mar 96 Released RFP for Concept Demonstration Efforts
May 96 Designated a joint, DOD, Acquisition Category ID Program by USD(A&T)
Nov 96 Competitively Awarded Concept Demonstration Contracts to Boeing and Lockheed Martin
Mar 01 Milestone II for JSF E&MD

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY:	4	PROGRAM ELEMENT:	0603800N	USN	PROJECT NUMBER: D2209
BUDGET ACTIVITY:	4	PROGRAM ELEMENT:	0603800F	USAF	PROJECT NUMBER: 2025
BUDGET ACTIVITY:	3	PROGRAM ELEMENT:	0603800E	DARPA	PROJECT NUMBER: JA-01
BUDGET ACTIVITY:	N/A	PROGRAM ELEMENT:	N/A	UNITED KINGDOM	PROJECT NUMBER: UK
BUDGET ACTIVITY:	N/A	PROGRAM ELEMENT:	N/A	MULTI-LATERAL	PROJECT NUMBER: ML
BUDGET ACTIVITY:	N/A	PROGRAM ELEMENT:	N/A	CANADA	PROJECT NUMBER: CAN
		PROGRAM ELEMENT TITLE:	JOINT STRIKE FIGHTER PROGRAM		PROJECT TITLE: JSF

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

	Project Cost Categories	FY 1997	FY 1998	FY 1999
a.	Weapon System Concept Demonstrations Contracts (including flying demonstrations)	409,727	696,154	702,484
b.	Alternate Engine Program	25,000	29,000	23,000
c.	Technology Maturation and Systems Engineering Support Total	152,784	181,298	184,995
	Breakout:			
	Technology Maturation			
	Airframe	8,370	1,509	1,200
	Flight Systems	38,445	29,912	26,790
	Manufacturing and Producibility	6,577	4,610	5,134
	Propulsion	23,605	32,159	6,319
	Mission Systems	37,025	59,558	99,050
	Subtotal Technology Maturation	114,022	127,748	138,493
	Plus: Systems Engineering Support	38,762	53,550	46,502
		152,784	181,298	184,995
d.	Prognostics and Health Management	7,612	14,270	12,467
e.	Supportability and Training	9,629	8,859	15,168

BUDGET ACTIVITY:	4	PROGRAM ELEMENT:	0603800N	USN	PROJECT NUMBER: D2209
BUDGET ACTIVITY:	4	PROGRAM ELEMENT:	0603800F	USAF	PROJECT NUMBER: 2025
BUDGET ACTIVITY:	3	PROGRAM ELEMENT:	0603800E	DARPA	PROJECT NUMBER: JA-01
BUDGET ACTIVITY:	N/A	PROGRAM ELEMENT:	N/A	UNITED KINGDOM	PROJECT NUMBER: UK
BUDGET ACTIVITY:	N/A	PROGRAM ELEMENT:	N/A	MULTI-LATERAL	PROJECT NUMBER: ML
BUDGET ACTIVITY:	N/A	PROGRAM ELEMENT:	N/A	CANADA	PROJECT NUMBER: CAN
		PROGRAM ELEMENT TITLE:	JOINT STRIKE FIGHTER PROGRAM		PROJECT TITLE: JSF

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

	Project Cost Categories (Cont)	FY 1997	FY 1998	FY 1999
f.	Requirements	15,387	20,341	14,575
	Breakout:			
	Modeling and Simulation	10,191	10,790	7,591
	Analysis, Threat/Intelligence, Cost & Operational Performance Trades (COPT) and Core Team Support	5,196	9,551	6,984
g.	Mission Support	13,937	15,071	11,450
h.	Services' General Reductions	2,097	17,128	
	Total	636,173	982,121	964,139
	Funding Resources:			
	0603800N	243,286	449,674	463,402
	0603800F	251,626	432,277	456,137
	0603800E	70,261	22,970	0
	United Kingdom	71,000	55,000	34,000
	Multi-Lateral		17,900	7,600
	Canada		4,300	3,000
	Total	636,173	982,121	964,139

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

BUDGET ACTIVITY: 4	PROGRAM ELEMENT: USN	0603800N	USN	PROJECT NUMBER:	D2209
BUDGET ACTIVITY: 4	PROGRAM ELEMENT: USAF	0603800F	USAF	PROJECT NUMBER:	2025
BUDGET ACTIVITY: 3	PROGRAM ELEMENT: DARPA	0603800E	DARPA	PROJECT NUMBER:	JA-01
BUDGET ACTIVITY: NA	PROGRAM ELEMENT: UNITED KINGDOM	N/A	UNITED KINGDOM	PROJECT NUMBER:	UK
BUDGET ACTIVITY: NA	PROGRAM ELEMENT: MULTILATERAL	N/A	MULTI-LATERAL	PROJECT NUMBER:	ML
BUDGET ACTIVITY: NA	PROGRAM ELEMENT: CANADA	N/A	CANADA	PROJECT NUMBER:	CAN
	PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER PROGRAM			PROJECT TITLE:	JSF

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) No budget in FY 1993 and Prior.

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
PRODUCT DEVELOPMENT										
Strike Warfare Concept Studies (Total Prior to FY 1997)										
Miscellaneous	Various	Oct93-Sep94			11,467					11,467
SUBTOTAL					11,467					11,467
Technology Maturation Concept Exploration Phase (Total Prior to FY 1997)										
Fld. Activ.	Various	Oct93-Sep94	3,432	3,432	3,432					3,432
Strike Warfare Systems Design Development (Total Prior to FY 1997)										
Boeing	C/CPFF	Dec 94	32,770	32,770	32,770					32,770
McAir	C/CPFF	Dec 94	23,708	23,708	23,708					23,708
Northrop Pico Rivera CA	C/CPFF	Dec 94	21,358	21,358	21,358					21,358
Lockheed	C/CPFF	Dec 94	28,311	28,311	28,311					28,311
Miscellaneous	Various	Various	1,121	1,121	1,121					1,121
Fld. Activ.	Various	Oct95-Sep96	8,322	8,322	8,322					8,322
SUBTOTAL					115,590					115,590
ASTOVL (Total Prior to FY 1997										
Lockheed	SS/CPFF	Oct 94	16,416	16,416	16,416					16,416
Boeing	SS/CPFF	Jan 95	11,200	11,200	11,200					11,200
Miscellaneous	Various	Various	15,539	15,539	15,539					15,539
SUBTOTAL					43,155					43,155
Core Team Support (Total Prior to FY 1997)										
Fld. Activ.	Various	Oct96-Sep97	2,522	2,522	2,522					2,522

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: February 1998

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Weapon System Concept Demonstrations (including flying demonstrators and supporting propulsion efforts)										
Boeing	C/CPFF	Nov 96	649,802	649,802 *		72,208	182,827	238,684	156,083	649,802
Lockheed	C/CPFF	Nov 96	706,800	706,800 *		105,900	203,200	246,900	150,800	706,800
Pratt & Whitney West Palm Beach FL	SS/CPAF	Nov 96	832,046	832,046		231,619	310,127	216,900	73,400	832,046
SUBTOTAL			2,188,648	2,188,648		409,727	696,154	702,484	380,283	2,188,648
*includes government managed equipment										
Alternate Engine Program										
GE	SS/CPFF	Nov 95	114,000	114,000	7,000	25,000	29,000	23,000	30,000	114,000
Technology Maturation										
Airframe										
McAir	SS/CPFF	Dec 94	19,240	19,240	12,100	7,140				19,240
Miscellaneous	Various	Various	2,485	2,485	1,861	24	100	500		2,485
Fld. Activ.	Various	Oct98-Sep99	5,603	5,603	1,788	1,106	1,409	700	600	5,603
SUBTOTAL					15,749	8,270	1,509	1,200	600	27,328
Flight Systems										
Lockheed	C/CPFF	Dec 94	51,227	51,227	15,296	16,088	10,029	7,708	2,106	51,227
McAir	C/CPFF	Dec 94	65,426	65,426	14,701	16,900	15,200	13,400	5,225	65,426
Miscellaneous	Various	Various	9,801	9,801	6,898	1,535	657	400	311	9,801
Fld. Activ.	Various	Oct98-Sep99	19,568	19,568	5,926	3,872	3,938	5,162	670	19,568
SUBTOTAL					42,821	38,395	29,824	26,670	8,312	146,022
Manufacturing and Producibility										
Hughes Los Angeles CA	C/CPFF	Dec 94	5,065	5,065	3,035	2,030				5,065
Lockheed	C/CPFF	Dec 94	11,190	11,190	2,897	1,836	2,767	2,890	800	11,190
General Res. Corp. Huntsville AL	C/CPFF	Dec 94	1,945	1,945	1,945					1,945
Scaled Comp.	C/CPFF	Jun 97	2,000	2,000		2,000				2,000
Miscellaneous	Various	Various	3,138	3,138	830	178	1,035	1,095		3,138
Fld. Activ.	Various	Oct98-Sep99	5,915	5,915	1,925	533	808	1,149	1,500	5,915
SUBTOTAL					10,632	6,577	4,610	5,134	2,300	29,253

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Propulsion										
Pratt & Whitney	C/CPFF	Dec 94	5,448	5,448	5,448					5,448
GE Cincinnati OH	SS/CPFF	Dec 94	5,681	5,681	5,681					5,681
Pratt & Whitney	SS/CPFF	Nov 95	30,000	30,000	30,000					30,000
Pratt & Whitney	SS/CPFF	Feb 97	29,780	29,780		13,859	13,009	2,912		29,780
Pratt & Whitney	SS/CPFF	Mar 97	3,640	3,640		3,640				3,640
Pratt & Whitney	SS/TBD	Dec 97	9,200	9,200		2,400	5,600	1,200		9,200
Miscellaneous	Various	Various	12,895	12,895	12,895					12,895
Fld. Activ.	Various	Oct98-Sep99	21,670	21,670	2,214	3,706	13,550	2,200		21,670
SUBTOTAL					56,238	23,605	32,159	6,312		118,314
Mission Systems										
TI Plano TX	C/CPFF	Dec 94	2,464	2,464	2,464					2,464
Lockheed	SS/CPFF	Dec 95	6,856	6,856	3,006	2,250	1,600			6,856
McAir	SS/CPFF	Dec 95	6,524	6,524	2,674	2,250	1,600			6,524
Hughes	C/CPFF	Dec 95	54,637	54,637	5,153	8,619	13,502	23,832	3,531	54,637
Westinghouse Baltimore MD	C/CPFF	Dec 95	49,998	49,998	4,788	7,660	13,498	20,522	3,530	49,998
Boeing	C/CPFF	Mar 96	33,024	33,024	300	3,874	11,000	16,700	1,150	33,024
Lockheed	C/CPFF	Mar 96	32,993	32,993	300	3,843	11,000	16,700	1,150	32,993
New Contract	C/CPFF	Jan 98	19,599	19,599			2,200	5,000	12,399	19,599
New Contract	C/CPFF	Dec 98	12,800	12,800				8,400	4,400	12,800
New Contract	C/CPFF	Dec 98	5,300	5,300				1,000	4,300	5,300
Hughes	C/CPFF	Dec 94	3,681	3,681	2,628	1,053				3,681
Miscellaneous	Various	Various	20,097	20,097	18,853	930	314			20,097
Fld. Activ.	Various	Oct98-Sep99	33,551	33,551	10,982	6,546	4,557	6,596	4,870	33,551
SUBTOTAL					51,148	37,025	59,271	98,750	35,330	281,524
Systems Engineering Support										
Miscellaneous	Various	Various	16,423	16,423		4,780	4,923	3,020	3,700	16,423
Fld. Activ.	Various	Oct98-Sep99	173,205	173,205		33,578	48,177	42,982	48,468	173,205
SUBTOTAL						38,358	53,100	46,002	52,168	189,628

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Prognostics and Health Management										
Boeing	C/CPFF	Jun 97	11,100	11,100		750	3,700	3,750	2,900	11,100
Lockheed	C/CPFF	Apr 97	13,100	13,100		2,050	3,000	5,350	2,700	13,100
Pratt & Whitney	C/CPFF	Jun 97	10,100	10,100		3,920	6,180			10,100
GE	C/CPFF	Mar 98	3,067	3,067			200	2,617	250	3,067
Miscellaneous	Various	Various	2,099	2,099		559	990	550		2,099
Fld. Activ.	Various	Oct98-Sep99	933	933		333	200	200	200	933
SUBTOTAL						7,612	14,270	12,467	6,050	40,399
Supportability and Training										
Classified										
Project 3	C/CPFF	Dec 94	13,037	13,037	2,262	3,000	3,250	1,675	2,850	13,037
Project 4	C/CPFF	Dec 94	9,324	9,324	1,038	2,525	1,236	1,675	2,850	9,324
Boeing	C/CPFF	Jun 97	3,875	3,875		1,000	1,375	1,500		3,875
Lockheed	C/CPFF	Jun 97	3,875	3,875		1,000	1,375	1,500		3,875
New Contract	C/CPFF	Jan 99	28,141	28,141				7,618	20,523	28,141
Miscellaneous	Various	Various	2,271	2,271	2,127	144				2,271
Fld. Activ.	Various	Oct98-Sep99	10,317	10,317	3,044	1,940	1,598	1,170	2,565	10,317
SUBTOTAL					8,471	9,609	8,834	15,138	28,788	70,840
Modeling and Simulation										
Miscellaneous	Various	Various	32,576	32,576	4,341	6,541	9,137	6,269	6,288	32,576
Fld. Activ.	Various	Oct98-Sep99	9,114	9,114	1,807	3,160	1,403	1,072	1,672	9,114
SUBTOTAL					6,148	9,701	10,540	7,341	7,960	41,690
Analysis, Threat, COPT and Core Support										
Miscellaneous	Various	Various	25,104	25,104	7,298	3,918	6,551	4,620	2,717	25,104
Fld. Activ.	Various	Oct98-Sep99	16,949	16,949	8,794	1,048	2,770	2,114	2,223	16,949
SUBTOTAL					16,092	4,966	9,321	6,734	4,940	42,053
Mission Support										
Institute for Defense Anal	Grant	Jan 97	2,500	2,500		2,500				2,500
Fld. Activ.	Various	Oct98-Sep99	29,059	29,059	7,896	4,429	7,016	4,578	5,140	29,059
SUBTOTAL					7,896	6,929	7,016	4,578	5,140	31,559

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 1998

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
SUPPORT AND MANAGEMENT ORGANIZATIONS (CS)										
ANSER Arlington VA	SS/CPFF	Apr 94	19,042	19,042	9,793	5,028	4,221			19,042
New Contract	C/CPFF	Feb 00	6,952	6,952				3,721	3,231	6,952
Miscellaneous	Various	Various	25,766	25,766	8,041	3,274	5,164	4,601	4,686	25,766
SUBTOTAL					17,834	8,302	9,385	8,322	7,917	51,760
TEST AND EVALUATION: (included above)										
GOVERNMENT FURNISHED PROPERTY: N/A										
Subtotal Product Development					398,361	625,774	955,608	955,817	561,871	3,497,431
Subtotal Support and Management					17,834	8,302	9,385	8,322	7,917	51,760
Services' General Reductions						2,097	17,128			19,225
Subtotal Test and Evaluation					0	0	0	0	0	0
Total Project					416,195	636,173	982,121	964,139	569,788	3,568,416
Funding Resources										
0603800N					208,221	243,286	449,674	463,402	271,141	1,635,724
0603800F					165,057	251,626	432,277	456,137	262,647	1,567,744
0603800E					28,917	70,261	22,970			122,148
United Kingdom					14,000	71,000	55,000	34,000	26,000	200,000
Multi-Lateral							17,900	7,600	6,700	32,200
Canada						0	4,300	3,000	3,300	10,600
Total					416,195	636,173	982,121	964,139	569,788	3,568,416

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1998

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603851M Non-Lethal Warfare DEM/VAL

PROJECT: C2319

COST (*In Thousands*)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
C2319 Non Lethal Weapons Program	9326	16290	22592	23636	24165	24631	25114	Continuing	Continuing
Quantity of RDT&E Articles									

A. (U) **Mission Description and Budget Item Justification:**
This project covers non lethal weapon (NLW) systems which are those systems that by their design, do not inflict fatal or permanent injuries. Instead, these systems are designed to stun, incapacitate, or hinder movement of individuals, crowds , or equipment.

(U) **Justification for Budget Activity**: This program is funded under Demonstration/Validation because it develops and integrates hardware for non-lethal weapons capabilities.

FY 1997 Planned Program:

- (U) $ 742 Established and staffed the Joint NLW Directorate
- (U) $ 210 Developed a computer code for directly measuring and determining blunt impact target effects to the thoracic region with subsequent performance validation testing and verification.
- (U) $ 700 Demonstrated enhancements of nonlethal technology in the Sea Dragon Advanced Concept Technology Demonstration (ACTD).
- (U) $ 1000 Demonstrated enhancements of nonlethal technology in the Military Operations Urban Terrain (MOUT)ACTD.
- (U) $ 120 Accomplished safety release testing, human factors evaluation, and packaging requirements, leading to a MS III decision for the Scorpion round.
- (U) $ 60 Developed an initial prototype for the 40mm Mk 19 NL Grenade to incorporate blunt impact ("stinger") rubber ball munitions
- (U) $ 475 Designed, fabricated, and demonstrated a scaled-up initial prototype vortex ring nonlethal air/gas gun
- (U) $ 100 Evaluated a paintball delivery technology for nonlethal applications.
- (U) $ 51 Developed and evaluated 3-Rib model with non-lethal munitions.
- (U) $ 308 Developed and evaluated Maritime Asset interdiction options to stop / slow maritime targets.
- (U) $ 450 Developed active Denial Technology on HMMWV mounted directed energy system
- (U) $ 50 Demonstrated a nonlethal prototype area denial/perimeter defense system

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE: February 1998
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603851M Non-Lethal Warfare DEM/VAL — PROJECT: C2319

•	(U) $	4	Tested a concertina wire type payload for the Volcano vehicle-mounted mine.
•	(U) $	269	Demonstrated system testing of a pre-emplaced system to stop a vehicle (up to 5100 pounds) traveling at speeds between 40-60 miles per hour.
•	(U) $	150	Evaluated and downselected several proposed electrical vehicle stoppers and initial moving vehicle field trials.
•	(U) $	347	Accomplished demonstration testing to identify bio-effects of target vulnerability and operator safety in various acoustic regimes and expand database.
•	(U) $	1197	Developed combustion driven sources to propagate acoustic energy at high power levels.
•	(U) $	278	Developed electrically driven sources to study propagation issues associated with acoustics for bio-effects.
•	(U) $	634	Developed and demonstrated two NL prototype munitions (sting ball and pyrotechnic whistle) for the light vehicle smoke obscurant system.
•	(U) $	400	Downselected a foam (or foams) for integration into a delivery platform and demonstration in conjunction with a concept of operations study.
•	(U) $	250	Accomplished demonstration testing of nonlethal payloads from existing UAVs.
•	(U) $	100	Accomplished demonstration testing of a missile as a platform to deliver nonlethal agents
•	(U) $	1000	Completed the preliminary design model of a hand held, eye-safe-at-the-aperture variant of the Saber 203.
•	(U) $	431	Demonstrated testing of a multi-purpose, nonlethal payload dispenser onto a UAV.
(U)Total $		9,326	

FY 1998 Planned Program:

•	(U) $	964	Administration of the Joint NLW Program and technologies database expansion.
•	(U) $	1000	Develop and evaluate expanded non lethal technologies in the MOUT and Sea Dragon ACTDs.
•	(U) $	1100	Expansion of nonlethal modeling & simulation initiatives.
•	(U) $	750	Technology investment funds
•	(U) $	605	NL crowd disperser round - Develop a multiple stinger ball round of NLW ammunition for the M203 Grenade Launcher
•	(U) $	1010	Bio Effects - Demonstration testing to identify bio-effects of target vulnerability and operator safety in various acoustic regimes and establish an initial database
•	(U) $	1130	Modular Crowd Control Munition - type classification of the Non lethal "Claymore" mine
•	(U) $	1050	Ground Vehicle Stopper - Evaluation of several proposed electrical vehicle stoppers that have potential in stopping maritime vessels.
•	(U) $	1050	Maritime Asset Interdiction - Continued development and evaluation of options to stop/slow ground vehicles..
•	(U) $	1000	Speed Bump Mine - System testing of a pre-emplaced system to stop a vehicle (up to 5100 pounds) traveling at speeds between 40-60 miles per hour.
•	(U) $	1514	Active Denial Technology - Development of HMMWV mounted directed energy system
•	(U) $	640	Additional testing of special non lethal rounds for the 66mm vehicle launched payloads.
•	(U) $	600	UAV Non Lethal Payloads - Continued development of the integration of non lethal payloads into Unmanned Aerial Vehicles
•	(U) $	950	Bounding Non Lethal Munition - Develop a non lethal bounding munition to serve as an area denial/perimeter defense system

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE: February 1998
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603851M Non-Lethal Warfare DEM/VAL — PROJECT: C2319

•	(U) $	1260	Canister Launched Area Denial System (CLADS) - Further development of concertina wire type payload for the Volcano vehicle-mounted mine.
•	(U) $	300	Foam Applications - Continued development of two foam systems, specifically integration of foams into delivery platforms.
•	(U) $	500	Acoustic Generators Continued development of electrically driven sources to study propagation issues associated with acoustics for bio-effects.
•	(U) $	458	Vortex Ring Gun - Design, fabrication and demonstration of a scaled-up initial prototype vortex ring nonlethal air/gas gun
•	(U) $	340	Under Barrel Tactical Payload Delivery System - Integration of paintball technology onto current service rifle
•	(U) $	69	SBIR: Portion of program reserved for Small Business Innovation Research assessment in accordance with 15 U. S. C. 638 (f) (1).
(U)Total $		16,290	

FY 1999 Planned Program:

•	(U) $	439	Administration of the Joint NLW Program and technologies database expansion.
•	(U) $	1400	Develop and evaluate expanded non lethal technologies in the MOUT and Sea Dragon ACTDs.
•	(U) $	1540	Expansion of nonlethal modeling & simulation initiatives.
•	(U) $	1500	Administration of technology investment funds
•	(U) $	670	NL crowd disperser round - Develop a multiple stinger ball round of NLW ammunition for the M203 Grenade Launcher
•	(U) $	1730	Bio Effects - Demonstration testing to identify bio-effects of target vulnerability and operator safety in various acoustic regimes and establish an initial database
•	(U) $	1200	Ground Vehicle Stopper - Evaluation of several proposed electrical vehicle stoppers that have potential in stopping maritime vessels.
•	(U) $	1200	Maritime Asset Interdiction - Continued development and evaluation of options to stop/slow maritime targets.
•	(U) $	1700	Speed Bump Mine - System testing of a pre-emplaced system to stop a vehicle (up to 5100 pounds) traveling at speeds between 40-60 miles per hour.
•	(U) $	4865	Active Denial Technology - Development of HMMWV mounted directed energy system
•	(U) $	600	Additional testing of special non lethal rounds for the light vehicle smoke obscurant.
•	(U) $	1100	UAV Non Lethal Payloads - Continued development of the integration of non lethal payloads into Unmanned Aerial Vehicles
•	(U) $	1600	Bounding Non Lethal Munition - Develop a non lethal bounding munition to serve as an area denial/perimeter defense system
•	(U) $	1000	Canister Launched Area Denial System (CLADS) - Further development of concertina wire type payload for the Volcano vehicle-mounted mine.
•	(U) $	198	Foam Applications - Continued development of two foam systems, specifically integration of foams into delivery platforms.
•	(U) $	700	Acoustic Generators Continued development of electrically driven sources to study propagation issues associated with acoustics for bio-effects.
•	(U) $	500	Vortex Ring Gun - Design, fabrication and demonstration of a scaled-up initial prototype vortex ring nonlethal air/gas gun
•	(U) $	650	Under Barrel Tactical Payload Delivery System - Integration of paintball technology onto current service rifle
(U)Total $		22,592	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE: February 1998
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603851M Non-Lethal Warfare DEM/VAL — PROJECT: C2319

B. (U) Project Change Summary

	FY 1997	FY 1998	FY 1999
(U) Previous President's Budget	9591	16807	23515
(U) Adjustments to Previous President's Budget (Taxes)	-265	-517	-923
(U) Current Budget Submit	9326	16290	22592

(U) Change Summary Explanation:

(U) Funding: Decrease of 265k in FY 97 is due to SBIR and reduced inflation. Decrease of 517k in FY 1998 and 398k in FY 1999 due to reduced inflation, also decrease of 525k in FY 99 due to functional transfer to O&M for civilian salaries.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary

(APPN, BLI,NOMEN)	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	To Complete	Total Cost
PAN,MC, BLI 166300, Items < $2M	1906	0	0	0	0	0	0	0	3806
PAN,MC, BLI 162800, Non-Lethals	0	1956	984	1957	1947	1941	1936	Cont.	Cont.

D. (U) Schedule Profile N/A

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603860N
PROGRAM ELEMENT TITLE: Joint Precision Approach Landing System

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2329 Joint Precision Approach Landing System	0	2,894	0	0	0	0	0	Cont.	Cont.
TOTAL	0	2,894	0	0	0	0	0	Cont.	Cont.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program element provides for the engineering, development, integration, adaptation, and testing of new and/or modernized precision air traffic control and landing aids. Joint Precision Approach and Landing System (JPALS) hardware and software are required to provide improved flight safety and more reliable all-weather landing capabilities ashore and afloat. Funded programs are required to upgrade or replace aging landing equipment on aircraft, aircraft carriers, amphibious ships, Naval Air Stations, and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites. Development of the JPALS hardware is required for Navy unique ship, shore and avionics applications.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ENGINEERING & MANUFACTURING DEVELOPMENT because it encompasses engineering and manufacturing development of new end-items prior to production approval decision.

Exhibit R-2

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603860N
PROGRAM ELEMENT TITLE: Joint Precision Approach Landing System

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 COMPLETE	FY 2002 PROGRAM	FY 2003	TO	TOTAL
W2329 Joint Precision Approach Landing System	0	2,894	0	0	0	0	0	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Joint Precision Approach Landing System project provides for the engineering, development, integration, adaptation, and testing of new and/or modernized precision air traffic control and landing aids. Joint Precision Approach and Landing System (JPALS) hardware and software are required to provide improved flight safety and more reliable all-weather landing capabilities ashore and afloat. Funded programs are required to upgrade or replace aging landing equipment on aircraft, aircraft carriers, amphibious ships, Naval Air Stations, and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites. Development of the JPALS hardware is required for Navy unique ship, shore and avionics applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1998 PLAN:

- (U) ($2,416) Provide engineering support, system development, and test and evaluation for JPALS.
- (U) ($478) Provide JPALS aircraft integration/A-kit development.

2. (U) FY 1999 PLAN: Not Applicable.

Exhibit R-2

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0603860N | PROGRAM ELEMENT TITLE: JPALS | PROJECT NUMBER: W2329 | PROJECT TITLE: JPALS

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's budget:	0	2,993	0
(U) Appropriated Value:	0	2,993	0
(U) Adjustments from PRESBUDG:	0	-99	0
(U) FY 1999 President's Budget:	0	2,894	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1998 decrease of -99 thousand consists of -45 thousand for 1.5% general reduction, -37 thousand for R&D general reduction, -10 thousand for consulting services, and -7 thousand for revised economic assumptions.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0305114A (Joint Precision Approach Landing System)
(U) PE 0305114F (Joint Precision Approach Landing System)
(U) PE 0305114N (Joint Precision Approach Landing System)
(U) PE 0603512N (Carrier Systems Development)
(U) PE 0604504N (Air Control)
(U) PE 0604512N (Shipboard Aviation Systems)

Exhibit R-2

DATE: February 1998

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603860N
PROGRAM ELEMENT TITLE: JPALS

PROJECT NUMBER: W2329
PROJECT TITLE: JPALS

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999	TO COMPLETE
Program Milestones		1Q-4Q DEMVAL/ EMD		
Engineering Milestones				
T&E Milestones		1Q-4Q Testing Preparation		
Contract Milestones				

Exhibit R-2

DATE: February 1998

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603860N
PROGRAM ELEMENT TITLE: JPALS

PROJECT NUMBER: W2329
PROJECT TITLE: JPALS

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Dev	0	1160	0
b. Systems Engineering Sup	0	963	0
c. T & E Support	0	480	0
d. Project Management Sup	0	251	0
e. Travel	0	40	0
Total	0	2,894	0

Exhibit R-3

DATE: February 1998

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603860N
PROGRAM ELEMENT TITLE: JPALS

PROJECT NUMBER: W2329
PROJECT TITLE: JPALS

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1996 & Prior	FY 1997 ACTUAL	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development Miscellaneous		Various	-	-	0	0	2,123	0	Cont.	Cont.
Support and Management Miscellaneous		Various	-	-	0	0	291	0	Cont.	Cont.
Test and Evaluation Miscellaneous		Various	-	-	0	0	480	0	Cont.	Cont.

GOVERNMENT FURNISHED PROPERTY : Not applicable.

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Production Development	0	0	2,123	0	Cont.	Cont.
Subtotal Support and Management	0	0	291	0	Cont.	Cont.
Subtotal Test and Evaluation	0	0	480	0	Cont.	Cont.
Total Project	0	0	2,894	0	Cont.	Cont.

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

Date: Jan 98

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604327N
PROGRAM ELEMENT TITLE: Hardened Target Munitions

(U) COST (Dollars in thousands)

PROJECT NUMBER &	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
	N/A	4,839	9,827	TBD	TBD	TBD	TBD	TBD	TBD
J2331 Hardened Target Munitions									

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Advanced Penetrator Definition Program will develop an advanced conventional earth penetrating warhead for use on conventional ballistic missiles. FY 1998 and FY 1999 program definition and risk reduction efforts will aid determination of outyear requirements.

1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN Date: Jan 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604327N
PROGRAM ELEMENT TITLE: Hardened Target Munitions

PROJECT NUMBER: J2331
PROJECT TITLE: Hardened Target Munitions

(U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1997 PLAN: N/A

2. (U) FY 1998 PLAN:

(U) ($4,839) Initiate Advanced Penetrator Definition program. Full obligation is projected by the 3rd quarter of the 1st year. FY 1998 efforts include:

(U) Initiate evaluation of reactive materials for penetrator warhead loading.

(U) Define penetrator design options for increased penetration.

(U) Initial definition of missile functional interfaces in support of providing missile guidance from the warhead.

3. FY 1999 PLAN: N/A

(U) (9,827) Continue Advanced Penetrator Definition Program. Full obligation is projected by the 3rd quarter of the 1st year. FY 1999 efforts include:

(U) Initiate ground tests to establish fragment, blast and temperature response environments.

(U) Initiate testing to obtain environmental data on penetrators which impact concrete at velocities up to 4000 feet per second.

(U) As needed, alternatives/modifications to the Hard Target Smart Fuze will be investigated.

(U) Initiate trade studies focusing on internal packaging & system guidance architectures.

(U) Define GPS receiver design and data processing options which optimize system accuracy and minimize degradation due to GPS jamming.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

Date: Jan 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604327N
PROGRAM ELEMENT TITLE: Hardened Target Munitions

PROJECT NUMBER: J2331
PROJECT TITLE:
Hardened Target Munitions

B. (U) PROGRAM CHANGE SUMMARY:

(U) CHANGE SUMMARY EXPLANATION:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	4,987	0
(U) Appropriated Value:	0	4,987	0
(U) Adjustment to FY 1997 Appropriated Value/President's Budget:	0	(-)148	+9,827
(U) FY 1999 PRESBUDG submit::	0	4,839	9,827

(U) CHANGE SUMMARY EXPLANATION: FY 1998 reduction represents Congressional adjustments: The FY 1999 increase continues program definition and risk reduction efforts.

(U) Schedule: N/A

(U) Technical: N/A

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

DATE: Jan 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604327N
PROGRAM ELEMENT TITLE: Hardened Target Munitions

PROJECT NUMBER: J2331
PROJECT TITLE: Hardened Target Munitions

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
NA	NA	NA	NA	NA	NA	NA	NA	N/A

(U) RELATED RDT&E: N/A

D. (U) SCHEDULE PROFILE: N/A

(U) COST (Dollars in thousands)

1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: Jan 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604327N PROGRAM ELEMENT TITLE: Hardened Target Munition PROJECT NUMBER: J2331 PROJECT TITLE: Hardened Target Munitions

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Hardened Target Munitions	0	4,839	9,827

Budget Item Justification
(Exhibit R-3, page 5 of 6)

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FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN

Date: Jan 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604327N
PROGRAM ELEMENT TITLE: Hardened Target Munition

PROJECT NUMBER: J2331
PROJECT TITLE: Hardened Target Munitions

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development										
LMMS	SS/CPFF	10/97	1102	1102			1102			1102
CSDL	SS/CPFF	10/97	500	500			500			500
SPA	SS/CPFF	10/97	52	52			52			52
LMMS	SS/CPFF	10/98	3837	3837				3837		3837
CSAL	SS/CPFF	10/98	700	700				700		700
SPA	SS/CPFF	10/98	200	200				200		200

GOVERNMENT FURNISHED PROPERTY

Item Description	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Delivery Date	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Product Development									
NAWC	WR	10/97				580			580
SNL	MIPR	10/97				1,005			1,005
ARMY	MIPR	10/97				600			600
AIR FORCE	MIPR	10/97				1,000			1,000
NAWC	WR	10/98					2,040		2,040
SNL	MIPR	10/98					1,750		1,750
ARMY	MIPR	10/98					800		800
AIR FORCE	MIPR	10/98					500		500

Budget Item Justification
(Exhibit R-3, 6 of 6)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET | DATE: February 1998

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0604707N | PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support | PROJECT NUMBER: X0798 | PROJECT TITLE: OTH Targeting

(U) COST: (Dollars in Thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 200 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	1,308	1,569	1,607	1,705	1,700	1,944	1,981	Cont.	Cont.
X2144 SEW Engineering	5,231	3,915	7,504	7,629	7,904	7,755	6,554	Cont.	Cont.
X2357 Maritime Battle Center		2,911	8,844	9,903	4,884				26,631
TOTAL	6,539	8,395	17,955	19,237	14,488	9,699	8,535	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Program Element (PE) contains three projects: Over-the-Horizon (OTH) Targeting, Space and Electronic Warfare (SEW) Engineering, and Maritime Battle Center. The projects are systems engineering non-acquisition programs with the objectives of developing, testing and validating Naval Command, Control, Communications, Computers, Intelligence, Reconnaissance, and Surveillance (C4ISR) architectures to support naval missions in Joint and Coalition Theater. The mission of this program element is carried out by multiple tasks that are used to ensure Naval C4ISR Command and Control Warfare (C2W) components of SEW are effectively integrated into the C4ISR architectures. The Program additionally ensures that (1) the composite operational capabilities of SEW systems (not the individual component systems) conform to the Naval C4ISR architecture as related to the objectives of National Defense Strategy and evolving joint visions and direction, such as Joint Vision 2010, "COPERNICUS...Forward", "Forward...From the Sea," C4I For the Warrior, and the Defense Science Board Summer Study Task Force on Information Architecture for the Battlefield and are guided by CINC requirements; and (2) that SEW systems and systems integration effort involves leading-edge technology transfer of information processing technologies primarily through integration of government and commercial off-the-shelf (COTS/GOTS) products to enhance the Navy's operational capability, interoperability, flexible reconfiguration, as well as reduce costs. The Maritime Battle Center will be a distributed organization consisting of concept development and analysis coordinated by the Naval War College, operations coordinated by the Sea-Based Battle Labs (SBBL) and technical development coordinated by the Space and Naval Warfare Systems Command (SPAWAR). The MBC will also act as the Navy representative to the Joint Battle Center and the Battle Labs of other services.

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BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0604707N | PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support | PROJECT NUMBER: X0798 | PROJECT TITLE: OTH Targeting

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications. It also develops a virtual demonstration and validation environment across Navy for C4ISR.

(U) COST: (Dollars in thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	1,308	1,569	1,607	1,705	1,700	1,944	1,981	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Over-the-Horizon Targeting (OTH-T) project supports prototyping and engineering activities critical to the development of operational capabilities to target TOMAHAWK and HARPOON cruise missiles beyond the sensor range of the launch platforms. Specifically, this project demonstrates enhanced capability to integrate sensor data using prototype sensor interface systems and provide that information via satellite communications to: (1) the Force Over-the-Horizon Track Coordinator (FOTC) for input into the common tactical/operational picture, and (2) TOMAHAWK and HARPOON cruise missile targeting systems. This line supports the promulgation of composite OTH-T system specifications; certifies the interoperability of, and exercises configuration control over any system that operates on the Officer-in-Tactical Command Information Exchange System (OTCIXS) net. This ensures the integrity of the net for transmission of OTH-T messages as new systems come onto the net, or as existing systems undergo substantive software revisions/upgrades. This line also provides technical expertise afloat and ashore via a cadre of highly-trained Fleet Systems Engineers who ensure smooth integration of new capabilities to enhance OTH-T during major Fleet exercises and demonstrations which are used to validate and evaluate developed portions ofC4ISR Operational and Systems Architecture.

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DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support

PROJECT NUMBER: X0798
PROJECT TITLE: OTH Targeting

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($203) Initiated prototype definition study. Provided the Navy-led JWID 97 initiative with continued east coast administrative support during SPAWAR BRAC move to San Diego.

- (U) ($559) Provided Fleet Engineering Support to Fleet CINCs to perform the following: monitor technical performance of OTCIXS during testing of interoperability of Advanced Tomahawk Weapon Control System (ATWCS), advanced submarine combat system (AN/BSY-2), migration of systems into JMCIS, and provide end-to-end system engineering expertise to ensure smooth integration of these same systems into the Fleet.

- (U) ($546) OTH Targeting Interoperability Certification - Utilize RLBTS to test evolutionary software enhancements, i.e., systems migration into JMCIS, ATWCS, and BSY-2 to verify compliance with interoperability requirements.

2. (U) FY 1998 PLAN:

- ($276) Conduct prototyping and demonstrations of OUTLAW HAWKEYE, an initiative to field advanced communications information management and real-time intelligence packages for the E-2C Aircraft. Evaluate potential packages and E-2C architecture.

- ($645) Provide Fleet Engineering Support to Fleet CINCs to perform the following: monitor technical performance of OTCIXS during testing of interoperability of prototype systems into JMCIS, provide end-to-end system engineering expertise to ensure smooth integration of these same systems into the Fleet, and provide the testing environment which will aid in the integration of such systems for Fleet use.

- ($648) OTH Targeting Interoperability Certification - Utilize RLBTS to test evolutionary software enhancements, i.e., systems migration into JMCIS or GCCS, to verify compliance with interoperability requirements.

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DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support

PROJECT NUMBER: X0798
PROJECT TITLE: OTH Targeting

3. (U) FY 1999 PLAN:

- ($271) Develop hardware/software packages for Command and Control (C2) aircraft on a cooperative basis with industry and the Air Force.

- ($703) Provide Fleet Engineering Support to Fleet CINCs to perform the following: monitor technical performance of OTCIXS during testing of interoperability of prototype systems into JMCIS, provide end-to-end system engineering expertise to ensure smooth integration of these systems into the Fleet, and provide the testing environment which will aid in the integration of such systems for Fleet use.

- ($633) OTH Targeting Interoperability Certification - Utilize RLBTS to test evolutionary software enhancements, i.e., systems migration into JMCIS or GCCS, to verify compliance with interoperability requirements.

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BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0604707N | PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support | PROJECT NUMBER: X0798 | PROJECT TITLE: OTH Targeting

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,377	1,617	1,837
(U) Adjustments from FY 1998 PRESBUDG:	-69	-48	-230
(U) FY 1999 President's Budget Submit:	1,308	1,569	1,607

(U) CHANGE SUMMARY EXPLANATION:

FY 1997: $-4K SBIR Transfer. $-28K: NWCF Adjustments. $-2K: Revised Economic Assumptions. $-35K Other Navy Adjustments.

FY 1998: $-44K Congressional Undistributed General Reductions. $-4K Revised Economic Assumptions

FY 1999: $-23K: NWCF Adjustments. $-207K: Other Navy Adjustments.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: (SEW) Architecture/Engineering Support program element is related to all Naval C4I related efforts.

D. (U) Schedule Profile: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support

PROJECT NUMBER: X0798
PROJECT TITLE: OTH Targeting

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Program Management	37	35	40
b. System Test and Evaluation	675	633	613
c. Prototyping and Demonstration	203	276	271
d. Engineering	177	281	307
e. Fleet Support	216	344	376
Current Allocation	1,308	1,569	1,607

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2144
PROJECT TITLE: SEW Engineering

(U) COST: (Dollars in Thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2144 SEW Engineering	5,231	3,915	7,504	7,629	7,904	7,755	6,554	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Space and Electronic Warfare (SEW) Engineering is a non-acquisition systems engineering effort and has the objectives of developing, testing and validating a Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architecture to support naval missions in Joint and Coalition Theater. The mission is carried out by multiple tasks that are used to ensure Naval C4ISR Command and Control (C2W) components are effectively integrated into the C4ISR architecture. The Project additionally ensures that the composite operational capabilities of the individual component systems conform to the C4ISR as related to the objectives of National Defense Strategy and evolving joint visions and direction, such as Joint Vision 2010, "COPERNICUS...Forward," "Forward...From the Sea," C4I For the Warrior, and the Defense Science Board Summer Study Task Force on Information Architecture for the Battlefield. This effort is guided by CINC requirements and the need to integrate leading-edge information processing technologies primarily through the use of government and commercial off-the-shelf (COTS/GOTS) products to enhance the Navy's operational capability, interoperability, flexible reconfiguration, as well as reduce costs. C^4ISR architectures support the following activities in achieving a fully integrated, interoperable Naval C4I system: identify technology developments that can be brought to bear to meet and validate C4ISR operational objectives, address prioritized CINC issues; integrate Naval C4I system developments, including developments from other services and commercially developed products in support of Joint Warfare Interoperability Demonstrations (JWID); develop interface and connectivity standards based architectures to support the enhanced operational capabilities in support of the C4ISR architectures; extract lessons learned for feedback from research, development, and acquisition programs to support further C4ISR architecture development efforts or more extensive implementation. This effort also performs high-level systems architecture/engineering to support long-range planning for "COPERNICUS...Forward", C4I For the Warrior, Theater Battle Management (in conjunction with the Air Force), Digitization of the Battlefield (in conjunction with the Army), Theater Ballistic Missile Defense, Mine Warfare, Amphibious Warfare integration into C4ISR, the Defense Information infrastructure (DII) and coalition force architectures; as well as technical architecture/engineering to support C4I Office of the Secretary of Defense (OSD) joint technical architecture initiatives.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 1998

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X2144
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support PROJECT TITLE: SEW Engineering

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($904) The U.S. Navy was the lead service for planning, coordination and execution of FY 97's Joint Warrior Interoperability Demonstration (JWID). As lead service, coordinated all participation and developed plans for the integration of maturing system developments, military and commercial technologies that support enhanced operational capability in key Department of Defense (DOD) priority areas and Joint Mission Area (JMA) Assessment Thrust Areas. These include high capacity communications, improved Command and Control Warfare (C2W), integrated landfight architecture, trusted systems/multi-level security, improved sensors/strike planning, common tactical/operational picture, theater air defense/force protection, and combat identification.

- (U) ($1,730) Continued to develop and validate a Naval C4ISR Architecture based on the multi-tier architecture framework of Operational, System and Technical, to support Naval missions in a Joint and Coalition Theater. Architectural development consisted of (1) assisting OPNAV, Navy Doctrine Command, and Fleet Commanders in the development of Operation Architectures for Amphibious Warfare, Undersea Warfare, Strike Warfare, Surface Warfare, Air Warfare, Theater Air Defense, and Mine Warfare, and maintaining documentation describing these Operational Architectures; (2) developing the "As-Is" Interim Systems Architecture for C4ISR as well as defining System Architecture parameters, attributes, and characteristics necessary to ensure that Program Executives and Managers acquire systems that achieve the desired operational objectives; and (3) defining the appropriate Technical Architectural standards and interfaces to achieve fully interoperable systems. Participated with the Joint Battle Center and Naval Battle Laboratories to verify and validate operational and system architectures. The Amphibious Warfare and Strike Warfare operational and systems architectures was completed. Theater Air Defense architectures were updated. Developed joint technical architecture in cooperation with other services.

- (U) ($1,104) Developed high-level systems and operational architecture processes to support long-range planning for Joint Vision 2010, "COPERNICUS...Forward," C4I for the Warrior, Joint Maritime Operations Functional Process Improvement, Amphibious Warfare, Undersea Warfare, Strike Warfare, Surface Warfare, Air Warfare, Theater Air Defense, and Mine Warfare operational architectures. Extracted lessons learned for feedback to research, development, and acquisition programs to support further architecture development efforts. An integrated C4ISR systems architecture, integrated node list, and hierarchical data dictionary were completed. Participated in OSD and joint architectural working groups and panels.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET | DATE: February 1998

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0604707N | PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support | PROJECT NUMBER: X2144 | PROJECT TITLE: SEW Engineering

- (U) ($1,493) Funding provided for the establishment of a JWID 97 program office under the leadership of the Office of the Chief of Naval Operations, Space, Information Warfare, Command, and Control (DCNO N6). The program office was established to provide overall leadership by managing the intra and inter service planning and coordination of JWID 97. Additional RDTE,N funding for Navy leadership of the JWID 97 program office was authorized by a Below Threshold Reprogramming from the Director, Navy Test and Evaluation and Technology Requirements (Ref: DCNO Memo Ser N6E/7U554961 of 14 Feb 97). The JWID 97 office was the central point for planning activities for JWID 97 and provides support to the JWID 97 sponsoring CINC, United States Atlantic Command.

2. (U) FY 1998 PLAN:

- (U) ($1,000) Develop plans for the integration of maturing system developments, military and commercial technologies that support the "COPERNICUS...Forward" concept into the annual Joint Warrior Interoperability Demonstration (JWID). Plans incorporate the use of enhanced operational capabilities in key CINC priority areas and Joint Mission Area (JMA) Assessment Thrust Areas including high capacity communication, improved Command and Control Warfare (C2W), integrated land fight architecture, trusted systems/multi-level security, improved sensors/strike planning, common tactical/operational picture, theater air defense/force protection, and combat identification.

- (U) ($1,350) Continue to develop and validate a Naval C4ISR Architecture based the multi-tier architecture framework of Operational, System, and Technical to support Naval missions in a Joint and Coalition Theater. Architectural development will consist of (1) assisting OPNAV, Navy Doctrine Command, and Fleet Commanders in the continuing upgrade of Operation Architectures and maintain documentation describing the Operational Architectures; (2) providing system architecture parameters, attributes, and characteristics necessary to ensure that Program Executives and Managers acquire systems that achieve the desired operational objectives. Participate with the Joint Battle Center and Naval Battle Laboratories to verify and validate operational and system architectures. The "To-Be" C4ISR systems architecture will be initiated. Previously delivered operational architectures will be updated.

- (U) ($800) Continue architectural and system engineering efforts leading to incremental design and implementation, specifically the integration of JMCOMS, JMCIS, and CDS.

- (U) ($200) Review, validate, and provide operational insight into the development of the "COPERNICUS...Forward" Implementation Documentation.

- (U) ($565) Develop the high-level systems and operational architecture processes to include long range planning for Joint Vision 2010, Copernicus...Forward, C4I for the Warrior, Joint Air Operations Functional Process Improvement, Theater Battle Management (in conjunction with the Air Force), Digitization of the Battlefield (with the Army), Marine Air Ground Task Force (MAGTF) C4I and integration into the DII. An updated integrated C4ISR systems architecture, integrated node list, information exchange requirements and hierarchical data dictionary will be provided. Participate in OSD and joint architectural working groups and panels.

3. (U) FY 1999 PLAN:

- (U) ($1,000) Develop plans for the integration of maturing system developments, military and commercial technologies that support enhanced operational capabilities in key CINC priority areas and Joint Mission Area (JMA) Assessment Thrust Areas into the annual Joint Warrior Interoperability Demonstration (JWID). Integration plans will include high-capacity communications, improved Command and Control Warfare (C2W), integrated landfight architecture, trusted systems/multi-level security, improved sensors/strike planning, common operational picture, collaborative planning, knowledge based systems, smart push-warrior pull data flow, theater air defense/force protection, and combat identification.

- (U) ($3,110) Continue to develop and validate a Naval C4ISR Architecture based on the multi-tier architecture framework of Operational, System, and Technical to support Naval missions in a Joint and Coalition Theater. Architectural development will consist of (1) assisting OPNAV, Navy Doctrine Command, and Fleet Commanders in the development of operation and overarching architectures and maintaining documentation describing the Operational Architectures; (2) providing system architecture parameters, attributes, and characteristics necessary to ensure that Program Executives and Managers acquire systems that achieve the desired operational objectives. Participate with the Joint Battle Center and Naval Battle Laboratories to verify and validate operational and system architectures. The "To-Be" C4ISR Systems Architecture will be completed. The "As-Is" C4ISR Systems Architecture will be updated as appropriate. The decomposition of the overarching "To-Be" C4ISR Systems Architecture will begin. This involves breaking down the specifics of warfighter functions to lower levels of detail.

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DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2144
PROJECT TITLE: SEW Engineering

- (U) ($231) Update the high-level systems and operational architecture processes to support long range planning for Joint Vision 2010, "Copernicus...Forward," C4I for the Warrior, Joint Air Operations Functional Process Improvement, Theater Battle Management (in conjunction with the Air Force), Digitization of the Battlefield (with the Army), Marine Air Ground Task Force (MAGTF) C4I architectures. An updated information exchange requirement list, integrated node list, and hierarchical data dictionary will be completed. Participate in OSD and joint architectural working groups and panels.

- (U) ($3,163) Represent and coordinate Naval C4ISR architecture development with both internal Naval and external service units and agencies including the DoD Architecture Coordination Council (ACC) and ASD(C3I) Joint Technical Architecture (JTA) Development Group. These architectures encompass Naval C4ISR systems including the Joint Maritime Command Information System (JMCIS), the Joint Maritime Communications System (JMCOMS) and Naval Intelligence, Surveillance and Reconnaissance systems. Efforts include initial maintenance of the overarching operational architecture, development of two mission systems architectures, maintenance of the "As-Is" overarching systems architecture, completion of the "To-Be" overarching systems architecture, establishing and populating the dynamic systems model, analysis of the criteria and requirements for the operational system architecture functional transition, continue population of the data models and update the Hierarchical Data Dictionary to reflect Joint study inputs and Naval inputs to the JTA Version 3.0. Provide C4ISR implementation of the Maritime Battle Center (MBC) including senior test engineers and laboratory coordinators to provide test/experimentation development planning with other Navy and service organizations for the conduct of Naval and Joint experimentations including Fleet Warfare Experiments, JWID, IT-21, Theater Air Defense (TAD) Battle Management C4I (BMC4I), etc.

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BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support
PROJECT NUMBER: X2144
PROJECT TITLE: SEW Engineering

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,567	3,088	4,840
(U) Adjustments from FY 1998 PRESBUDG:	+1,664	+827	+2,664
(U) FY 1999 President's Budget Submit:	5,231	3,915	7,504

(U) CHANGE SUMMARY EXPLANATION:

FY 1997: $-47K SBIR Transfer. $1,520K: Established JWID 97 program office. $-4K: Revised Economic Assumptions. $-75K: NWCF Adjustments. $+270K: Other Navy Adjustments.

FY 1998: $1,000: Consolidation of Communications Support Systems (CSS) efforts previously executed under PE 0204163N, project X2074. $-194K: Congressional Undistributed General Reductions. $-15: Revised Economic Assumptions. $+36K: Other Navy Adjustments.

FY 1999: $-1,500K: Fleet Battle Experiments. $3,427: Consolidation of ongoing Naval C4ISR architecture efforts previously executed under various SPAWAR projects. $1,013: Consolidation of CSS efforts previously executed under PE 0204163N, project X2074. $-58K: NWCF Adjustments. $-218K: Other Navy Adjustments.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: (SEW) Architecture/Engineering Support program element relates to all Naval C4I related efforts.

D. (U) SCHEDULE PROFILE: Not applicable.

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DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2144
PROJECT TITLE: SEW Engineering

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. SEW/C4I Technology Integration	1,104	565	231
b. Systems A&E and Validation	1,730	1,350	6,273
c. Joint Warrior Interoperability Demonstrations	2,397	1,000	1,000
d. Systems Validation		200	
e. Systems Engineering		800	
Current Allocation	5,231	3,915	7,504

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PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2144
PROJECT TITLE: SEW Engineering

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: ($ in thousands)

PERFORMING ORGANIZATIONS

Contractor/ Government Performing Activity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete
Product Development:										
Various		N/A	Cont.	Cont.	6,962	3,560	5,231	3,915	7,504	Cont.
Support and Management:		N/A	N/A	N/A	0	0	0	0	0	0
Test and Evaluation:		N/A	N/A	N/A	0	0	0	0	0	0
Subtotal Product Development					6,962	3,560	5,231	3,915	7,504	Cont.
Subtotal Support and Management					0	0	0	0	0	0
Subtotal Test and Evaluation					0	0	0	0	0	0
Total Project:					6,962	3,560	5,231	3,915	7,504	Cont.

GOVERNMENT FURNISHED PROPERTY: None

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1998

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2357
PROJEC TITLE: Maritime Battle Center

(U) COST: (Dollars in Thousands)

PROJECT NUMBER TITLE	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2357 Maritime Battle Center		2,911	8,844	9,903	4,884				26,631

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of the Maritime Battle Center (MBC) is to execute the Naval Warfare Innovation Process. The process takes concepts developed by the Strategic Studies Group and approved by the Chief of Naval Operations into Fleet Battle Experiments; conducts preliminary sub-scale experiments and technological demonstrations focused on the advanced engineering and operational system development of systems related to all conflict levels of littoral battlespace. The MBC environment is a network centric environment that links the existing "core" Naval facilities to the Joint Battle Center, the Federated Battle Lab Network, and technologists in industry and academia supporting collaborative planning and experimentation. The MBC is essential to the evolution of combat capabilities since it is the engine for validating new network centric warfare techniques in conjunction with the Sea Based Battle Laboratories, Science & Technology (S&T) initiatives and other initiatives that originate with the operating forces. The MBC will support the early and sustained involvement of Joint Warfighters in refining the technology to meet the tactics, techniques, and procedures need for 2010-2020 Littoral Battlespace. The MBC will have multiple roles since it is a crosscutting organization involved in several facets of concept, platform, weapons, weapon systems and information technologies (IT) system development and integration. These include collaborative planning, experimentation planning and execution, technology transition(acquisition support), system of systems engineering, technology insertion, and operational demonstrations.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET | DATE: February 1998

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0604707N | PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support | PROJECT NUMBER: X2357 | PROJEC TITLE: Maritime Battle Center

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1998 PLAN:

- (U) ($300) MBC Administration and Management - The management and administration of MBC activities includes oversight of the experimental planning phase, the execution and collection phases, the analysis phase, and the output decision phase. This entails the integration of many preliminary experiments and technology demonstrations coupled with the inputs of experienced military leaders, current warfighting CINCs, and technologists from industry and academia.

- (U) ($780) Enabling Technical Development - Prior to any technology transition to the Project Spaces onboard the Sea Based Battle Labs during a FBE, the technology needs preliminary engineering experimentation to determine its compatibility and compliance with the Global Command and Control System (GCCS) architectures, IT-21 architectures, and the identification of high performance and interoperability issues. The objectives of these preliminary experiments is to bring information superiority to Fleet operations while achieving a level of critical mass in the early identification of technologies with "production" potential. These technologies include commercially developed technologies in collaborative planning, interactive sharing, the correlation of decision data—reducing 'decision" time, and the exploration of dynamically managed circuits operating in sea, ground, and/or aerospace domains.

- (U) ($1,000) Fleet Battle Experiments (FBE) - The Second and Third Fleets are the designated experimentation lead. Commander Second Fleet (C2F) and Command Third Fleet (C3F) will lead the FBE series and have designated their flagships USS MT.WHITNEY and USS CORONADO as Sea Based Battle Laboratories (SBBL) that will work with the MBC Director in the conduct of the FBEs. This provides the opportunity for the fleet to directly participate in the development of future Navy capabilities and provides a common sense check for the technologist and concept developer. Commander Second Fleet (C2F) will execute Fleet Battle Experiment "C" in the Spring of '98 and either Sixth Fleet or Third Fleet (C3F) will execute "D" during the Fall of '98. For both experiments the Advanced Concepts Site will capture experiment outcomes.

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BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0604707N | PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support | PROJECT NUMBER: X2357 | PROJEC TITLE: Maritime Battle Center

- (U) ($831) Battle Staff Level Collaboration - The Navy Collaborative Information Technology Initiative (NAVCITI) at Virginia Polytechnic Institute and State University will assist the SPAWAR, Advanced Concepts Site in the planning and execution phases of Fleet Battle experiments and ACS experiments. The assistance will include the conceptualization, design, and implementation of the Naval Virtual Intranet; providing candidate technological solutions in: distributed software development, software quality assessment, prediction methodologies, distributed group collaboration tools, distributed maritime information management, and wireless LANs/WANs. The NAVCITI will participate in selected experiments, analyzing technical information, and making recommendations in support of the Naval Warfare Innovation Process; assist the ACS in developing proposals for follow-on experimentation in distributed collaboration and immersive environments.

2. (U) FY 1999 PLAN:

- (U) ($983) MBC Administration and Management - The management and administration of MBC activities includes oversight of the experimental planning phase, the execution and collection phases, the analysis phase, and the output decision phase. This entails the integration of many preliminary experiments and technology demonstrations coupled with the inputs of experienced military leaders, current warfighting CINCs, and technologists from industry and academia.

- (U) ($491) Enabling Technical Development - Prior to any technology transition to the Project Spaces onboard the Sea Based Battle Labs during a FBE, the technology needs preliminary engineering experimentation to determine its compatibility and compliance with the Global Command and Control System (GCCS) architectures, IT-21 architectures, and the identification of high performance and interoperability issues. The objectives of these preliminary experiments is to bring information superiority to Fleet operations while achieving a level of critical mass in the early identification of technologies with "production" potential. These technologies include commercially developed technologies in collaborative planning, interactive sharing, the correlation of decision data—reducing 'decision" time, and the exploration of dynamically managed circuits operating in sea, ground, and/or aerospace domains.

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- (U) ($5,896) Fleet Battle Experiments (FBE) - The Second and Third Fleets are the designated experimentation lead. Commander Second Fleet (C2F) and Command Third Fleet (C3F) will lead the FBE series and have designated their flagships USS MT.WHITNEY and USS CORONADO as Sea Based Battle Laboratories (SBBL) that will work with the MBC Director in the conduct of the FBEs. This provides the opportunity for the fleet to directly participate in the development of future Navy capabilities and provides a common sense check for the technologist and concept developer. Commander Third Fleet (C2F) will execute Fleet Battle Experiment "E" in the Spring of '99. This Fleet Battle Experiment will serve as the macro experiment housing the mini experiments/demonstrations: Urban Warrior and the Extended Littoral Battlespace ACTD. The Advanced Concepts Site will capture experiment outcomes and work the rapid transition of value-added technologies with production Program Directorates.

- (U) ($1,474) Technical - The MBC will plan and participate in planning by others of exercises and tests to be run in the MBC. Its core competency will be fleet operations, exercise designs, costing, equipping and orchestration. This group will develop exercises and test objectives, data collection efforts, perform exercise analysis and overall evaluations with recommendations for future related activities. The technical operations element will also evaluate the results of Advanced Concept Technology Demonstration (ACTDs), Joint Warrior Interoperability Demonstration (JWIDs), and Joint Battle Center (JBC) activities and determine the most expeditious paths to transition such concepts into actual and sustainable Naval warfighting capability. As promising innovative technologies emerge from the commercial sector, the technical operations element will devise insertion strategies for prototypes. Using existing resources the components needed to provide the required set of capabilities will be generated and brought into operation for testing and analyses purposes. Navy laboratory support from all claimancies will be tasked dependent on the requirements. Knowledge of laboratory capabilities and projected needs of such laboratories will be inherent in this support. The integration of capability will be in full cognizance of joint interoperability concern and with the objective of system being "born joint" interfacing with other services systems, labs, etc. will be provided by his support element. Joint exercise support supplied by maritime forces will also be coordinated using this organizational function.

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B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:		0	0
(U) Adjustments from FY 1998 PRESBUDG:		+2,911	+8,844
(U) FY 1999 President's Budget Submit:		2,911	8,844

(U) CHANGE SUMMARY EXPLANATION:

FY 1998: $+3,000K: Congressional increase for Advanced Technical Communications Initiatives. $-89K: Congressional Undistributed Reductions.

FY 1999: $+9,000K Fleet Battle Experiments. $-156K: Commercial Purchases Inflation Adjustment.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

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DATE: February 1998

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PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2357
PROJEC TITLE: Maritime Battle Center

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. MBC Administration and Management		300	983
b. Enabling Technical Development		750	491
c. Fleet Battle Experiments		1,000	5,896
d. Battle Staff Level Collaboration		861	
e. Technical			1,474
Current Allocation		2,911	8,844

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: N/A