DEPARTMENT OF THE NAVY
FY 1999 BUDGET ESTIMATES

JUSTIFICATION OF ESTIMATES

RESEARH, DEVELOPMENT, TEST & EVALUATION
BUDGET ACTIVITY 4: DEMONSTRATION & VALIDATION

SEPTEMBER 1997

Department of the Navy
FY 1998/1999 RDT&E Program

Exhibit R-1

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

DATE: September 1997

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Millions of Dollars FY 1997	FY 1998	FY 1999	Security Classification
27	0603207N	Air/Ocean Tactical Application	4	17.473	16.017	29.440	U
28	0603208N	Training System Aircraft	4	2.128	-	-	U
29	0603216N	Aviation Survivability	4	13.341	7.859	8.264	U
30	0603254N	ASW Systems Development	4	20.682	22.869	20.479	U
		(R2/R3 Materials provided in Classified Budget Book)					
31	0603261N	Tactical Airborne Reconnaissance	4	27.498	10.607	1.498	U
32	0603382N	Adv Combat System Technology	4	3.685	5.232	8.800	U
33	0603502N	Surface & Shallow Water Mine Countermeasures	4	82.211	58.231	81.798	U
34	0603504N	Adv Submarine Combat Systems Dev	4	36.549	61.122	69.660	U
		(R2/R3 Materials included in Classified Budget Book)					
35	0603506N	Surface Ship Torpedo Defense	4	5.107	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
36	0603512N	Carrier Systems Development	4	14.030	98.587	107.109	U
37	0603513N	Shipboard System Component Dev	4	17.499	19.194	30.843	U
38	0603514N	Ship Combat Survivability	4	8.131	7.050	7.729	U
39	0603525N	PILOT FISH	4	89.956	118.728	120.362	U
		(Classified -- Material Not Available)					
40	0603536N	RETRACT JUNIPER	4	9.962	9.776	11.362	U
		(Classified -- Material Not Available)					
41	0603542N	Radiological Control	4	2.729	3.030	3.657	U
42	0603553N	Surface ASW	4	3.453	5.704	12.078	U
43	0603561N	Advanced Submarine System Dev	4	61.919	59.067	61.597	U
44	0603562N	Submarine Tactical Warfare Sys	4	4.296	4.931	4.740	U
45	0603563N	Ship Concept Advanced Design	4	14.363	16.193	15.167	U
46	0603564N	Ship Prelim Design & Feasibility Studies	4	15.744	38.682	43.478	U
47	0603570N	Advanced Nuclear Power Systems	4	129.409	125.357	120.427	U
		(R2/R3 Materials included in Classified Budget Book)					
48	0603573N	Adv Surface Machinery Systems	4	64.459	49.741	59.457	U
49	0603576N	CHALK EAGLE	4	142.165	137.442	125.444	U
		(Classified -- Material Not Available)					

50	0603582N	Combat System Integration	4	5.672	7.739	9.824	U
51	0603609N	Conventional Munitions	4	24.255	34.190	40.399	U
52	0603610N	Advanced Warhead Dev (MK-50)	4	0.599	2.012	-	U
		(Info Contained in R1 Line 114)					
53	0603611M	Marine Corps Assault Vehicles	4	55.732	62.505	106.672	U
54	0603612M	MC Mine Countermeasures	4	-	-	1.993	U
55	0603635M	MC Ground Combat/Support System	4	40.626	38.164	41.383	U
56	0603654N	Jt Serv Explosive Ordnance Dev	4	6.588	10.701	10.933	U
57	0603658N	Cooperative Engagement Capability	4	-	139.229	133.951	U
58	0603711N	Fleet Tactical Development	4	3.167	-	-	U
		(Prior Year Only -- R2/R3 Not Required)					
59	0603713N	Ocean Engineering Development	4	8.002	12.658	13.526	U
60	0603721N	Environmental Protection	4	47.882	51.389	60.962	U
61	0603724N	Navy Energy Program	4	2.901	4.159	4.657	U
62	0603725N	Facilities Improvement	4	2.124	1.720	1.983	U
63	0603734N	CHALK CORAL	4	74.309	94.358	100.328	U
		(Classified -- Material Not Available)					
64	0603746N	RETRACT MAPLE	4	80.256	120.033	120.385	U
		(Classified -- Material Not Available)					
65	0603748N	LINK PLUMERIA	4	34.486	29.433	22.816	U
		(Classified -- Material Not Available)					
66	0603751N	RETRACT ELM	4	23.884	21.822	11.980	U
		(Classified -- Material Not Available)					
67	0603755N	Ship Self Defense	4	267.295	9.961	12.544	U
68	0603785N	Combat Systems Oceanographic Perf Assessment	4	12.887	11.706	-	U
69	0603787N	Special Processes	4	88.428	81.439	84.024	U
		(Classified -- Material Not Available)					
70	0603790N	NATO Research and Development	4	9.385	13.330	11.194	U
71	0603795N	Gun Weapons Systems Technology	4	52.595	37.809	100.571	U
72	0603800N	Joint Adv Strike Technology Program	4	243.298	448.855	461.437	U
73	0603851M	Non -Lethal Warfare Dem/Val	4	9.326	16.807	22.990	U
74	0603852N	Arsenal Ship DEM/VAL	4	27.317	-	-	U
		(Info Contained in R1 Line 94)					
		(Prior Year Only -- R2/R3 Not Required)					
75	0603860N	JPALS	4	-	2.993	-	U
76	0603889N	Counterdrug RDT&E	4	20.027	-	-	
		(Prior Year Only -- R2/R3 Not Required)					
77	0604327N	Hardened Target Munitions	4	-	4.987	-	U
78	0604707N	SEW Architecture/Eng Support	4	6.176	5.705	18.343	U
		Total Demonstration and Validation (Dem/Val)		1,934.006	2,139.123	2,336.284	

UNCLASSIFIED

Department of the Navy
FY 1998/1999 RDT&E Program
Alphabetic Listing

Exhibit R-1

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76	0603889N	Counterdrug RDT&E	4	20.027	-	-	
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60	0603721N	Environmental Protection	4	47.882	51.389	60.962	U
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		Total Demonstration and Validation (Dem/Val)		1,934.006	2,139.123	2,336.284	

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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	3,150	0	0	0	0	0	0	17,303
X0513 Air/Ocean Prediction									
	1,681	1,644	0	0	0	0	0	0	9,453
X0514 Air/Ocean Shipboard Measurements									
	1,459	1,788	0	0	0	0	0	0	10,105
X0523 Air/Ocean Data Assimilation									
	716	736	0	0	0	0	0	0	4,439
X0948 Precise Timing and Astrometry									
	1,186	1,242	0	0	0	0	0	0	7,283
X1596 Satellite Ocean Tactical Applications									
	3,580	3,504	0	0	0	0	0	0	22,009

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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	2,036	0	0	0	0	0	0	26,830
X2008 Tactical Ocean Data Assimilation and Prediction									
	1,930	1,917	0	0	0	0	0	0	11,923
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	8,672	8,934	9,174	9,419	10,675	CONT.	CONT.
X2342 METOC Data Assimilation and Modeling									
	0	0	11,829	12,468	12,845	13,225	12,617	CONT.	CONT.
X2343 Tactical METOC Applications									
	0	0	7,448	7,888	7,993	8,163	8,667	CONT.	CONT.
X2344 Precise Timing and Astrometry									
	0	0	1,491	1,497	1,533	1,566	1,601	CONT.	CONT.
TOTAL	17,473	16,017	29,440	30,787	31,545	32,373	33,560	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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: September 1997

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	8,672	8,934	9,174	9,419	10,675	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.

- (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) ($650) 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 (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

2.(U) FY 1998 PLAN:

From Project R0118:

- (U) ($1,000) Continue Airborne Combat Data Collection via fleet assets.

- (U) ($900) 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.

- (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) ($815) Continue development of airborne laser bathymetry techniques from fixed wing aircraft for crisis response.

- (U) ($647) Continue information management and DMAP functions.

From Project X0514:

- (U) ($655) 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) ($800) Begin development of next-generation SMOOS(R) sensors.

- (U) ($33) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR analyses and studies.

3. (U) FY 1999 PLAN:

- (U) ($925) Continue Airborne Combat Data Collection via fleet assets.
- (U) ($900) 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) ($1,100) Continue assessments of temporal and spatial variability of littoral environments for acoustic data inversion.
- (U) ($450) 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) ($525) Begin development of data connectivity with the Global Command and Control Systems (GCCS).
- (U) ($375) Begin development of advanced aerosol measurement techniques.

- (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 C^4ISR 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	+8,672
(U) FY 1999 FMB Budget Submit:	0	0	8,672

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$8,672) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDTE under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture. 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 RDTE funds to OPN.

(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: September 1997

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	6,972
b. Travel	0	0	100
c. Software Development	0	0	1,600
Total	0	0	8,672

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	8,672	CONT.	CONT.
Support and Management											
Test and Evaluation											

GOVERNMENT FURNISHED PROPERTY: N/A

Contract

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: September 1997

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PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

PROJECT NUMBER: X2341
PROJECT TITLE: METOC Data Acquisition

Item Description	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	8,672	CONT.	CONT.
Subtotal Support and Management										
Subtotal Test and Evaluation										
Total Project				0	0	0	0	8,672	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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	11,829	12,468	12,845	13,225	12,617	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.

(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) ($587) 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 (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

From Project X0523:

- (U) ($695) 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 (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

From Project X1596:

- (U) ($1,343) 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 (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

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

- (U) ($762) 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 (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

2. (U) FY 1998 PLAN:

From Project X0513:

- (U) ($470) 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) ($275) Begin development of Arabian Gulf/Arabian Sea ocean model.
- (U) ($30) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR analyses and studies.

From Project X0523:

- (U) ($723) 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.
- (U) ($13) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR analyses and studies.

From Project X1596:

- (U) ($1,088) Complete development of expert systems for satellite oceanographic and atmospheric feature analysis.

- (U) ($307) Begin development of SSM/IS atmospheric algorithms.
- (U) ($1,320) 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 (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR analyses and studies.

From Project X2008: (Note: Balance of X2008 funding ($615) is identified in Project X2343.)

- (U) ($777) 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) ($25K) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR analyses and studies.

3. (U) FY 1999 PLAN:

- (U) ($1,250) Continue modeling and simulation of atmosphere and ocean environmental effects on Navy systems.
- (U) ($800) 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) ($803) Continue development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 4D variational techniques.
- (U) ($411) Complete development of SSM/IS atmospheric algorithms.
- (U) ($693) Complete transition of new algorithms for SAR and altimetry data.
- (U) ($250) Continue evaluation of aviation impact variables satellite product.
- (U) ($625) 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) ($400) 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) ($793) Continue the verification and validation of products and data assimilation techniques developed for fleet applications. Continue fleet support through participation in fleet exercises.
- (U) ($234) Develop and update overarching C^4ISR mission requirements and conduct associated C^4ISR analyses and studies.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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	+11,829
(U) FY 1999 FMB Budget Submit:	0	0	11,829

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$11,829) 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. 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 RDTE funds to OPN.

(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: September 1997

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	11,704
b. Travel	0	0	0	125
Total	0	0	0	11,829

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	11,829	CONT.	CONT.
Support and Management											
Test and Evaluation											

GOVERNMENT FURNISHED PROPERTY: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: September 1997

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	11,829	CONT.	CONT.
Subtotal Support and Management										
Subtotal Test and Evaluation										
Total Project				0	0	0	0	11,829	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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	7,448	7,888	7,993	8,163	8,667	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.

- (U) ($19) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

2. (U) FY 1998 PLAN:

From Project X2008: (Note: Balance of X2008 funding ($1,302) is identified in Project X2342.)

- (U) ($605) 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 (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR 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) ($2,819) 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) ($1,562) 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.

- (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 C^4ISR 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	+7,448
(U) FY 1999 FMB Budget Submit:	0	0	7,448

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

FY 1999: (+$7,448) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDTE under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture. 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 RDTE funds to OPN.

(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: September 1997

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	1,407
b. Travel	0	0	0	75
c. Software Development	0	0	0	5,966
Total	0	0	0	7,448

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	7,448	CONT.	CONT.
Support and Management											
Test and Evaluation											

GOVERNMENT FURNISHED PROPERTY: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

Date: September 1997

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

Contract Item Description	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	7,448	CONT.	CONT.
Subtotal Support and Management										
Subtotal Test and Evaluation										
Total Project				0	0	0	0	7,448	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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	1,491	1,497	1,533	1,566	1,601	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) ($336) Continued demonstration of large scale CCD arrays for electronic astrography.

- (U) ($35) Developed and updated Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C^4ISR) implementation guidance. Developed and updated Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conducted associated C^4ISR analyses and studies.

1. (U) FY 1998 PLAN:

From Project X0948:

- (U) ($127) Continue evaluation of time transfer capabilities via fiber optic network.
- (U) ($150) Complete demonstration of GPS for UTI/Polar Motion.
- (U) ($350) Continue demonstration of large scale CCD array for electronic astrography.
- (U) ($422) 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 (C^4ISR) implementation guidance. Develop and update Naval C^4ISR mission to incorporate an overarching operational, systems, technical and information architecture. Conduct associated C^4ISR analyses and studies.

4. (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.

- (U) ($275) 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 C^4ISR 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	+1,491
(U) FY 1999 FMB Budget Submit:	0	0	1,491

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

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

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Date: September 1997

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: Sept 1997

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	295	0	0	0	0	0	0	0	880,019
H1150 Joint Primary Aircraft Trainer	1,834	0	0	0	0	0	0	0	10,229
TOTAL	2,129	0	0	0	0	0	0	0	890,248

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. Planned 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 specific ship or aircraft applications.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

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: Sept 1997

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: Sept 1997

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:	1,857	0	0
(U) Appropriated Value:	1,952		
(U) Adjustments from Pres Budget:	-23		
(U) FY 1999 OSD/OMB Budget Submit:	1,834	0	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY97 decrease of $23 thousand reflects an adjustment made for Small Business Innovative Research (SBIR).

(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								

(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.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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	278	0	0	0	0	0	0	0	0
W0584 Aircrew Protective Clothing & Devices	9,571	3,256	4,138	2,928	2,991	3,049	3,124	CONT.	CONT.
W0591 Aircraft Survivability, Vulnerability & Safety	1,703	2,183	1,524	1,938	1,980	2,017	2,017	CONT.	CONT.
W0592 Aircraft & Ordnance Safety	817	1,290	1,745	1,777	1,815	1,849	1,893	CONT.	CONT.
W1819 Carrier Aircraft Fire Suppression System	961	1,130	857	992	1,013	1,032	1,057	CONT.	CONT.
TOTAL	13,341	7,859	8,264	7,635	7,799	7,947	8,142	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.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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 Aircrew Protective Clothing and Devices									
	9,571	3,256	4,138	2,928	2,991	3,049	3,124	CONT.	CONT.
Current Actual Program Value	10,803								

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.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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.
- (U) This submission does not reflect $1,232 on Navy Deferral reserved for a DoD Omnibus Reprogramming.

2. (U) FY 1998 PLAN:

- (U) ($2,319) Initiate Advance Technology Escape System using controllable propulsion (Fourth Generation Escape System).
- (U) ($ 487) Initiate demonstration and validation of Russian K-36 ejection and automatic escape technologies.
- (U) ($ 450) Flight test of HAILSS/AILSS/AW system.

3. (U) FY 1999 PLAN:

- (U) ($2,165) Continue ATES using controllable propulsion (Fourth Generation Escape System).
- (U) ($481) Begin Smart Adaptive Mission Support System (SAMSS) (follow-on to HAILSS/AILSS).
- (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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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	11,542		
(U) Adjustments from PRESBUDG:	-1,488	0	-163
(U) FY 1999 OSD/OMB Budget Submit:	9,571	3,256	4,138

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97 decrease reflects -$241 thousand for SBIR assessment; -$1,232 thousand for Omnibus reprogramming, and -$15 thousand for revised economic and minor adjustments. FY99 reflects a decrease of -$147 thousand for resource sponsor program adjustment; -$10 thousand for the Navy Working Capital Fund (NWCF) rate adjustments and -6 thousand for minor program adjustments.

(U) Schedule: A portion of the FY 96 funding for W0584 projects was the result of a Congressional plus-up expected in late FY 96, but did not arrive until February of FY 97. The delay in receipt of funding caused projects to miss test and transition dates which necessitated that the milestone schedules be rescoped. As a direct result schedules slipped by up to one year. The revised schedule profile accurately reflects these changes and the time required to complete the current programs.

(U) Technical: Not Applicable

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)

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0584

PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT TITLE: Aircrew Protective Clothing & Devices

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROJECT MILESTONES	4TH GEN ESCAPE (ATES): CONTINUE 1Q K36/AES COMPLETE 4Q CONTROLLABLE PROPULSION: INITIATE 1Q VISUAL ARCHITECTURE INITIATE 2Q97-2Q98	4TH GEN ESCAPE (ATES) & CONTROLLABLE PROPULSION INTEGRATION: INITIATE 1Q CONTROLLABLE PROPULSION: COMPLETE 4Q	4TH GEN ESCAPE (ATES) & CONTROLLABLE PROPULSION INTEGRATION: COMPLETE 1Q02	4TH GEN ESCAPE (ATES) TRANS 2002
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

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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

D. (U) SCHEDULE PROFILE: (CONTINUED)

	FY 1997	FY 1998	FY 1999	TO COMPLETE
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	HAILSS/AILSS/AW FLIGHT TEST COMPLETE 4Q	
CONTRACT MILESTONES				

DATE: September 1997

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

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	800	872
b. Primary Hardware Development	1,402	1,262	1,271
c. Developmental Test & Evaluation	795	794	1,445
d. Contractor Engineering	4,851	150	200
e. Government Engineering	1,600	200	300
f. Travel	50	50	50
Total	9,571	3,256	4,138

DATE: September 1997

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

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0584
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	2,571	3,328	CONT	CONT
Various Field Activities (Aggregrate Total)					3,668	1,730	575	700	CONT	CONT
Support and Management					102	110	110	110	CONT	CONT
Test and Evaluation:					0	926	0	0	0	0

GOVERNMENT FURNISHED PROPERTY: Not Applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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

	FY 1996	FY 1997 & Prior	FY 1998 Budget	FY 1999 Budget	To Budget	Total Complete	Program
Subtotal Product Development	8,561	8,535	3,146	4,028	CONT	CONT	
Subtotal Support and Management	102	110	110	110	CONT	CONT	
Subtotal Test and Evaluation	0	926	0	0	0	0	
Total Project	8,663	9,571	3,256	4,138	CONT	CONT	

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	1,703	2,183	1,524	1,938	1,980	2,017	2,068	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) ($1,150) Initiated the development of a rotary wing Infrared (IR) survivability signature suppression program. ($816 of these funds will be reprogrammed to Program Element 0604212N, Project H0485).
- (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) ($1,842) Continue the development of a rotary wing IR signature suppression program.
- (U) ($131) Continue the development of RDT&E master plan update.

- (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) ($1124) Continue the development of a rotary wing IR survivability signature suppression program.
- (U) ($80) Continue the development of RDT&E master plan update.
- (U) ($120) 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	1,801		
(U) Adjustments from PRESBUDG:	-24	0	-1,337
(U) FY 1999 OSD/OMB Budget Submit:	1,703	2,183	1,524

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 1997 decrease reflects -$22 thousand for the Small Business Innovation Research assessment, and -$2 thousand for revised economic adjustments. The FY 1999 decrease of -$1,337 thousand consists of -$939 thousand for a resource sponsor program adjustment; -$183 thousand for low expenditure rates; net decrease of -$219 thousand for contract restructuring (IR Suppression); +$8 thousand for the Navy Working Capital Fund (NWCF) rate adjustments and -$4 thousand for minor program adjustments.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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

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

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(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

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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	1,420	1,035
b. Systems Engineering	510	538	154
c. Hardware Test	0	0	0
d. Software Development	327	210	320
e. Travel	50	15	15
g. Reprogramming	816*	0	0
Total	1,703	2,183	1,524

*These funds will be reprogrammed to Program Element 0604212N, Project H0485.

DATE: 12 September 1997

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

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0591
PROGRAM ELEMENT TITLE: Aviation Survivability 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	10/97				*816	650	954	CONT.	CONT.
Various field activities (Aggregrate Total)					3,202	839	1,118	1,876	CONT.	CONT.
Support and Management										
Travel					100	50	15	15	CONT.	CONT.
Test and Evaluation					370	0	400	0	CONT.	CONT.

*$816 of these funds will be reprogrammed to Program Element 0604212N, Project H0485.

DATE: September 1997

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

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0591
PROGRAM ELEMENT TITLE: Aviation Survivability 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	839	1,768	2,084	CONT.	CONT.
Subtotal Support and Management	100	50	15	15	CONT.	CONT.
Subtotal Test and Evaluation	370	0	400	0	CONT.	CONT.
Reprogramming		816*				
Total Project	4,979	1,705	2,183	2,845	CONT.	CONT.

*These funds will be reprogrammed to Program Element 0604212N, Project H0485.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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	1,290	1,745	1,777	1,815	1,849	1,893	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 demonstrate the lowest risk technology.

3. (U) FY 1998 PLAN:

- (U) ($426) Conduct demonstration of rocket motor IM technology for HYDRA.
- (U) ($456) 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.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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)($735) 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	857		
(U) Adjustments from PRESBUDG:	- 2	0	+27
(U) FY 1999 OSD/OMB Budget Submit	817	1,290	1,745

(U) Funding: FY 1997 reflects a decrease of -$2 thousand for SBIR and revised economic adjustments. FY 1999 increase of +$27 thousand consists of an increase of +$29 thousand for NWCF rate adjustments and -$2 thousand for 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

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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	1,130	857	992	1,013	1,032	1,057	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) ($336) Continue development of ordnance cooling requirements.
- (U) ($390) Continue development of environmentally safe test and training simulator.
- (U) ($228) Continue fire testing of agents, equipment, and aircraft and ordnance materials.
- (U) ($176) Continue development of flight deck imaging system.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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

3. (U) FY 1999 PLAN:

- (U) ($100) Complete development of ordnance cooling requirements.
- (U) ($412) Continue development of environmentally safe test and training simulator.
- (U) ($100) Continue fire testing of agents, equipment, aircraft and ordnance materials.
- (U) ($245) Continue development of flight deck imaging 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	1,003		
(U) Adjustments from PRESBUDG:	-1		-586
(U) FY 1999 ODS/OMB Budget Submit	961	1,130	857

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 decrease reflects -$1 thousand for revised economic adjustments. FY 1999 decrease of -$586 thousand consists of -$476 thousand for resource sponsor program adjustments; -$7 thousand for Navy Working Capital Fund (NWCF) surcharge; -$101 thousand for low expenditure rates and -$2 thousand for minor program adjustments.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

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				
Contract Milestones				

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET **DATE: September 1997**

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									
	27,498	10,607	1,498	0	0	0	0	0	221,223

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Tactical Airborne Reconnaissance Program develops systems to provide timely and accurate imagery intelligence. Present systems provide such imagery from manned platforms using film based sensors, necessitating a return to base for film processing. Manned reconnaissance, with Electro-Optical, Infrared and Synthetic Aperture Radar (SAR) sensors can provide both broad coverage and high resolution imagery at extended ranges via data link in near real time. The USMC RF-4Bs were phased out in 1990. A Navy Follow-On Tactical Reconnaissance capable aircraft will replace the interim Navy F-14 Tactical Air Reconnaissance Pod System (TARPS) with a suite of sensors that will provide near real time data-linked information, Overflight and Short Range Stand-Off(O&SRS-O) sensors used for imagery processing, analysis, 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: September 1997**

BUDGET ACTIVITY: 4PROGRAM ELEMENT: 0603261N **PROJECT NUMBER: E0534**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance **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) ($813) Continued in-house engineering support.

2. (U) FY 1998 PLAN:

- (U) ($6,518) Complete development and integration of F/A-18 Tactical Reconnaissance System.

- (U) ($3,339) 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) ($750) Continue in-house engineering support.

3. (U) FY 1999 PLAN:

- (U) ($1,248) Complete system Operational Evaluation. Conduct program review for full production decision. Achieve Initial Operational Capability with limited production systems. Conduct Follow-On Test and Evaluation. Continue in-house technical support.
- (U) ($250) Continue in-house engineering support.

Exhibit R-2
FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N PROJECT NUMBER: E0534
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance 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	28,972		
(U) Adjustments from President's Budget:	+4,416	0	+40
(U) FY 1999 OSD/OMB Budget Submit:	27,498	10,607	1,498

Funding: The net increase of +$4,416 thousand in FY 1997 consists of a +$4,887 thousand Congressional add for TARPS C/D, a -$440 thousand reduction for Small Business Innovation Research (SBIR), -$31 for minor balancing and Navy Working Capital Fund (NWCF) adjustments. The net increase of +$40 thousand in FY 1999 consists of minor balancing and NWCF adjustments.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

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

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

(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.

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	1Q/LRIP II CONTRACT AWARD	3Q/FRP CONTRACT AWARD	

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN **DATE: September 1997**

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	6,076	0
b. Support Contract	277	325	242
c. In-House Support	5,839	2,006	425
d. Test and Evaluation	2,082	2,200	831
Total	27,498	10,607	1,498

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN **DATE: September 1997**

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603261N** **PROJECT NUMBER: E0534**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance **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
MDA St. Louis, MO	S-CPFF	Nov 95	45,566	45,566	23,990	15,500	6,076	0	0	45,566
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	2,089	1,245	277	325	242	0	2,089
Field Activities	Var	Oct 98	27,362	27,362	26,393	457	482	30	0	27,362
NAWC China Lake	Var	Oct 98	10,014	10,014	3,800	4,295	1,524	395	0	10,014
Test & Evaluation										
Field Activities	WX	Oct 98	5,386	5,386	5,226	45	100	15	0	5,386
NAWC PAX River	WX	Oct 98	8,113	8,113	3,160	2,037	2,100	816	0	8,113

GOVERNMENT FURNISHED PROPERTY: Not Applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN **DATE: September 1997**

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603261N** **PROJECT NUMBER: E0534**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance **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	6,076	0	0	168,259
Subtotal Support and Management	31,438	5,029	2,331	667	0	39,465
Subtotal Test and Evaluation	8,386	2,082	2,200	831	0	13,499
Total Project	181,620	27,498	10,607	1,498	0	221,223

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N PROJECT NUMBER: K0324
PROGRAM ELEMENT TITLE: Advanced Combat Sys Engineering 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	5,232	8,800	8,313	14,896	15,214	15,565	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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

(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)($2,800) 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 concepts.

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) ($6,129) 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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		
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 President's Budget:			
a. Adjustments	-173		-23
(U) FY 1999 OSD/OMB Budget Submit:	3,685	5,232	8,800

(U) PROGRAM CHANGE SUMMARY EXPLANATION:

(U) Funding: FY1997 change due to Congressional Undistributed Reductions. FY1999 change due to minor pricing 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)

1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N PROJECT NUMBER: K0324
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering 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	4,532	7,350
c. Program Management Support	50	100	250
Total	3,685	5,232	8,800

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603382N PROJECT NUMBER: K0324
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering 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	12,131	12,131	2,961	2,127	3,291	3,752	CONT.	CONT.
Miscellaneous			4,849	4,849	750	508	841	2,750	CONT.	CONT.
Support and Management			400	400	0	50	100	250	CONT.	CONT.
Miscellaneous										
GOVERNMENT FURNISHED PROPERTY: Not applicable.										
Subtotal Product Development					5,461	3,635	5,132	8,550	CONT.	CONT.
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	5,232	8,800	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	6,895	18,150	21,923	19,065	19,469	19,919	CONT.	CONT.
Q1233 Integrated Combat Weapons Systems	6,503	5,202	12,009	8,712	4,505	5,505	2,505	0	195,543
Q2131 Assault Breaching Systems	27,191	25,665	29,496	16,517	17,425	18,621	14,108	CONT.	CONT.
V2094 Unmanned Undersea Vehicle	23,938	20,469	22,143	30,253	27,280	25,372	17,425	CONT.	CONT.
Quantity of RDT&E Articles/NMRS			1						
TOTAL	82,211	58,231	81,798	77,405	68,275	68,967	53,957	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: September 1997

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	6,895	18,150	21,923	19,065	19,469	19,919	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) Developed and procured two (V)3 Engineering Development Models (EDMs) as contingency systems to accelerate fleet introduction per the CNO directed and approved Near Term Mine Warfare Campaign Plan.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

2. (U) FY 1998 PLAN:
   - (U) Remote Minehunting:
     - (U)($6,895) Continue development and testing (DT/OT) of RMS system (V)3 including requisite logistics support for the additional contingency systems.

3. (U) FY 1999 PLAN:
   - (U) Remote Minehunting:
     - (U) ($15,609) Begin development of RMS (V)4 including new sensors.
     - (U) ($2,541) Complete development of RMS (V)3 including requisite logistics support for the additional contingency systems ($700 thousand identified for Risk Reserve).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:			
a. General Reductions	-1156		-5
b. SBIR Transfer	-573		
c. RMS Realignment			+6651
d. NWCF R&D - Surface Warfare Ctr			+9
(U) FY 1999 OSD/OMB Budget Submit:	24,579	6,895	18,150

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: Remote Minehunting: FY97 changes due to general reductions, (-1,156), and SBIR Transfer (-573). FY99 changes due to RMS pricing adjustments (+6,651).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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	16,302	16,334	16,500	19,489	20,119	CONT.	CONT.

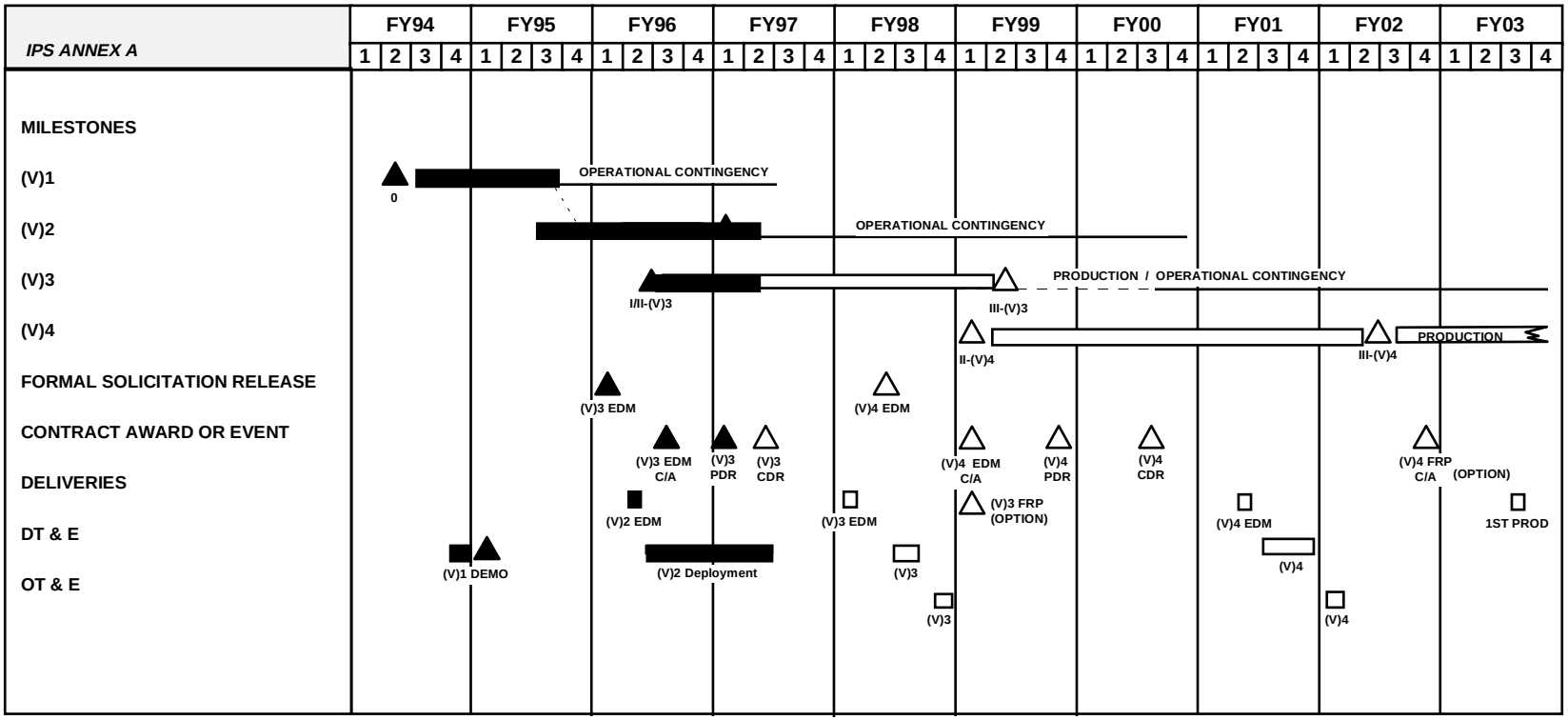
(U) RELATED RDT&E:

(U) PE 0604373N (Airborne Mine Countermeasures)

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

RMS PROGRAM SCHEDULE

P.E. 0603502N/Q0260



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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

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

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. System Development	16,563	3,343	10,483
b. System Testing	1,549	1,929	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	907	1,231
h. Travel	58	20	54
TOTAL	24,579	6,895	18,150

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	2,393	2,541	Cont.	Cont.
TBD	C/CPAF	TBD	Cont.	Cont.	0	0	0	10,298	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	1,919	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: September 1997

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q0260
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	3,785	14,990	Cont.	Cont.
Subtotal Support and Management	28,809	2,599	1,191	2,054	Cont.	Cont.
Subtotal Test and Evaluation	10,577	139	1,919	1,106	Cont.	Cont.
Total Project	123,915	24,579	6,895	18,150	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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)	6,503	5,202	12,009	8,712	4,505	5,505	2,505	0	195,543

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) ($1,411)TECHEVAL.
- (U) MP3 for AN/SLQ-48:
  - (U) ($0) Milestone III decision.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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

- (U) ICWS
  - (U) ($5,092) Architecture definition study, life cycle cost model, Functional requirements document and began the preliminary design.

2. (U) FY 1998 PLAN:

- (U) CLDG:
  - (U) ($800) Complete TECHEVAL.
  - (U) ($200) Conduct OPEVAL.
  - (U) ($339) Prepare for Milestone III.

- (U) ICWS:
  - (U) ($3,162) Complete architecture study, life cycle cost model, and preliminary design.

- (U) MEDAL:
  - (U) ($701) 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) ($135) Conduct MSIII.

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

- (U) ICWS:
  - (U) ($7,493) 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) ($2,519) 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: September 1997

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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:			
a. Adjustments:	+4,777		+10,078
(U) FY 1999 OMB/OSD Budget Submit:	6,503	5,202	12,009

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 97 increase due to Accelerate ICWS, reduction due to SBIR (-$149) and Misc adjustments (-$1,074).FY99 changes due to funding of ICWS Block 1 development (+$6,349), CLDG realignment (+$1,827), Mine Neutralization Vehicle (+$170), and MEDAL realignment (+$1,719).

(U) Technical: Not applicable.

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

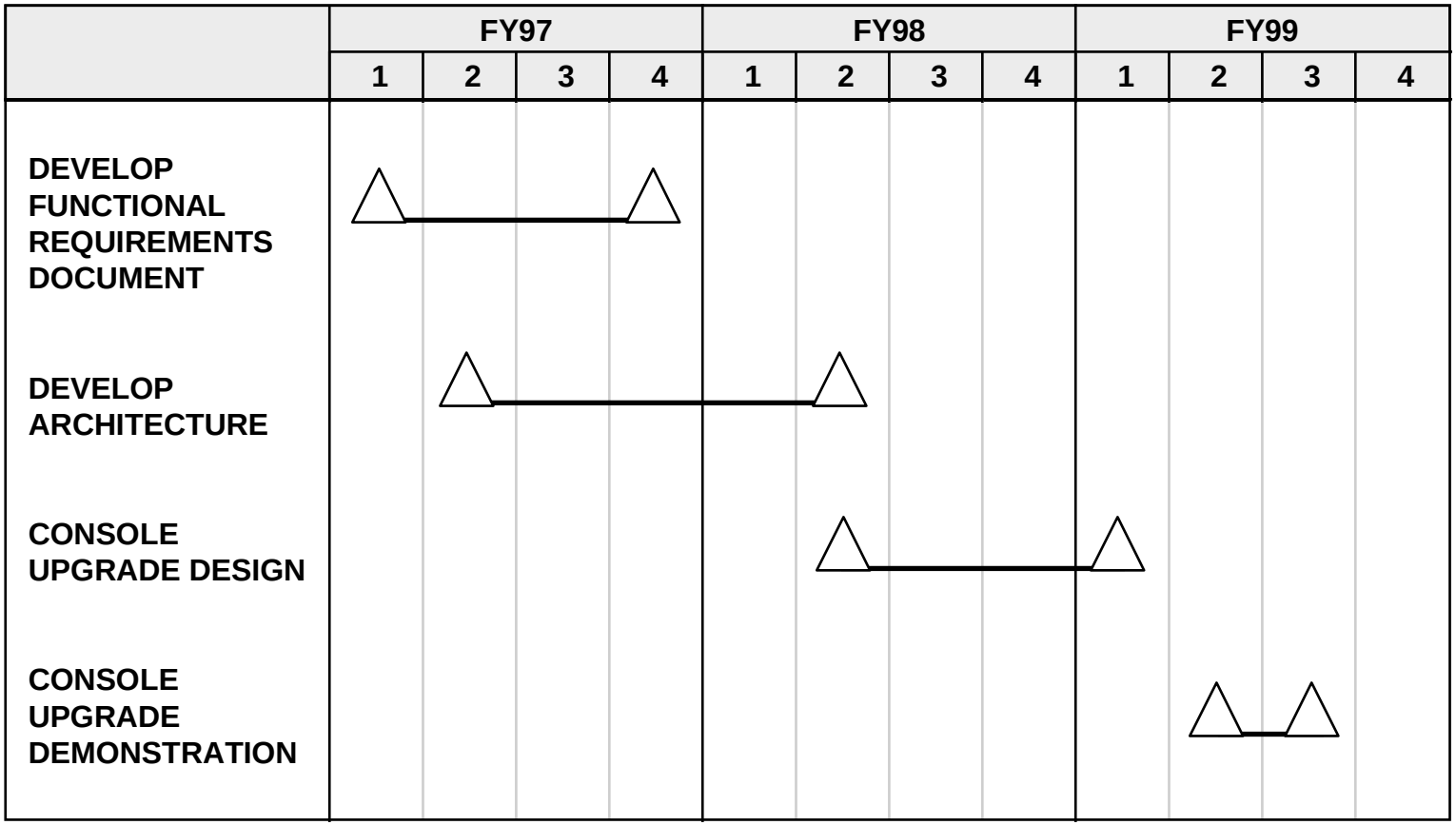
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PANMCX (MP-3) Line 535000	2,190	2,456	2,456	3,278	3,342	3,416	3,492	CONT.	CONT.
(U) OPN (CLDG) Line 262200	0	0	0	3,165	5,252	5,785	5,757	CONT.	CONT.
(U) OPN (ICWS) Line 262200	17,459	0	16,728	10,035	4,663	5,108	10,142	CONT.	CONT.

(U) RELATED RDT&E: Not Applicable.

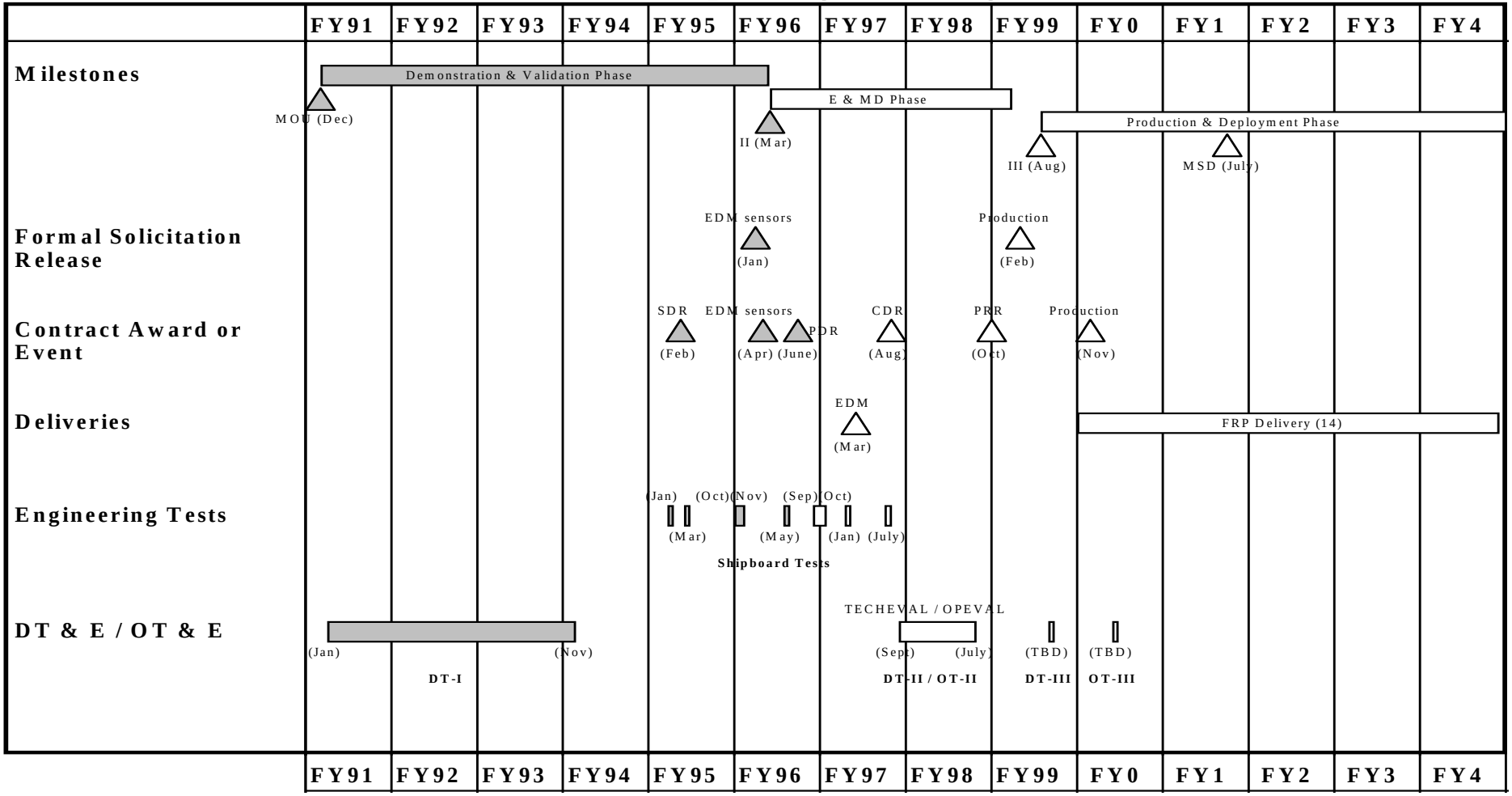
D. (U) SCHEDULE PROFILE: See next page.

INTEGRATED COMBAT WEAPON SYSTEM

P.E. 0603502N/Q1233



Closed Loop Degaussing



NOTES:

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	2,985	6,246
b. System Testing	1,411	250	1,592
c. SW Support	0	725	2,519
d. Logistics	800	650	800
e. Program Management	0	250	400
f. Travel	55	40	60
g. Misc	180	302	392
TOTAL	6,503	5,202	12,009

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q1233
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures 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	1,994	292	Cont.	Cont.
NSWC Carderock	WR	10/96	52,103	52,103	47,629	1,385	1,262	1,827	0	52,103
ONR	PD	12/96	N/A	Cont.	0	0	492	2,228	Cont.	Cont.
TBD	C/PR	12/98	Cont.	Cont.	0	0	0	6,052	Cont.	Cont.
Misc	Various	Various	3,956	3,956	0	4,201	0	0	3,956	3,956
Support and Management										
Misc	Various	Various	Cont.	Cont.	5,549	151	389	601	Cont.	Cont.
NSWC CSS	WR	10/96	Cont.	Cont.	2,431	0	650	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: September 1997

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	6,252	3,748	10,699	Cont.	Cont.
Subtotal Support and Management	7,980	151	1,039	810	Cont.	Cont.
Subtotal Test and Evaluation	43,358	100	415	500	Cont.	Cont.
Total Project	166,409	6,503	5,202	12,009	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	25,665	29,496	16,517	17,425	18,621	14,108	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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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

- (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.

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) ($657) Prepare for P3I Cost analysis.
  - (U) ($1,589) LCAC integration tests.
  - (U) ($2,986) Autonomous craft controller component procurement.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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) ($300) P3I Cost Analysis.
  - (U) ($8,716) Procure P3I RDT&E hardware.
  - (U) ($1,000) Procure Breach Zone Array (BZA) DT-I test hardware.
  - (U) ($450) BZA Cost Analysis.
  - (U) ($900) BZA MSI.
  - (U) ($5,041) LCAC/airframe integration.
  - (U) ($2,209) Autonomous craft controller integration tests.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:			
a. Adjustments:	-1,566		+10
(U) FY 1999 OSD/OMB Budget Submit:	27,191	25,665	29,496

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97 SBIR transfer (-$300) and undistributed reductions (-$1,266).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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

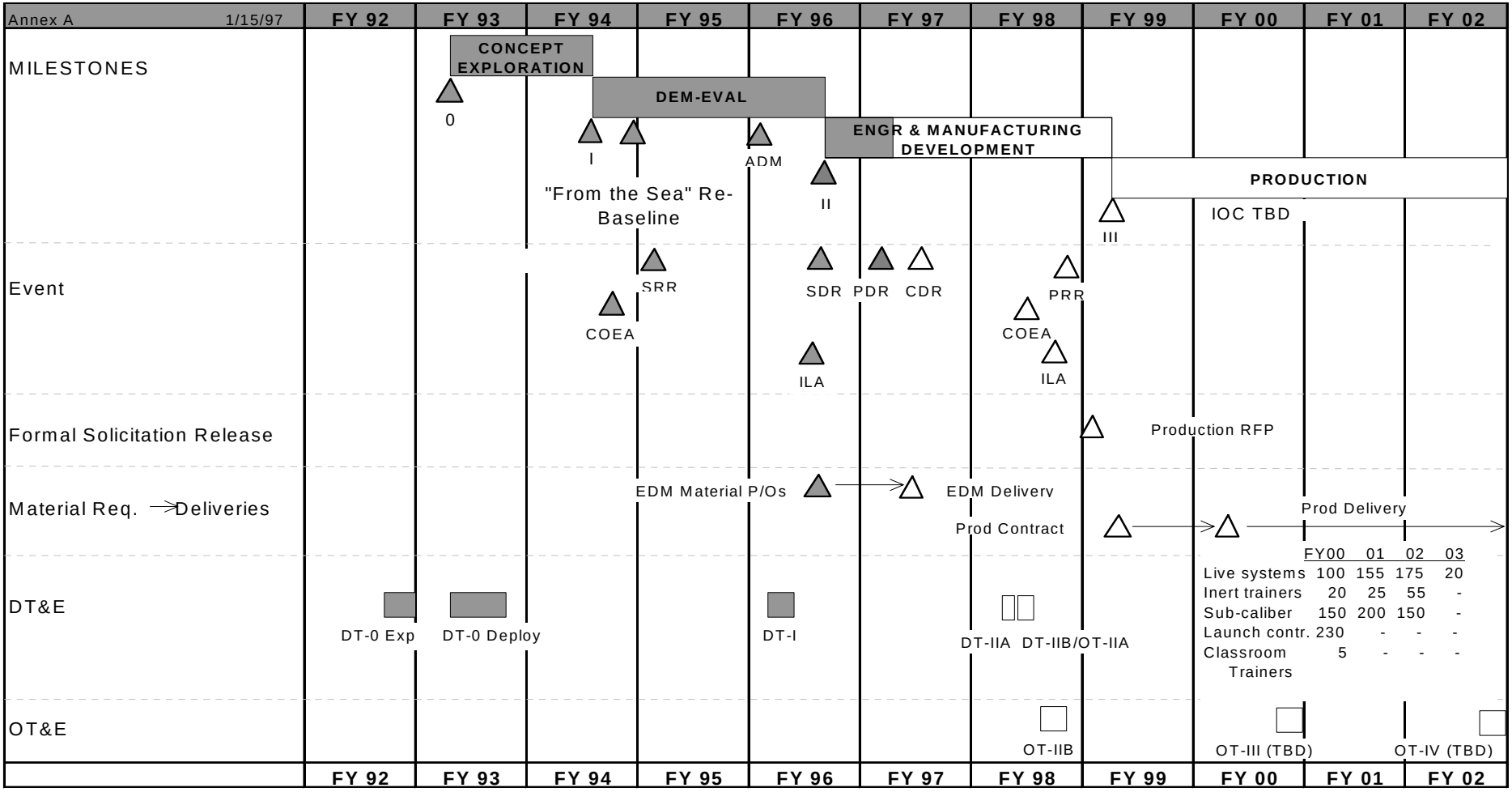
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN line item # 262400	942	0	9,335	22,898	31,532	34,302	35,114	Cont.	Cont.

(U) RELATED RDT&E:

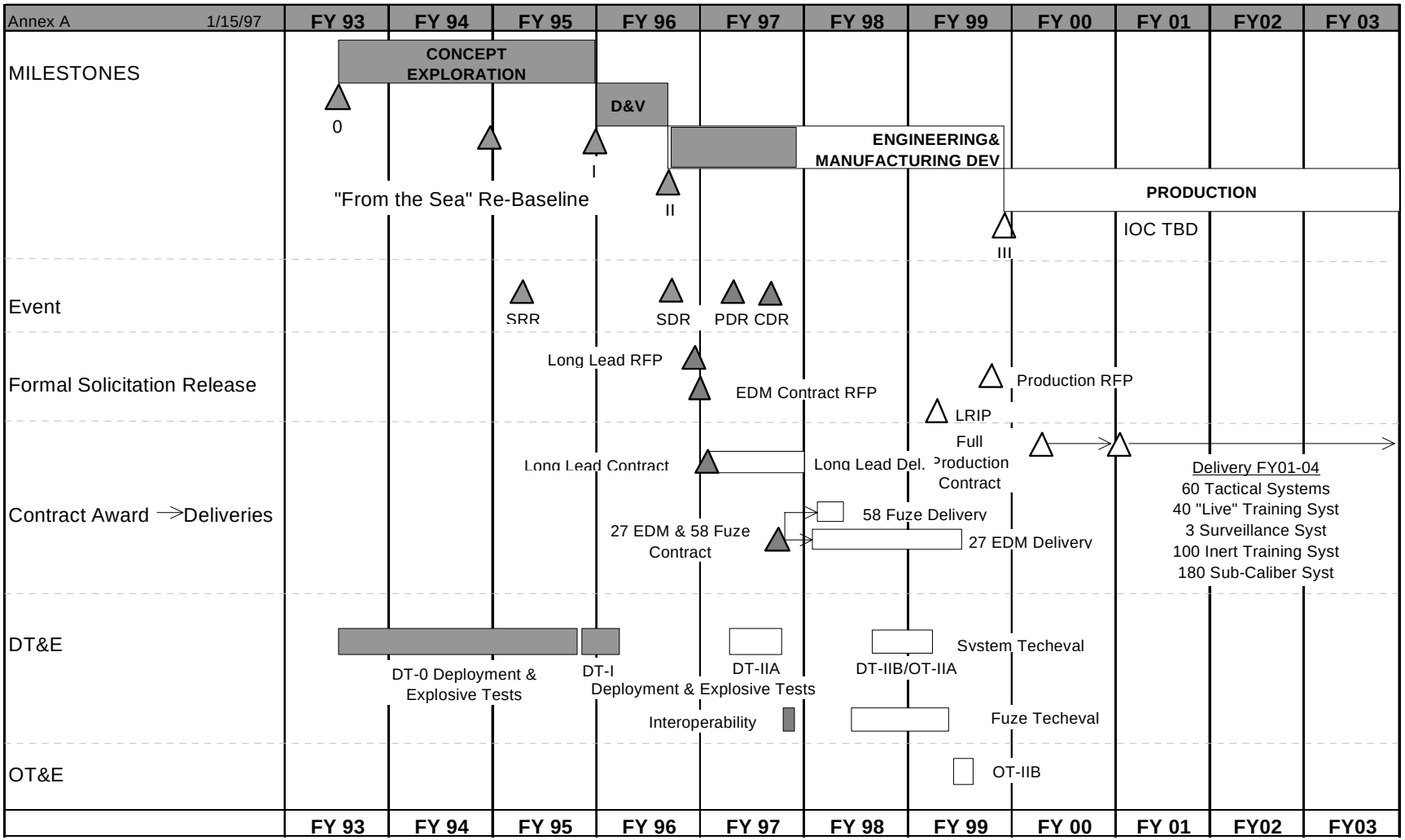
(U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration).
PE 0603640M and 0602131M (Advanced Countermine System (ACS); USMC M58 line charges).

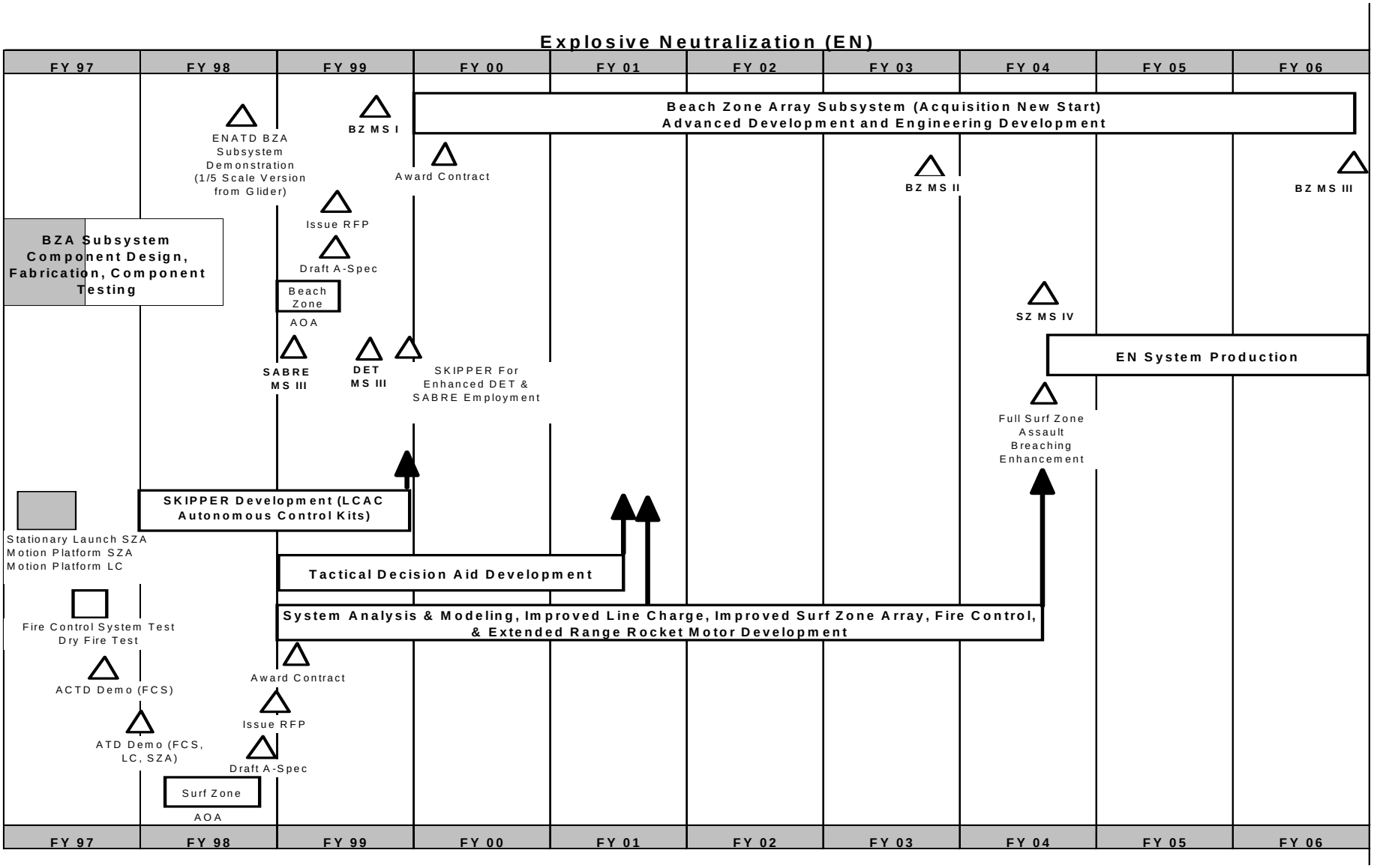
D. (U) SCHEDULE PROFILE: See next page.

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



ANNEX A - PROGRAM STRUCTURE
DISTRIBUTED EXPLOSIVE TECHNOLOGY




Explosive Neutralization (EN)
FY 97
FY 98
FY 99
FY 00
FY 01
FY 02
FY 03
FY 04
FY 05
FY 06
Beach Zone Array Subsystem (Acquisition New Start)
Advanced Development and Engineering Development
ENATD BZA Subsystem Demonstration (1/5 Scale Version from Glider)
BZ MS I
Award Contract
BZ MS II
BZ MS III
Issue RFP
Draft A-Spec
BZA Subsystem Component Design, Fabrication, Component Testing
Beach Zone
AOA
SZ MS IV
SABRE MS III
DET MS III
SKIPPER For Enhanced DET & SABRE Employment
EN System Production
Full Surf Zone Assault Breaching Enhancement
SKIPPER Development (LCAC Autonomous Control Kits)
Stationary Launch SZA
Motion Platform SZA
Motion Platform LC
Tactical Decision Aid Development
System Analysis & Modeling, Improved Line Charge, Improved Surf Zone Array, Fire Control, & Extended Range Rocket Motor Development
Fire Control System Test
Dry Fire Test
ACTD Demo (FCS)
Award Contract
Issue RFP
ATD Demo (FCS, LC, SZA)
Draft A-Spec
Surf Zone
AOA

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603502N PROJECT NUMBER: Q2131
PROGRAM ELEMENT TITLE: Surface and Shallow Water MCM 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	6,340	10,870
b. System Testing	2,886	7,761	2,697
c. System Engineering Development	5,048	7,019	7,711
d. Logistics Support	915	789	1,074
e. Procurement Support	760	100	2,515
f. Technical Management	1,030	1,447	1,888
g. Program Management	906	2,129	2,651
h. Travel	85	80	90
TOTAL	27,191	25,665	29,496

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	4,159	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	2,349	1,888	Cont.	Cont.
NSWC/IH	WR	10/96	Cont.	Cont.	810	1,268	100	0	Cont.	Cont.
Misc	Various	Various	Cont.	Cont.	3,013	991	1,307	2,864	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: September 1997

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	13,709	22,047	Cont.	Cont.
Subtotal Support and Management	6,107	2,861	3,756	4,752	Cont.	Cont.
Subtotal Test and Evaluation	12,911	5,341	8,200	2,697	Cont.	Cont.
Total Project	71,569	27,191	25,665	29,496	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	20,469	22,143	30,253	27,280	25,372	17,425	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 by early 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: September 1997

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) ($8,714) 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) ($15,224) 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) ($10,186) 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) ($10,283) Priority 2 (LMRS): Award and execute up to two Detailed Design contracts. Conduct product development risk mitigation.

3. (U) FY 1999 PLAN:

- (U) ($6,431) Priority 1 (NMRS): Continue Operation and Support of the Prototype System.
- (U) ($15,712) 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: September 1997

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) 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		
(U) Adjustments from FY 1997 Appropriated Value/FY 1998 PRESBUDG:			
a. Adjustments:	-2,022		-2,867
(U) FY 1999 OSD/OMB Budget Submit:	23,938	20,469	2 2,143

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 reduction is due to the Small Business Innovative Research (SBIR) assessment (-$594K), Undistributed Congressional Reductions (-$1,233K) and minor adjustments ($-195K). FY 1999 increase of $133K is due to NWCF adjustments and the reduction (-$3,000K) is due to funding realignment of R&D for Unmanned Underwater Vehicle.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	15,000	CONT.	CONT.

(U) The $15,000K in FY 2003 provides funding to begin LMRS production.

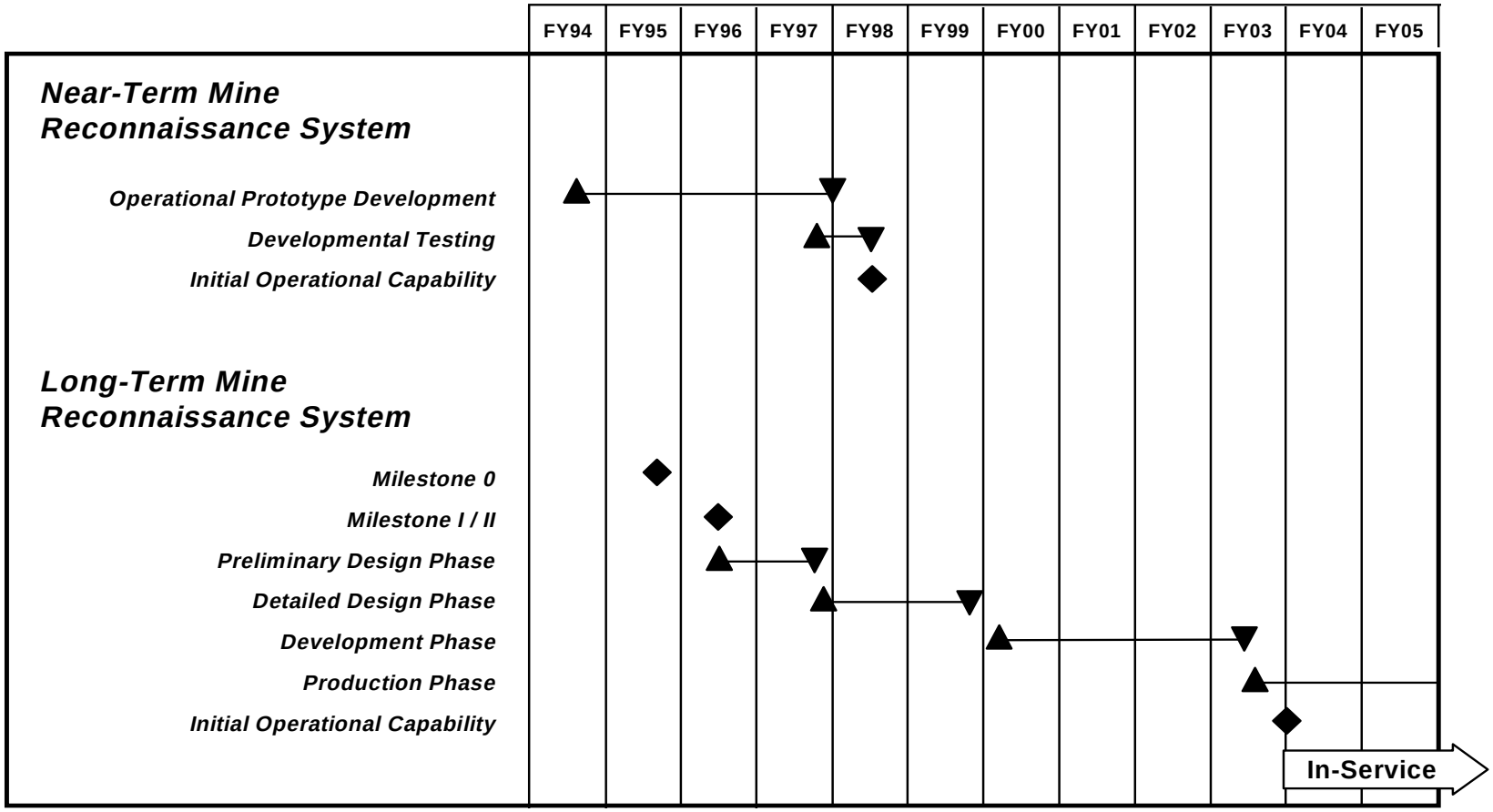
(U) RELATED RDT&E:

(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: September 1997

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	18,148	13,545	13,667
b. System Maintenance and Support	311	3,409	5,330
c. Contractor Engineering Support	885	555	600
d. Government Engineering Support	3,281	2,085	1,829
e. Program Management Support	653	590	507
f. Govt. Developmental Test and Evaluation	660	285	210
Total	23,938	20,469	22,143

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	39,967*	39,967*	31,324	6,345	5,219	0	0	40,148*
NGC/NMRS O&S	SS/CP	09/97	TBD	TBD	0	311	3,409	5,330	CONT.	CONT.
NGC - Northrop Grumman Corporation, Electronic Sensors and Systems Division, Annapolis MD										
LMC/LMRS	C/FFP	08/96	TBD	TBD	470	3,933	0	0	CONT.	CONT.
LMC - Lockheed Martin Corporation, Lockheed Martin Government Electronics System, Moorestown, NJ										
NGC/LMRS	C/FFP	08/96	TBD	TBD	470	3,935	0	0	CONT.	CONT.
NGC - Northrop Grumman Corporation, Electronic Sensors and Systems Division, Annapolis MD										
RIC/LMRS	C/FFP	08/96	TBD	TBD	470	3,935	0	0	CONT.	CONT.
BNA - Boeing North America, Anaheim, CA										
TBD/LMRS	C/CPAF	11/97	TBD	TBD	0	0	8,326	13,667	CONT.	CONT.
APL/ARL	SS/CPFF	01/98	CONT.	CONT.	3,388	885	555	600	CONT.	CONT.
NUWC	WR	11/97	CONT.	CONT.	3,821	2,244	1,795	1,769	CONT.	CONT.
Miscellaneous	WR	11/97	CONT.	CONT.	0	1,037	290	60	CONT.	CONT.
Support and Management										
Miscellaneous	various	various			1,110	653	590	507	CONT.	CONT.
Test and Evaluation										
Misc	WR	11/97	CONT.	CONT.	122	660	285	210	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 $43,648K.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	22,625	19,594	21,426	CONT.	CONT.
Subtotal Support and Management	1,110	653	590	507	CONT.	CONT.
Subtotal Test and Evaluation	122	660	285	210	CONT.	CONT.
Total Project	41,175	23,938	20,469	22,143	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	61,122	69,660	76,964	44,142	45,335	42,030	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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROJECT NUMBER: V0223
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development 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). (October 1996 - July 1997).

- (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. (October 96 - July 97)

- (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. (October 96 - June 97)

- (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. (October 96 - June 97)

- (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. (October 96 - May 97)

- (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. (October 96 - February 97)

3. (U) FY 1998 PLAN:

- (U) ($6,600) 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. (October 97 - March 98)

- (U) ($32,590) 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. (October 97 - July 98)

- (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. (October 97 - July 98)

- (U) ($10,482) 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. (October 97 - July 98)

- (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. (October 97 - July 98)

- (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. (October 97 - June 98)

4. (U) FY 1999 PLAN:

- (U) ($6,000) 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. (October 98 - June 99)

- (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. (October 98 - July 99)

- (U) ($5,500) Advanced Towed Arrays Continue development and laboratory evaluation of high gain MLTA and flexible array handling system. (October 98 - March 99)

- (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. (October 98 - July 99)

- (U) ($6,000) 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. (October 98 - March 99)

- (U) ($700) 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. (October 98 - March 99)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	37,291	61,122	70,321
(U) Appropriated Value:	19,149	0	0
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:		0	0
a. SBIR transfer	-610	0	0
b. FFRDC respread	-86	0	0
c. Congressional undistributed reductions	-1,858	0	0
d. Revised Econ. Assumption	-46	0	0
e. Sub Technology Adj	0	0	-1000
f. DBOF Surcharge Correction	0	0	-432
g. NWCF R&D	0	0	771
h. Congressional plus-up	+20,000		
(U) FY 1999 OSD/OMB Budget Submit:	36,549	61,122	69,660

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY1997 decrease due to SBIR transfer (-$610K), FFRDC (-86K), Congressional undistributed reductions (1,858K), revised economic assumptions (-46K)and Congressional increase (+20,000K). FY1999 decrease due to Submarine Technology Adjustment (-1000K), DBOF surcharge correction (-432K) and increase due to net NWCF Adjustment (+771K).

(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: September 1997

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

(U) RELATED RDT&E:
(U) PE0603562N (Submarine Tactical Warfare System)
(U) PE0604524N (Submarine Combat System)
(U) PE0604503N (Submarine System Equipment 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: September 1997

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	59,822	68,360
b. Support & Management	791	600	600
c. Test & Evaluation	450	700	700
Total	36,549	61,122	68,660

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603504N PROJECT NUMBER: V0223
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development 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	0	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	11,275	12,628	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: September 1997

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	600	600	Cont.	Cont.
Test and Evaluation										
NUWC/NL	WR	10/97	Cont.	Cont.	2,246	450	700	750	Cont.	Cont.
Miscellaneous	Var.	Var.	Cont.	Cont.	1,230	0	0	0	Cont.	Cont.

GOVERNMENT FURNISHED PROPERTY: Not Applicable.

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	877	1,025	1,038	1,064	1,085	1,112	CONT.	CONT.
22208 Future CV R&D	7,663	90,246	102,242	151,262	131,091	110,098	64,946	CONT.	CONT.
W1723 CV Launch and Recovery Systems	2,120	3,255	2,653	1,887	4,699	1,343	4,390	CONT.	CONT.
W2269 EAF Matting	3,762	4,209	1,189	3,546	0	0	0	0	12,706
TOTAL	14,030	98,587	107,109	157,733	136,854	112,526	70,448	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 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.

UNCLASSIFIED

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	877	1,025	1,038	1,064	1,085	1,112	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) ($350) 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) ($225) 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	0	0
(U) Adjustments to FY 1997 Appropriated Value/ FY98 President's Budget:			
a. Minor Pricing Adjustments	-21	0	-11
(U) FY 1999 OSD/OMB Budget Submit:	485	877	1,025

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97 reflects decrease of $21 thousand for general undistributed reductions. FY99 reflects decreases of $11 thousand for minor 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
Program Milestones		3Q Complete Overspeed Governor Investig.	2Q Complete Multiple PLC Investigations

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S1722
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: CV Weapons Elevator Improvements

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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development 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	90,246	102,242	151,262	131,091	110,098	64,946	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 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:

- ($ 4,746) Continue improvement of aircraft carrier design tools and assess aircraft carrier design criteria.

- ($20,000) Commence development of advanced aircraft launch alternatives including an Advanced Technology Aircraft Launcher (ATL).

- ($ 5,000) Commence flight deck aviation support such as ski jump integration and development an integrated rapid aircraft turnaround capability to reduce manpower on the flight deck.

- ($35,000) Commence propulsion plant alternatives assessments including nuclear and conventional power generation, integrated machinery controls, integrated electric power systems and advanced auxiliary systems.

- ($10,000) Commence development of advanced passive survivability concepts including armor, underbottom, side protection systems and carrier-suitable, pro-active, tactical and damage response systems.

- ($ 3,000) Assess alternatives for carrier-suitable integrated information management resources such as a common shipwide computing plant architecture and functional applications.

- ($ 4,500) Assess emerging technologies to enable development of advanced carrier topside systems and designs including adjunct multi-function sensor concepts to perform aircraft control and landing guidance functions and design concepts to address RF emission and signature.

- ($ 6,000) Assess emerging technologies to enable significant reductions in manpower requirements.

- ($ 2,000) Restart development of an Aviation Weapons Information Management System.

3. (U) FY 1999 PLAN:

- (U) ($ 2,314) Continue improvement of aircraft carrier design tools and assess aircraft carrier design criteria.
- (U) ($23,900) Continue development of advanced aircraft launch alternatives including an Advanced Technology Aircraft Launcher (ATL).
- (U) ($ 5,100) Continue flight deck aviation support such as ski jump integration and development an integrated rapid aircraft turnaround capability to reduce manpower on the flight deck.
- (U) ($49,000) Continue propulsion plant alternatives assessments including nuclear and conventional power generation, integrated machinery controls, integrated electric power systems and advanced auxiliary systems.
- (U) ($10,000) Continue development of advanced passive survivability concepts including armor, underbottom, side protection systems and carrier-suitable, pro-active, tactical and damage response systems.
- (U) ($ 3,000) Continue assessment of alternatives for carrier-suitable integrated information management resources such as a common shipwide computing plant architecture and functional applications.
- (U) ($ 4,500) Continue assessment of emerging technologies to enable development of advanced carrier topside systems and designs including adjunct multi-function sensor concepts to perform aircraft control and landing guidance functions and design concepts to address RF emission and signature.
- (U) ($ 2,428) Continue to assess emerging technologies to enable significant reductions in manpower.
- (U) ($ 2,000) Continue development of an Aviation Weapons Information Management System.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	5,771	90,246	104,952
(U) Appropriated Value:	6,017	0	0
(U) Adjustments to FY 1997 Appropriated Value/ FY98 President's Budget:			
a) Various pricing adjustments	1,646	0	-2,710
(U) FY 1999 OSD/OMB Budget Submit:	7,663	90,246	102,242

(U) CHANGE SUMMARY EXPLANATION:

(U)Funding: FY97 reflects decreases of $101 thousand for minor pricing adjustment, $253 thousand for General undistributed reductions and increase of $2,000 thousand as a result of JULY 1997 BTR update. FY99 reflects decreases of $-2,710 for various pricing adjustments.

(U) Schedule: Not applicable.

(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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development 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			ATL: 2Q PDR ARMOR: 3Q PDR
T&E Milestones			
Contract Milestones		ATL: 1Q DEMVAL AWARD	

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	87,746	83,742
b. Software Development	500	2,500	2,500
c. Primary Hardware	0	0	16,000
d. Travel	60	0	0
e. Miscellaneous	224	0	0
Total	7,663	90,246	102,242

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	10,267	8,899	Cont.	Cont.
Naval Sea Systems Command Detachment, (PERA CV)										
PERA CV	WR	Feb 97	Cont.	Cont.	25	103	500	500	Cont.	Cont.
Naval Surface Warfare Center, Ship Systems Engineering Station, Philadelphia, PA										
NAVSSES	WR	Feb 96	Cont.	Cont.	295	521	500	500	Cont.	Cont.
Naval Surface Warfare Center, Dahlgren Division, Dahlgren, VA										
NSWC/DD	WR	Apr 96	Cont.	Cont.	515	319	9,416	10,225	Cont.	Cont.
Naval Surface Warfare Center, Port Hueneme Division, Port Hueneme, CA										
NSWC/PHD	WR	Apr 96	Cont.	Cont.	25	5	200	200	Cont.	Cont.
Naval Air Warfare Center, Aircraft Division, Lakehurst, NJ										
NAWC AD LKE	WR	Feb 96	Cont.	Cont.	1,780	1,465	32,405	35,600	Cont.	Cont.
Naval Air Warfare Center, Aircraft Division, Patuxant River, MD										
NAWC AD PAX	WR	Feb 97	Cont.	Cont.	15	45	500	500	Cont.	Cont.
NCCOSC Research and Development Division, San Diego, CA										
NRaD	WR	Mar 96	Cont.	Cont.	220	40	3,000	3,500	Cont.	Cont.
Naval Research Laboratory, Washington, DC										
NRL	WR	Feb 96	Cont.	Cont.	330	140	2,000	2,500	Cont.	Cont.
Supervisor of Shipbuilding, Conversion and Repair, Newport News, VA										
SOSNN	WR	Jun 96	Cont.	Cont.	245	0	0	0	Cont.	Cont.
John J. McMullen Associates, Arlington, VA										
JJMA	Contr.	Feb 96	Cont.	Cont.	1,500	1,614	1,500	1,500	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

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)										
Advanced Marine Enterprises, Inc., Arlington, VA										
AME	Contr.	Apr 96	Cont.	Cont.	301	580	500	500	Cont.	Cont.
George G. Sharp, Inc., Arlington, VA										
GGS	Contr.	Apr 96	Cont.	Cont.	20	0	250	250	Cont.	Cont.
M. Rosenblatt & Son, Inc., Arlington, VA										
MRS	Contr.	Apr 96	Cont.	Cont.	245	65	250	250	Cont.	Cont.
American Systems Corporation, Reston, VA										
ASC	Contr.	Feb 96	Cont.	Cont.	240	165	300	300	Cont.	Cont.
ROH, Inc., Arlington, VA										
ROH	Contr.	Mar 96	Cont.	Cont.	105	155	300	300	Cont.	Cont.
Newport News Shipbuilding, Newport News, VA										
NNS	Contr.	Jun 96	Cont.	Cont.	200	0	0	0	Cont.	Cont.
Naval Nuclear propulsion Program										
SEA 08	Misc.	Oct 97	Cont.	Cont.	0	0	20,000	35,000	Cont.	Cont.
Contractors										
(TBD)	Misc.	Oct 96	Cont.	Cont.	0	1,161	7,565	1,439	Cont.	Cont.
Miscellaneous										
Misc.	Misc.	Aug 95	Cont.	Cont.	149	255	793	279	Cont.	Cont.

Support and Management: Not Applicable

Test and Evaluation: Not Applicable

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: S2208/22208
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT TITLE: Future CV R&D

GOVERNMENT FURNISHED PROPERTY

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		Not Applicable								
Support and Management		Not Applicable								
Test and Evaluation		Not Applicable								

Total

	FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	8,715	7,663	90,246	102,242	Cont.	Cont.
Subtotal Support and Management	0	0	0	0		
Subtotal Test and Evaluation	0	0	0	0		
Total Project	8,715	7,663	90,246	102,242	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	2,120	3,255	2,653	1,887	4,699	1,343	4,390	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, respectively, 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) ($65) Conducted feasibility inestigations 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.

(U) FY 1998 PLAN:

- (U) ($3,255) 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 systems performance specification that will become part of the engineering development model (EDM) request for proposals (RFP). Provide engineering and management support to the program.

(U) FY 1999 PLAN:

- (U) ($2,653) 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		
(U) Adjustments from FY 1997 Appropriated Value/FY98 President's Budget:			
a. Various pricing adjustments	-111	0	41
U) FY 1999 OSD/OMB Budget Submit:	2,120	3,255	2,653

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 97 reflects a decrease of $110 thousand for General Undistributed reductions and $1 thousand minor pricing adjustment. FY 99 reflects an increase of $41 thousand for minor pricing adjustments.

(U) Technical: Not applicable.

(U) Schedule: Not applicable.

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			

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W1723
PROGRAM ELEMENT TITLE: Carrier Systems Development 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	1,282	1,717	1,430
b. Software Development	446	984	723
c. Integrated Logistics Support	150	227	258
d. Development Test & Evaluation	242	327	242
Total	2,120	3,255	2,653

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	2,120	3,255	2,653	Cont.	Cont.
Kaman Electromagnetics, Hudson, MA										
Kaman EM	CPFF	12/92	4,900	4,900	1,840	0	0	0	4,900	4,900
Miscellaneous, Navy										
Misc.	WX	9/95	32,432	32,432	1,277	0	0	0	32,432	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: September 1997

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	2,120	3,255	2,653	Cont.	Cont.
Subtotal Support and Management	200					
Subtotal Test and Evaluation	0					
Total Project	17,070	2,120	3,255	2,653	Cont.	Cont.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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		3,762	4,209	1,189	3,546	0	0	0	12,706

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. Potentially 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) ($2,768) 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) ($500) Reprogramming to Project W1723 (CV Launch & Recovery Systems).

- (U) ($445) Reprogramming to Project W2232 (CV Launch & Recovery Systems).

(U) FY 1998 PLAN:

- (U) ($ 67) Evaluate candidate materials to determine heat resistant and load bearing properties.
- (U) ($4,142) Validate mobility, auxiliary and anchoring subsystem alternatives. Conduct system integration studies and develop prototype designs.

(U) FY 1999 PLAN:

- (U) ($ 101) Validate compatibility of mat panels with AM-2 mat and aircraft operations.
- (U) ($1,088) Fabricate full scale system demonstration units suitable for validation of concepts in a test and controlled operational environment.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W2269
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT Title: EAF Matting

B. (U) PROGRAM CHANGE SUMMARY: (Dollars in thousands)

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	3,829	4,209	2,673
(U) Appropriated Value:	3,991	0	0
(U) Adjustments from FY 1997 Appropriated Value/FY98 President's Budget:			
a. General Undistributed	-167	0	0
b. NWCF Adustments	0	0	-44
c. MOSLS (EAF)	0	0	-889
d. Low Expenditure Rate	0	0	-547
e. FY 1997 SBIR Transfer	-62	0	0
f. N88 Final Balance Adjustments	0	0	-4
(U) FY 1999 OSD/OMB Budget Submit:	3,762	4,209	1,189

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY97 reductions of $167 for General undistributed reductions and $62 thousand for FY 1997 SBIR Transfer. FY 1999 decrease of $44 thousand results from Navy Working Capital Funds (NWCF) adjustments, a decease of $889 thousand for MOSLS (EAF); a decrease of $547 for low expenditures and a decrease of $4 thousand for N88 Final Balance Adjustments.

(U) Schedule: Delays in developing and coordinating program documentation caused the late contract award. The following milestones are changed as a result.

From:	To:
MAT DT 4Q/97	MAT DT 2Q/98

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603512N PROJECT NUMBER: W2269
PROGRAM ELEMENT TITLE: Carrier Systems Development PROJECT Title: EAF Matting

	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) EAF OPN (PE 0206139M, Expeditionary Airfields)	0	0	0	5,605	4,504	4,600	Cont.	Cont.	

(U) RELATED RDT&E: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development

PROJECT NUMBER: W2269
PROJECT Title: EAF Matting

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones		A/G: 1Q MS I	
Engineering Milestones			
T&E Milestones	A/G: 4Q Subsys Test	Mat:2Q DT	
Contract Milestones	A/G: 4Q Contract Award Mat: 4Q Contract Award		

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	3,928	1,012
b. Software Development	0	0	0
c. Integrated Logistics Support	263	281	177
d. Development Test & Evaluation	0	0	0
e. Reprogrammings	945	0	0
Total	3,762	4,209	1,189

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	2,470	2,470	0	2,000	1,500	189	2,000	5,689
TBD	CPFF	12/15/97	6,072	6,072	0	817	2,709	1,000	1,546	6,072

Support and Management: Not applicable.

Test and Evaluation: Not applicable.

GOVERNMENT FURNISHED PROPERTY: Not applicable

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603512N

PROGRAM ELEMENT TITLE: Carrier Systems Development

PROJECT NUMBER: W2269

PROJECT Title: EAF Matting

	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Production Development	3,762	4,209	1,189	3,546	11,761
Subtotal Support and Management	0	0	0	0	0
Subtotal Test and Evaluation	0	0	0	0	0
Total Project	3,762	4,209	1,189	3,546	12,706

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: Sept 1997

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	15,923	7,227	16,159	11,454	6,759	11,088	11,454	CONT	CONT
S1712 - Hull, Mechanical & Electrical Improvement	1,576	11,967	14,684	14,038	17,559	19,556	15,419	CONT	CONT
TOTAL	17,499	19,194	30,843	25,492	24,318	30,644	26,873	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.

(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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S0382
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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	15,923	7,227	16,159	11,454	6,759	11,088	11,454	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, 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.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($7,538) 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 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:

- ($6,827) 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) ($15,709) 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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S0382
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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	0	0
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 President's Budget	-1168	0	+24
(U) FY 1999 OSD/OMB Budget Submit:	15,923	7,227	16,159

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $1168K reflects minor pricing adjustments(-$450K) and general undistributed reductions(-$718K).
FY 1999: Increase of $24K 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: 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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S0382

PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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 Transient Analysis Model 4Q ROV Power System
SMART SHIP	1Q Initiate Demo 4Q Complete Demo		
MAGNETIC SILENCING	4Q Eddy Current Measurement System Defined	4Q LPD-17 Model Complete 4Q Eddy Current Tests on Surface Combatant	1Q Adv Deg ATD Trans to Surf Comb 4Q CLDG Sys for Surf Comb Defined 4Q CLDG Sensors Provided
ADVANCED AUXILIARIES	4Q LP Air Sys Sim, Design	4Q Adv Mach Sys LABEVAL Proof of Concept	4Q Autonomic Mach Zone Demo

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

DATE: Sept 1997

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	7,538	6,827	15,709
b. Fiber Optic	1,482	0	0
c. Salvage	400	400	450
d. Smart Ship	6,503	--	--
TOTAL	15,923	7,227	16,159

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

DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S0382
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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	3,000	Cont	Cont
Misc Contr.	Various	Various			11,793	6,331	1,000	2,226	Cont	Cont
NSWC/Dahl.	WR	Various			6,191	0	0	0	0	6,191
NSWC/CD	WR	Various			12,846	3,300	4,455	10,062	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: Sept 1997

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	15,923	7,227	16,159	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	15,923	7,227	16,159	Cont	Cont

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S1712

PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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	11,967	14,684	14,038	17,559	19,556	15,419	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) ($981) Continue development of affordable mechanical 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) ($10,986) 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) ($981) Continue development of improved HM&E auxiliary components for improved maintenance and reliability. Complete ship service genset feasibility study and ball valve development.

- (U) ($13,703) 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 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	1,589	11,967	14,826
(U) Appropriated Value:	1,657	0	0
(U) Adjustments to Appropriated Value/ FY 1998 President's Budget	-81	0	-142
(U) FY 1999 OSD/OMB Budget Submit:	1,576	11,967	14,684

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $81K reflects minor pricing adjustments(-$13K) and general undistributed reductions (-$68K).
FY 1999: Decrease of $142K 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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S1712
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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: Sept 1997

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	981	981
b. Integr. Topside Design	866	10,986	13,703
TOTAL	1,576	11,967	14,684

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

DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603513N PROJECT NUMBER: S1712
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development 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	717	1,342	Cont	Cont
JJMA	C/CPFF	Various			0	0	1,500	2,000	Cont	Cont
Rockwell	C/CPFF	Various			0	0	1,500	2,000	Cont	Cont
Lockheed/ Martin	C/CPFF	Various			0	0	1,500	2,000	Cont	Cont
NSWCCD	WR	Various			1,599	1,063	2,000	2,378	Cont	Cont
NSWCDD	WR	Various			0	0	900	1,000	Cont	Cont
NRL	WR	Various			50	80	900	1,000	Cont	Cont
NSWCCD/Phil	WR	Various			0	0	600	600	Cont	Cont
NRaD	WR	Various			0	0	1,850	1,864	Cont	Cont
NAWC	WR	Various			0	30	500	500	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	11,967	14,684	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	11,967	14,684	Cont	Cont

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

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	2,261	2,062	2,107	2,117	2,162	2,206	2,258	CONT.	CONT.
S1121 Personnel Protection	1,803	0	0	0	0	0	0	0	48,245
S1565 Fire Protection/Damage Control Systems	4,067	4,988	5,622	5,707	5,833	5,954	6,091	CONT.	CONT.
TOTAL	8,131	7,050	7,729	7,824	7,995	8,160	8,349	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) Starting in FY 1998, P.E. 0603514N/S1121 efforts transition 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: Sept 1997

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	2,261	2,062	2,107	2,117	2,162	2,206	2,258	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 Maritime Fire Support Demonstrator and LPD-17 designs.

- (U) ($1,077) 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.

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) ($1,068) 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) ($988) 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.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S0384
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Combat Survivability Design

(U) FY 1998 President's Budget:	2,195	2,062	2,116
(U) Appropriated Value	1,502		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget			
a. Adjustments	759		-9
(U) FY 1999 OSD/OMB Budget Submit	2,261	2,062	2,107

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 changes due to: +785K Near Term Mine Warfare Reprogram; -94K General Undistributed Reductions; and +68K Minor Pricing Adjustments. FY 1999 change due to -9K Minor Pricing Adjustments.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Specification changes included in new construction ships (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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S0384
PROGRAM ELEMENT TITLE: Ship Combat Survivability 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 Full Scale Test

Contract Milestones: None

FY 1999 PROGRAM ELEMENT PROJECT COST BREAKDOWN DATE: Sept 1997

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	1,516	1,266	1,607
c. Specification/Design Standard Preparation	200	50	100
d. Hardware Development	250	486	200
e. Travel	10	10	10
TOTAL	2,261	2,062	2,107

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) (Not applicable)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control 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
S1565 Fire Protection/Damage Control Systems	4,067	4,988	5,622	5,707	5,833	5,954	6,091	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.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1997 ACCOMPLISHMENTS:

- (U) ($410) 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):

- (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; and developed shipboard procedures for the on-scene leader in support of rapid battle damage assessment and prioritization.

- (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) ($400) 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) ($1,208) 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):

- (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) Complete 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) ($450) 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.

- (U) ($912) Conduct fleet evaluations aboard the ex-USS SHADWELL in support of developing shipboard procedures for firefighting in a chemical, biological, and radiological (CBR) environment.

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

- (U) ($1,710) Conduct full scale weapon effects demonstrations of automated fire suppression system options including intelligent component level valve control and central overall system control architectures.

- (U) ($600) Initiate development of a crew casualty/damage control model for ASAP 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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control Systems

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		
(U) Adjustments to FY 1997 Appropriated Value/1998 President's Budget			
a. Adjustments	1,714		-30
(U) FY 1999 OSD/OMB Budget Submit	4,067	4,988	5,622

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 changes due to: +2,000K Near Term Mine Warfare Reprogram; -181K General Undistributed Reductions; and -105K Minor Pricing Adjustments. FY 1999 change due to -30K Minor Pricing Adjustments.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Specification changes included in new construction ships (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).

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control Systems

D. (U) SCHEDULE PROFILE:

	FY 1997	FY 1998	FY 1999
Program Milestones			
Engineering Milestones	2Q ASAP Dynamic Electrical Model	4Q ASAP Fire/Smoke Model	
	4Q RTSS Software Module		
	4Q Magazine Sprinkler System Vulnerability Assessment and Specification		
	4Q Systems Reconfiguration Management Display Guidelines		
		4Q DCS Structural Software Module	

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control Systems

	FY 1997	FY 1998	FY 1999
Engineering Milestones (Cont'd)		4Q DCA/RPL Interactive Training System	
T&E Milestones	4Q RTSS Shipboard T&E	3Q 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
			3Q Automated HM&E Demonstrations
			4Q Self Contained Water Mist Evaluations
Contract Milestones Not Applicable			

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S1565
PROGRAM ELEMENT TITLE: Ship Combat Survivability PROJECT TITLE: Fire Protection/Damage Control Systems

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	3,797
c. Specifications/Design Standard Preparation	100	180	350
d. Training Development	625	150	0
e. Software Development	1,586	1,400	850
f. Travel	25	25	25
TOTAL	4,067	4,988	5,622

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands) Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	3,030	3,657	3,667	3,740	3,743	3,727	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

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) Began enhancements to LHTLD System. Continued development of LHTLD 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.

2. (U) FY 1998 PLAN:

- (U) ($2,080) Continue enhancements to LHTLD System. Continue development of LHTLD Dosimeters.
- (U) ($707) 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) ($280) Begin research, development and testing of Tritium Monitoring Systems.
- (U) ($200) Begin Casualty Dosimeter Development and Testing.
- (U) ($50) Begin ARCADES enhancements.

B. PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
FY 1998 President's Budget:	2,769	3,030	3,677
Appropriated Value:	2,886		
Adjustments to FY 1997 Appropriated Value/FY 1998 President’s Budget:			
a. SBIR	-37		
b. Undistributed reductions	-117		
c. Revised Economic Assumptions	-3		
d. NWCF surcharge			-20
FY 1999 OSD/OMB Submit:	2,729	3,030	3,657

CHANGE SUMMARY EXPLANATION:

Funding:
FY 1997:
a. SBIR Transfer (-37).
b. Congressional undistributed reductions (-117).
c. Supplemental Rescission Revised Economic Assumptions (-3).

Schedule: Not applicable.
Technical: Not applicable.

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	6,093	4,136	6,810	7,415	6,971	5,885	10,156	50,875

D. (U) SCHEDULE PROFILE: See Attachment(A).

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	525	547
c. Developmental Test and Evaluation	188	546	584
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	3,030	3,657

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	739	737	CONT.	CONT.
Naval Surface Warfare Center, White Oak Det. Silver Spring, MD	WR	Various	4,980	4,980	4,980	0	0	0	0	4,980
Miscellaneous	Various	Various	CONT.	CONT.	2,251	10	10	10	CONT.	CONT.
Test and Evaluation										
Miscellaneous	Various	Various	CONT.	CONT.	2,078	415	546	584	CONT.	CONT.

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

GOVERNMENT FURNISHED PROPERTY:
Product Development - Not applicable.

Support and Management - Not applicable.

Test and Evaluation - Not applicable.

	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	749	747	CONT.	CONT.
Subtotal Test and Evaluation	2,078	415	546	584	CONT.	CONT.
Total Project	20,660	2,729	3,030	3,657	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	5,704	12,078	16,105	22,245	27,148	22,107	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 USW 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. In addition, 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 (USW-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: September 1997

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. (1 October 1996 - 30 April 1997)

2. (U) FY 1998 PLAN:

- (U) ($4,048) 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. (1 October 1997 - 30 April 1998)

- (U) ($672) Tactical Control. Update Tactical Control architecture and functional capabilities to account for surface ship requirements. Initiate development of contact management functionality to support TARS and SQQ-89. (1 October 1997 - 31 December 1997)

- (U) ($584) Passive Processing. Initiate adaptation of passive processing approaches developed under Advanced Submarine Combat Systems Development (P.E. 0603504N, V0223) for use with surface towed arrays. Develop approaches for commonizing surface and submarine processing architectures. (1 October 1997 - 31 December 1997)

- (U) ($400) Requirements Engineering. Based on FY97 SC-21 top level USW MOE requirements, perform functional decomposition for LBVDS, Passive, Hull and other USW systems. Perform technology assessment and bottoms up verification of LBVDS and Hull Array technologies in support of functional decomposition. Begin incorporation of PEO(USW) and DON Modeling and Simulation (M&S) infrastructure. (1 October 1997 - 31 December 1997)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

3. (U) FY 1999 PLAN:

- (U) ($3,000) Towed Systems (TARS). Complete TARS post-test analysis and transition to MFTA. Initiate development of Broadband Variable Depth Sonar. (1 October 1998 - 31 December 1998)
- (U) ($2,800) Advanced Processing. Continue commonization of surface and submarine processing architectures. 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) ($5,000) Advanced Hull Systems. Initiate development of Broadband ASW and High Resolution Obstacle Avoidance hull Advanced Development Models. (1 October 1998 - 28 February 1999)
- (U) ($1,278) Requirements Engineering. Formulate USW-21 systems engineering analysis model. Continue USW-21 analyses for Hull and Towed Systems. Formalize and finalize Analytic baseline for systems engineering models. Continue incorporation of PEO(USW) and DON M&S infrastructure. (1 October 1998 - 31 December 1998)

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY1999
(U) FY 1998 President's Budget:	3,778	5,704	4,717
(U) Appropriated Value:	3,964	0	0
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President’s Budget:			
a. Adjustments	-511		+7,361
(U) FY 1999 OSD/OMB Budget Submit:	3,453	5,704	12,078

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced Development

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 reduced (-511K) due to general reductions. FY 1999 increase (-7361K) due to program restructing and NWCF R&D rate adjustments.

(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)

D. (U) SCHEDULE PROFILE: See attached

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	4,754	11,278
b. Support and Management	145	200	300
c. Test and Evaluation	400	750	500
Total	3,453	5,704	12,078

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced 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										
NAVUNSEAWARCEN DET Newport, RI	WR	6/96	CONT.	CONT.	33,013	2,354	1,684	2,537	CONT.	CONT.
Misc Contractors	C/CPFF	Q2/95	TBD	CONT.	4,585	554	2,048	6,341	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.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare PROJECT TITLE: ASW Advanced 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	52,373	2,908	4,754	11,278	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	5,704	12,078	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	59,858	59,067	61,597	61,037	25,555	26,172	26,865	CONT.	CONT.
F2177 New Design HM&E	2,061	0	0	0	0	0	0	0	144,268
TOTAL	61,919	59,067	61,597	61,037	25,555	26,172	26,865	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: September 1997

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) 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: September 1997

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	59,858	59,067	61,597	61,037	25,555	26,172	26,865	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).

- (U) ($20,126) 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 aditional 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) ($2,067) 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) ($13,200) 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) ($20,300) 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) ($11,500) Continue development of an advanced sail concept to exploit shaping and materials to improve ship hydrodynamics, add aditional 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) ($2,297) 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) ($29,900) 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 large scale model build and develop plans for the demonstration and validation of tools. Begin downselect process for next phase of the program. Complete manufacture of rim driven main seawater pump test hardware and commence test and evaluation.

- (U) ($12,900) 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 developing a new concept propulsor which 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.

- (U) ($8,000) Continue development of an advanced sail concept to exploit shaping and materials to improve ship hydrodynamics, add aditional 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) ($1,500) Continue 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 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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget			
a. Congressional Undistributed Adjustments	-2,628		
b. SBIR Assessment	-1,287		
c. SSN Security Functional Transfer			-3,900
d. NWCF Adjustments			112
e. BTR 97-7 Adjustment	-184		
f. MPN Adjustment	-216		
g. Revised Economic Assumptions	-75		
(U) FY 1999 OSD/OMB Budget Submit:	59,858	59,067	61,597

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 97 adjustments from FY 98 President's Budget include -$2,628K for Congressional undistributed adjustments, -$1,287K for SBIR, -$184K for a minor below threshold reprogramming, -$216K for MPN, and -$75K for Revised Economic Assumptions. FY 99 was decreased by -$3,900K for the SSN Security Functional Transfer to PE 0101224N (SSBN/SSN Security and Survivability Program) and increased by +$112K for 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine Systems 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 for scaling effects on LSV
	Continue LSV support for New SSN propulsor development program	Complete LSV support for New SSN propulsor development program	
	Commence Hydrodynamics testing for scaling effects on LSV	Continue hydrodynamics testing for scaling effects 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine Systems Development

	FY 1997	FY 1998	FY 1999
	Complete LSV support for the test & demo of the advanced hybrid advanced tech demo US/UK commission mobile deep array (NOULD 96) Began advanced sail concept exploration		
Engineering Milestones	Complete sea trial with arc fault wide band optic sensor Deliver composite shaft joint Complete development of LIDAR, early warning, TDASS module	Complete EES 2nd generation elastomer disk life cycle test Design & fab LSV adv sail Dev instrumentation/ sensor suite for LSV test	Deliver LSV advanced sail Install LSV sail and instrumentation/ sensor suite

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine Systems 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine Systems Development

	FY 1997	FY 1998	FY 1999
Contract Milestones			

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine Systems Development

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

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a. Hardware Development	39,560	37,932	44,080
b. Developmental T&E	13,255	11,935	12,317
c. Countermeasures Dev	3,239	4,000	0
d. R&D Facilities Mgmt	3,804	5,200	5,200
TOTAL	59,858	59,067	61,597

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine 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										
TRACOR	C/CPFF	12/87	CONT.	CONT.	8,757	1,854	1,910	1,967	CONT.	CONT.
Austin, Texas										
NNS	S/CPFF	03/90	15,054	15,054	15,054	0	0	0	0	15,054
Norfolk, Virginia										
NNS	S/CPFF	01/95	CONT.	CONT.	4,848	10,543	10,337	11,442	CONT.	CONT.
Norfolk, Virginia										
GD/EBDiv	S/CPFF	03/92	19,231	19,231	19,231	0	0	0	0	19,231
Groton, Connecticut										
GD/EBDiv	S/CPFF	01/95	CONT.	CONT.	11,437	6,715	6,527	7,069	CONT.	CONT.
Groton, Connecticut										
JHU/APL	S/CPFF	10/89	CONT.	CONT.	23,160	3,050	3,931	500	CONT.	CONT.
Laurel, Maryland										
AT&T	S/CPFF	10/94	3,627	3,627	3,627	0	0	0	0	3,627
Whippany, New Jersey										
NSWC	WR	Var	CONT.	CONT.	83,800	15,277	14,950	16,450	CONT.	CONT.
Bethesda & Annapolis, Maryland; Bayview, Idaho; Portsmouth, Virginia										
NUWC	WR	Var	CONT.	CONT.	14,582	3,826	3,012	3,335	CONT.	CONT.
New London, Connecticut; Newport, Rhode Island										
Misc	Var	Var	CONT.	CONT.	54,809	4,725	7,285	8,337	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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603561N PROJECT NUMBER: S2033
PROGRAM ELEMENT TITLE: Advanced Submarine System Development PROJECT TITLE: Advanced Submarine Systems 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	2,215	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	5,796
Whippany, New Jersey										
GD/EBDiv			CONT.	CONT.	9,123	3,310	3,700	3,531	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	5,020	7,786	0	10,024

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	45,990	47,952	49,100	CONT.	CONT.
Subtotal Support and Management	4,051	613	180	180	CONT.	CONT.
Subtotal Test and Evaluation	36,409	13,255	10,935	12,317	CONT.	CONT.
Total Project	279,765	59,858	59,067	61,597	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	2,612	2,504	3,310	3,348	3,441	3,547	CONT.	CONT.
V1739 Submarine Special Operations Support Development	2,015	2,319	2,236	2,404	1,952	2,171	2,356	CONT.	CONT.
TOTAL	4,296	4,931	4,740	5,714	5,300	5,612	5,903	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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N PROJECT NUMBER: F0770
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems PROJECT TITLE: Advanced Submarine Support Equipment Program

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
F0770 Advanced Submarine Support Equipment Program	2,281	2,612	2,504	3,310	3,348	3,441	3,547	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:

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

1. (U) FY 1997 Accomplishments:

- (U)($1,437) Continued development of Laser Warning Receiver FDM.
- (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) ($1,557) Perform at sea testing of Laser Warning Receiver FDM.
- (U) ($980) 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: F0770
PROJECT TITLE: Advanced Submarine Support Equipment Program

3. (U) FY 1999 PLAN:

- (U) ($1,354) Continue development of Passive Localization, Photonics Mast Auto Target Recognition and Tracking algorithms and MMW Frequency Extension FDM's by awarding development contracts.

- (U) ($50) Initiate development of HMI design enhancement FDMs by generating procurement documentation through TDA and contractor support.

- (U) ($1,100) Complete development of Laser Warning Receiver. Continue Passive Localization, Photonics Mast Auto Target Recognition and Tracking algorithms, and MMW Frequency Extension development through TDA and contractor support.

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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:			
a. SBIR Transfer	-40	0	0
b. Undistributed Reductions	-119	0	0
c. Quadrennial Defense Review (QDR) Adjustment	0	0	-1,000
d. NWCF R&D - Undersea Warfare Centers	0	0	+29
(U) FY 1999 OSD/OMB Budget Submit:	2,281	2,612	2,504

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: The $159K decrease in FY 1997 is due to an SBIR assessment and undistributed reductions. The $971K decrease in FY99 is due to a decision to delay the Low Probability of Intercept FDM and HMI design enhancement ($-1,000K), and an increase for NWCF R&D Undersea Warfare Centers ($+29K).

(U) Schedule: HMI design enhancement and Low Probability of Intercept FDM contract awards are delayed one year and two years respectively.

(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: September 1997

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. Feasibility Demonstration Models	2,166	2,512	2,256
b. Requirements Development	80	85	233
c. Miscellaneous	35	15	15
Total	2,281	2,612	2,504

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										

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N PROJECT NUMBER: V1739
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems PROJECT TITLE: Submarine Special Operations Support Development

Sensor Technology Insertion FDM contracts										
JHU/APL	C/CPIF	12/95	3,384	3,384	935	1,437	1,557	0	0	3,384
TBD	C/CPIF	3/99	CONT.	CONT.	0	0	0	1,354	CONT.	CONT.
Miscellaneous					14,881	789	1,009	1,123	CONT.	CONT.
Support and Management										
Miscellaneous					2,372	55	46	27	CONT.	CONT.
Test and Evaluation					0	0	0	0	0	0

GOVERMENT FURNISHED PROPERTY: Not Applicable.

	FY 1996 & Prior	FY 1997 Actual	FY 1998 Budget	FY 1999 Budget	Total Complete	Total Program
Subtotal Product Development	15,816	2,226	2,566	2,477	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	18,188	2,281	2,612	2,504	CONT.	CONT.

(U) COST: (Dollars in Thousands)

PROJECT NUMBER &	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	TO	TOTAL

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N PROJECT NUMBER: V1739
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems PROJECT TITLE: Submarine Special Operations Support Development

TITLE	ACTUAL	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	COMPLETE	PROGRAM
V1739 Submarine Special Operations Support Development	2,015	2,319	2,236	2,404	1,952	2,171	2,356	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:

- ($2,015) Conducted/supported an Arctic Science Exercise and plan for ICEX 1-98.

2. (U) FY 1998 PLAN:

- ($2,022) Conduct/support an Arctic Science Exercise and ICEX 1-98.
- ($297) Provide updates to the Naval Warfare Publication (NWP) concerning routine and emergency under-ice surfacing operations for SSN 688.

3. (U) FY 1999 PLAN:

- ($2,236) Conduct/support an Arctic Science Exercise and plan for ICEX 1-00.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,018	2,319	2,264
(U) Appropriated Value:	2,138	2,319	2,264
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 Presidents Budget:			
a. Congressional Undistributed Reductions	-123		
b. NWCF and other minor adjustments			-28
(U) FY 1999 OSD/OMB Submit:	2,015	2,319	2,236

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY1997 decrease of 123K due to Congressional undistributed reductions.

FY1998: None

FY1999 net decrease of 28K due to -60K for Artic Operations Support, -35K due to DBOF surcharge Correction, and +67K for NWCF R&D.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

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: September 1997

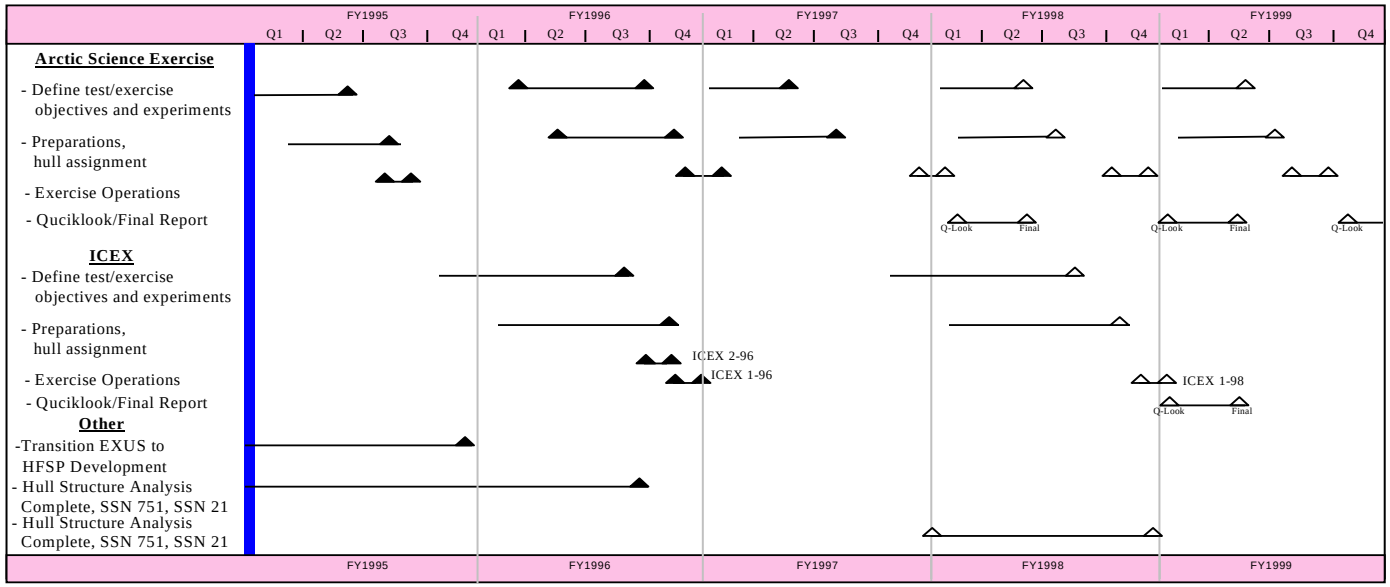
BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

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

Schedule Profile



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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. Systems Engineering	0	0	0
b. Developmental Test & Evaluation	1,440	1,739	1,656
c. Contractor Engineering Support	400	400	400
d. Program Management Support	160	160	160
e. Travel	15	20	20
Total	2,015	2,319	2,236

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

PERFORMING ORGANIZATIONS

Contractor/ Government Performing	Contract Method/ Fund Type	Award/ Oblig	Perform Activity	Project Office	Total* FY 1996	FY 1997	FY 1998	FY 1999	To	Total

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

Activity	Vehicle	Date	EAC	EAC	& Prior	Budget	Budget	Budget	Complete	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.
David Taylor Research Carderock, MD	WR	3/93	CONT.	CONT.	1,101	0	0	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.
Support Costs and Management Services										
Miscellaneous	N/A	N/A	CONT.	CONT.	1,157	575	580	580	CONT.	CONT.
Test and Evaluation										
NUWC Division Keyport, WA	WR	5/93	CONT.	CONT.	3,767	1,390	1,739	1,656	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.

GOVERNMENT FURNISHED PROPERTY: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: V1739
PROJECT TITLE: Submarine Special Operations Support Development

*V1739 is a continuing program. Only FY95 dollars are shown.

	Total* FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	6,958	0	0	0	CONT.	CONT.
Subtotal Support and Management	1,157	575	580	580	CONT.	CONT.
Subtotal Test and Evaluation	4,061	1,440	1,739	1,656	CONT.	CONT.
Total Project	12,176	2,015	2,319	2,236	CONT.	CONT.

*V1739 is a continuing program. Only FY95 dollars are shown.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	14,363	16,193	15,167	14,246	17,731	15,930	13,583	Continuing	Continuing

A. (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 (Feasibility through Contract Design) design tools, criteria, and methods.

(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) ($1,328) 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 outyear efforts based on results of assessment of ability to use/not use legacy design tools.

- (U) ($1,078) Collection and analysis of long-term hydrodynamic loads data and update algorithms for longitudinal and transverse bending as well as torsion loads. Complete grillage strength test fixture. Assessed developing ultimate strength relationships. Completed fatigue testing. Fracture assessment formulation. Updated reliability inputs and assessment techniques; validation of processes and utilize 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) ($8,909) 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) ($1,810) 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) ($760) 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) ($1,648) 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) ($1,500) 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 of 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 fracture assessment formulation. Complete stiffener geometry testing. Complete compressive strength of stiffener testing. Analyze fatigue test data. 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 utilized technologies/improved design methods on existing ships and new designs. Support Ship Structure Committee (SSC) Research.

- (U) ($11,300) 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 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. Systems engineering analysis (including life cycle cost analysis) to identify/develop the families of modules as the building blocks of the future surface navy, including configuration control requirements. Complete the HM&E families of common modules fleet level functional sizing and concepts efforts. 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. With focus on surface combatants continue development of generic build strategies (GBS) for naval ships that foster product-oriented ship design and construction, and incorporate common system architectures, alternative distributed ship systems architectures and modules. Include results of the commonality architecture and zonal distributed systems and analyze their impact on ship production costs, scheduling, fabrication, erection, outfitting, and testing. 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 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 total ship modular open systems architecture and other life cycle 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.

(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. 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 life cycle 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. Complete development of concepts for modular damage control equipment stowage. 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. Support design of advanced electronics module 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 so that these systems are supported by zonal distributed systems, and the weapons / topside / sensor zone and interfaces are not violated.

3. (U) FY 1999 PLAN:

- (U) ($700) 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) ($1,502) 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) ($1,500) 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) ($1,100) 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. Complete analysis of fatigue test data and update design data sheet (DDS). 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) ($10,365) 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. Complete 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 for 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. Engineer 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. With focus on surface combatants continue development of generic build strategies (GBS) for naval ships that foster product-oriented ship design and construction, and incorporate common system architectures, alternative distributed ship systems architectures and modules. Include results of the commonality architecture and zonal distributed systems and analyze their impact on ship production costs, scheduling, fabrication, erection, outfitting, and testing. 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. Begin development of a generic maintenance and modernization strategy for a modular open systems architecture family of surface combatants.

(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 life cycle 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 life cycle cost (LCC) 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-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. Complete design of advanced 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	----	----
(U) Adjustments to FY 1997 Appropriated Value / FY 1998 President’s Budget:	+556	-5	-7,087
(U) FY 1999 OSD/OMB Submit:	14,363	16,193	15,167

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 net increase is due to SBIR assessment (-$229K), undistributed general reductions & FY 97 supplemental revised economic assumptions (-$581K), and BTRA for VGAS concept studies ($1,366K). FY 1998 reduction is due to minor adjustments (-5K). FY 99 increase due to minor adjustment (+12K). PR 99 adjustment was due to sponsor funding constraints.
(U) Schedule: Efforts in this PE were re-phased for DD 21 lead award in FY 04.
(U) Technical: The brunt of the 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 DD 21. It also increases the Navy's risk of achieving the DD 21 procurement, and operating & support cost objectives by now relying on industry investment on life cycle affordability technologies for the DD 21 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: September 1997

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
	Fracture & Grillage Tests of Shipyard Fabrication Specimens Complete 4Q	Cost Tool Integration w/SBD 4Q	Visualization/Simulation of Discrete Electrical Control Systems 4Q
	Visualization Virtual Mockup for SBD 4Q	Feasibility Tool (ASSET) Integration w/SBD 4Q	Visualization of 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 Complete 3Q	Radio Communication Modular Equipment Stds. 4Q	C4I Modularity Distributed Systems Prototype 4Q

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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)	Prototype Stateroom Module Complete 3Q	HM&E Module Interface Standards Development Plan 4Q	Zonal HVAC Design & Distr. System Level II Design 4Q
	Early Stage Design for Production Guidance Production 4Q	Module Design Handbook Complete 4Q	HM&E Module Interface Standards Complete 4Q
	Assessment of Impact of Zonal Distributed Syst. Arch. on Ship 4Q	Combat Systems Zone & Interface Standards Development Plan 3Q	Modular Food Service Level II Design 4Q
	PODAC Cost Model Prototype Version 0 2Q	PODAC Cost Model Validation Complete 4Q	PODAC Cost Model Version 1 Complete 4Q
	Surface Combatant GBS Phase I 4Q	Dedicated Distributed Systems Serviceways Level II Design 4Q	Surface Combatant 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: September 1997

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	760	700
b. Ship Design Methods, Tools, & Criteria	1,315	1,623	1,477
c. Simulation Based Design	211	1,500	1,500
d. Reliability Based Structures	1,078	985	1,100
e. EM Engineering	444	--	--
f. Affordability Through Commonality	8,881	11,275	10,340
g. Vertical Gun Advanced Ships (VGAS)	1,810		
h. Travel	46	50	50
TOTAL	14,363	16,193	15,167

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	2,195	1,905	CONT.	CONT.
John J. McMullen Assoc. (JJMA) Arlington, VA	C/CPFF	4-95	CONT.	CONT.	1,314	430	1,920	1,670	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	1,800	1,600	CONT.	CONT.
Other Contractors	Various	Various	N/A	N/A	22,901	4,121	4,670	4,460	CONT.	CONT.
NSWC/Carderock Division	WR	Various	N/A	N/A	11,606	4,946	4,295	4,200	CONT.	CONT.
Other Govt. Activities	WR	Various	N/A	N/A	4,285	2,164	1,313	1,332	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	14,363	16,193	15,167	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	14,363	16,193	15,167	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	15,744	3,848	2,056	10,549	8,395	0	0	CONT.	CONT.
22300 CV Feasibility Studies	0	34,834	41,422	15,650	0	0	0	0	91,906
TOTAL	15,744	38,682	43,478	26,199	8,395	0	0	CONT.	CONT.

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 are 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) 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S0408
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies 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)	15,744	3,848	2,056	10,549	8,395	0	0	CONT.	CONT.

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) ($15,744) 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 completed in the fourth quarter to support a planned FY 97 Milestone I Decision. Expanded ADC(X) Feasibility Studies and AOA support to include the Fleet Oiler AOE(X).

2. (U) FY 1998 PLAN:

- (U) ($3,848) Complete ADC(X)/AOE(X) Ship Feasibility Studies, AOA support and preparation of documentation required for the planned FY 98 Milestone I decision.

3. (U) FY 1999 PLAN:

- (U) ($2,056) Feasibility Studies and AOA support will begin for a new class of helicopter carrier, LH(X) following a Milestone 0 decision.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	12,377	3,848	2,062
(U) Appropriated Value:	12,942		
(U) Adjustments to FY 1997 Appropriated Value/FY98 President's Budget:			
a. FY 97 SBIR Transfer	-204	0	0
b. General Undist Reduction	-580	0	0
c. DD 1002: March 1997 Update BTRs	3,616	0	0
d. FFRDC Reduction	-30	0	0
e. NOC Base Mgt Transfer	0	0	-6
(U) FY 1999 OSD/OMB Budget Submit	15,744	3,848	2,056

(U) CHANGE SUMMARY EXPLANATION:

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S0408
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: Ship Feasibility Studies

(U) Funding: FY97 reflects increase of ($3,616K) for DD 1002: March 1997 update BTRs and decreases of ($204K) for SBIR transfer and General undistributed reductions (-$580), and decrease of $30 thousand for FFRDC reductions. FY 99 reflects decrease of (-$6K) due to minor pricing adjustments.

(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)
(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		4Q AOE(X) MS I 1Q SC21 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 FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S0408
PROGRAM ELEMENT TITLE: Ship Peliminary Design and Feasibility Studies PROJECT TITLE: Ship Feasibility Studies

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

PROJECT COST CATEGORIES	FY 1997	FY 1998	FY 1999
a.Ship Design Feasibility Studies	15,629	3,808	2,026
b.Travel	115	40	30
TOTAL	15,744	3,848	2,056

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: September 1997

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) 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	2,984	0	350	CONT.	CONT.
Other Government	WR/Reqn	Various	CONT.	CONT.	4,347	2,403	500	700	CONT.	CONT.
Aplied Physics Laboratory Laurel, MD	Comp	Various	CONT.	CONT.	3,635	2,559	0	0	CONT.	CONT.
J.J. McMullen Arlington, VA	Comp	Various	CONT.	CONT.	0	4,312	1,500	0	CONT.	CONT.
Other Contractor	Comp	Various	CONT.	CONT.	6,155	3,361	1,798	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)

FY 1999 RDT&E,N PROGRAM/PROJECT COST BREAKDOWN DATE: September 1997

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) 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	19,347	15,619	3,798	2,056	CONT.	CONT.
Subtotal Support and Management	55	125	50	0	CONT.	CONT.
Subtotal Test and Evaluation						
Total Project	19,402	15,744	3,848	2,056	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S2300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies 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	34,834	41,422	15,650	0	0	0	0	91,906

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) ($5,000) Provide CVX AOA engineering support.

4. (U) FY 1999 PLAN:

- (U) ($30,465) Continue Ship Feasibility Studies and ORD preparation for CVX.
- (U) ($ 5,957) 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.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	34,834	43,013
(U) Appropriated Value:	0		
(U) Adjustments to FY 1997 Appropriated Value/FY98 President's Budget:			
a. Minor Pricing Adjustments	0	0	-56
b. NWCF Adjustment	0	0	251
c. Programmatic Adjustment	0	0	-1,786
(U) FY 1999 OSD/OMB Submit:	0	34,834	41,422

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Changes due to minor pricing, NWCF and programmatic adjustments.

(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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S2300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

(U) RELATED RDT&E:

(U) PE 0604567N (Ship Contract Design/Live Fire T&E)

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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S2300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies 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	34,684	41,222
b. Travel	0	150	200
c. Miscellaneous	0	0	0
TOTAL	0	34,834	41,422

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S2300
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	2,000	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	1,000	2,000	CONT.	CONT.
NAVSURFWARCEN, Port Hueneme Division, Port Hueneme, CA	WR	Oct 97	CONT.	CONT.	0	0	100	100	CONT.	CONT.
NAVAIRWARCEN, Aircraft Division, Lakehurst, NJ	WR	Oct 97	CONT.	CONT.	0	0	1,000	2,000	CONT.	CONT.
NCCOSC Research and Development Division, San Diego, CA	WR	Oct 97	CONT.	CONT.	0	0	2,000	3,000	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S2300
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	2,000	3,000	CONT.	CONT.
John J Mcmullen Assoc., Arlington, VA	Contr	Oct 97	CONT.	CONT.	0	0	2,000	2,000	CONT.	CONT.
Advanced Marine Enterprises, Inc., Arlington, VA	Contr	Oct 97	CONT.	CONT.	0	0	2,000	2,000	CONT.	CONT.
George G. Sharp, Inc., Arlington, VA	Contr	Oct 97	CONT.	CONT.	0	0	1,000	1,000	CONT.	CONT.
M. Rosenblatt & Son, Inc., Arlington, VA	Contr	Oct 97	CONT.	CONT.	0	0	1,000	1,000	CONT.	CONT.
Contractors	Contr	Oct 97	CONT.	CONT.	0	0	19,234	20,822	CONT.	CONT.
Miscellaneous	Misc.	Oct 97	CONT.	CONT.	0	0	1,000	1,000	CONT.	CONT.

Support and Management:

Test and Evaluation:

GOVERNMENT FURNISHED PROPERTY: (Not applicable).

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603564N PROJECT NUMBER: S2300
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies PROJECT TITLE: CV Feasibility Studies

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	34,834	41,422	15,650	91,906
Subtotal Support and Management						
Subtotal Test and Evaluation						
Total Project	0	0	34,834	41,422	15,650	91,906

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs 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	49,741	59,457	85,518	45,256	33,985	26,759	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, UK. 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs 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).

2. (U) FY 1998 PLAN:

- (U) ($32,297) ICR: Take delivery of EDM recuperator. Modify the exhaust collector, perform testing on B/4 engine, install the EDM recuperator, and perform 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) ($15,694) 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) ($ 1,750) 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.

3. (U) FY 1999 PLAN:

- (U) ($ $33,595K) IPS: Complete FSAD testing and conduct an Early Operational Assessment (EOA) by COMOPTEVFOR. Commence phase 2 engineering 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 needed to accommodate phase 2 modules; continue testing to validate performance models and characterize module interfaces; modify designs as necessary to maintain compatibility with phase 2 modules.

(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) ($23,962) 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) ($ 1,900) 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs

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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:			
a. Adjustments	-4,414		+7,368
(U) FY 1999 DON Submit:	64,459	49,741	59,457

(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 1999 $26K NWCF R&D - Surface Warfare Centers correction and $142K DBOF Surcharge Correction and other pricing adjustments ($7,368K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs 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 PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs

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	44,254	52,362
b. SYSTEMS ENGINEERING	1,608	1,750	1,900
c. DEVELOPMENTAL T&E	5,417	3,612	5,095
d. TRAVEL	115	125	100
TOTAL	64,459	49,741	59,457

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs 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	31,313	20,920	CONT.	CONT.
N0002493C4010 CAE-LINK, BINGHAMPTON NY (SMCS)										
	C/CPAF	5/95	27,247	27,247	28,143	0	0	0	0	28,143
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	10,816	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	20,040	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.

Contractor/ Contract

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs PROJECT TITLE: Advanced Surface Machinery Programs

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
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:					365,535	59,042	46,129	54,362	CONT.	CONT.
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	365,535	59,042	46,129	59,457	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603573N PROJECT NUMBER: S1314
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Programs PROJECT TITLE: Advanced Surface Machinery Programs

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	386,821	64,459	49,741	59,457	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROJECT NUMBER: S0164
PROGRAM ELEMENT TITLE: Combat System Integration 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	7,739	9,824	9,513	9,738	9,900	10,084	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 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) ($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) ($5,645) 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.

3. (U) FY 1999 PLAN:

- (U) ($7,348) 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		
(U) Adjustments to Appropriated Value/ FY 1998 President's Budget			

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROJECT NUMBER: S0164
PROGRAM ELEMENT TITLE: Combat System Integration PROJECT TITLE: Combat System Integration

a. Adjustments	+1,793		+31
(U) FY 1999 OSD/OMB Budget Submit	5,672	7,739	9,824

(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.

FY 1999: Increase for NWCS Surface Warfare Center (+$27) 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 configuration:
(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.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROJECT NUMBER: S0164
PROGRAM ELEMENT TITLE: Combat System Integration 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	3,642	5,579
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	7,739	9,824

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROJECT NUMBER: S0164
PROGRAM ELEMENT TITLE: Combat System Integration 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. (See Note)	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	6,449	8,534	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.

Note: In FY 94 Navy reorganizations, Integrated Combat System Test Facility, San Diego Ca. became a division of Naval Surface Warfare Center (NSWC), Port Hueneme Division (PHD), Port Hueneme, Ca. Work Request (WR) funds above include Request for Contractual Procurement (RC) effort at NSWC PHD. Miscellaneous includes contractor support and Program Headquarters Travel.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603582N PROJECT NUMBER: S0164
PROGRAM ELEMENT TITLE: Combat System Integration PROJECT TITLE: Combat System Integration

GOVERNMENT FURNISHED PROPERTY: Not applicable.

	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	7,739	9,824	CONT.	CONT.
Total Project	142,410	5,672	7,739	9,824	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	10,145	12,701	14,729	14,846	16,862	19,191	CONT.	CONT.
K2299 Non-Nuclear Expendable Ordnance (NNEO)	0	1,863	2,336	1,390	924	993	1,016	CONT.	CONT.
U1821 Conventional Fuze/Warhead Package	16,452	22,182	25,362	33,391	24,837	19,205	19,640	CONT.	CONT.
TOTAL	24,255	34,190	40,399	49,510	40,607	37,060	39,847	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 S2299): 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.

(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.

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	10,145	12,701	14,729	14,846	16,862	19,191	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.

(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

1. (U) FY 1997 ACCOMPLISHMENTS (CON'T):

(U) 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) ($945) Continued evaluation of IM ordnance concepts. Conducted system demonstrations of new high explosives combined with improved warhead and booster for potential application to JSOW unitary variant. Continued modeling and data base improvements and application that reduced and enhanced IM warhead design and test efforts.

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

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) ($3,003) 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) ($1,095) 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

2. (U) FY 1998 PLAN (CON'T):

- (U) ($4,969) 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

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) ($4,141) 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) ($1,705) 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.

- (U) ($5,655) 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: September 1997

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	0	0
(U) Adjustments to FY 1997 Appropriated Value/FY1998 President's Budget	-2,503	0	-14
(U) FY 1999 OSD/OMB Budget Submit	7,803	10,145	12,701

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 decrease of $2,503K results from SBIR assessment (-$69K), undistributed reductions (-$434K), and BTRA's (-$2,000K).
(U) Funding: FY1999 decrease due to minor adjustments.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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: September 1997

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	2,780	3,435
b. Technology Development & Demonstration	3,104	4,840	6,395
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	10,145	12,701

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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

PROJECT NUMBER: S0363
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	11/96	CONT.	CONT.	77,234	3,959	5,268	5,667	CONT.	CONT.
NSWCDD	WR	11/96	CONT.	CONT.	66,681	597	600	1,170	CONT.	CONT.
NSWCIHDIV	WR	11/96	CONT.	CONT.	16,848	3,207	4,142	5,689	CONT.	CONT.
Misc	WR	11/96	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: September 1997

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	10,145	12,701	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	10,145	12,701	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE: Conventional Munitions 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	1,863	2,336	1,390	924	993	1,016	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 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.

3. (U) FY 1998 PLAN:
   - (U) ($1,863) MULTI-FUNCTION FUZE: Incorporate pre-planned product improvement programs to reduce fuze cost and increase producibility.

4. (U) FY 1999 PLAN:
   - (U) ($2,336) MULTI-FUNCTION FUZE: Continue incorporation of product improvement programs into Multi-Function Fuze to reduce cost and increase producibility.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	0	1,863	2,327
(U) Appropriated Value:			
(U) Adjustments To FY 1997 Appropriated Value/ FY 1998 President's Budget	0	0	+9
(U) FY 1999 OSD/OMB Budget Submit	0	1,863	2,336

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: Increase in FY 1999 is due to NWCF surcharge corrections.
(U) Schedule: A five month slip in IOC has occurred as a result of technical difficulties with Monolithic Microwave Integrated Circuit (MMIC) technology.
(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 1998.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE: Conventional Munitions 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		1Q TECHEVAL 1Q OPEVAL	1Q TECHEVAL P3I 1Q OPEVAL P3I
CONTRACT MILESTONES		1Q PRODUCTION 2Q P3I	1Q PRODUCTION P3I

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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

PROJECT NUMBER: K2299
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	763	938
b. Hardware Fabrication and Procurement	0	375	600
c. Demonstration Test and Evaluation	0	300	375
d. Operational Test and Evaluation	0	125	123
e. Engineering Support	0	200	200
f. Program Management Support	0	80	80
g. Travel	0	10	10
h. Other/Miscellaneous	0	10	10
Total	0	1,863	2,336

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: K2299
PROGRAM ELEMENT TITLE:Conventional Munitions 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	713	1,136	CONT.	CONT.
Motorola	CPFF	Various	952	952	0	0	425	527	0	952
Hittite	CPFF	Various	948	948	0	0	0	0	0	948
Support and Management										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	300	300	CONT.	CONT.
Test and Evaluation										
NAVSURFWARCEN Dahlgren, VA	WR	Various	CONT.	CONT.	0	0	150	150	CONT.	CONT.
NAVAIRWARCEN / WD China Lake, CA	WR	Various	CONT.	CONT.	0	0	150	100	CONT.	CONT.
COMOPTEVFOR Norfolk, VA	WR	Various	CONT.	CONT.	0	0	125	123	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	1,138	1,663	CONT.	CONT.
Subtotal Support and Management	0	0	300	300	CONT.	CONT.
Subtotal Test and Evaluation	0	0	425	373	CONT.	CONT.
Total Project	0	0	1,863	2,336	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE: Conventional Munitions 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	22,182	25,362	33,391	24,837	19,205	19,640	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 Land Attack Cruise Missile Defense (LACMD)/Direct Hit and Multi-Mode 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.
   - (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) LAND ATTACK 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) ($259) ADVANCED STRIKE WARHEAD DEVELOPMENT: Precursor warhead and penetration tests and validate concept.
   - (U) ($1,000) 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) ($8,691) LAND ATTACK CRUISE MISSILE DEFENSE (LACMD)/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.

3. (U) FY 1999 PLAN:
   - (U) ($360) DIRECTIONAL ORDNANCE SYSTEM: Conduct quick look scaling design/test.
   - (U) ($3,100) ADVANCED STRIKE WARHEAD DEVELOPMENT: Conduct follow-thru warhead and fuze/ESAD tests. Conduct system effectiveness assessments and tradeoffs.
     (U) ($1,100) ORDNANCE COMPONENT TECHNOLOGY: Complete efforts on high energy density capacitors and high G fiber optic acceleometer. Initiate efforts on near field contact sensors and enhanced low energy exploding foil initiator.
   - (U) ($2,982) ADVANCED ANT-AIR ORDNANCE DEVELOPMENT: Initiate effort to mature advanced physical concepts to enhance anti-air kill probability by taking advantage of prior warhead and fuzing technology investments.
   - (U) ($10,820) LAND ATTACK CRUISE MISSILE DEFENSE (LACMD)/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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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		
(U) Adjustments from FY 1997 Appropriated Value/ FY 1998 President's Budget	-2,732	0	+196
(U) FY 1999 OSD/OMB Budget Submit:	16,452	22,182	25,362

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: Decrease in FY 1997 Value is due to SBIR reduction and pricing adjustments. Increase in FY 1999 is due to NWCF 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: September 1997

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

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

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

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Design and Analysis	5,516	9,148	12,366
b. Hardware Fabrication and Procurement	2,400	4,600	4,800
c.Demonstration Test and Evaluation	5,508	8,234	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	22,182	25,362

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE:Conventional Munitions PROJECT TITLE: Conventional Fuze/Wrhead 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.
NAVAIRWARCEN / WD China Lake, CA	WR	Various	CONT.	CONT.	54,195	4,069	2,009	1,400	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	0	104	6,000	6,000	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603609N PROJECT NUMBER: U1821
PROGRAM ELEMENT TITLE:Conventional Munitions 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: September 1997

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	12,248	15,366	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	22,182	25,362	CONT.	CONT.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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)	55732	62505	106672	94780	113677	134730	157046	Continuing	Continuing
Quantity of RDT&E Articles			2				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) $ 2970 Continue to provide in-house support.
- (U) $ 800 Provide for Project Office Personnel costs.
- (U) $ 4197 Continue to enlist program support to coordinate and update program planning.
- (U) $ 68 Initiate Ballistic Armor validation testing.

(U)Total $ 55,732

(U) FY 1998 Planned Program:

- (U) $ 56788 Continue PDRR phase, contractor design, Modeling and Simulation, and initiate fabrication of the AAAV Personnel (P) prototypes.
- (U) $ 3267 Continue to provide in-house support.
- (U) $ 1750 Continue to enlist program support to coordinate and update program planning.
- (U) $ 700 Conduct testing on AAAV subsystems. Continue Ballistic Armor Validation testing.

(U)Total $ 62,505

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE September 1997

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) $ 3400 Complete Armor validation, initiate characterization, Hydraulic test rig testing, and initiate prototype testing.

(U)Total $ 106,672

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	-5586	2371	427
(U) Current Budget Submit	55732	62505	106672

(U) Change Summary Explanation:

(U) Funding: FY 1997 reflects below threshold reprogramming of $3,999 million and $1,587 million for SBIR, FFRDC, and economic adjustment reduction. The FY 1998 increase reflects a return of funds reduced in previous years. 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:

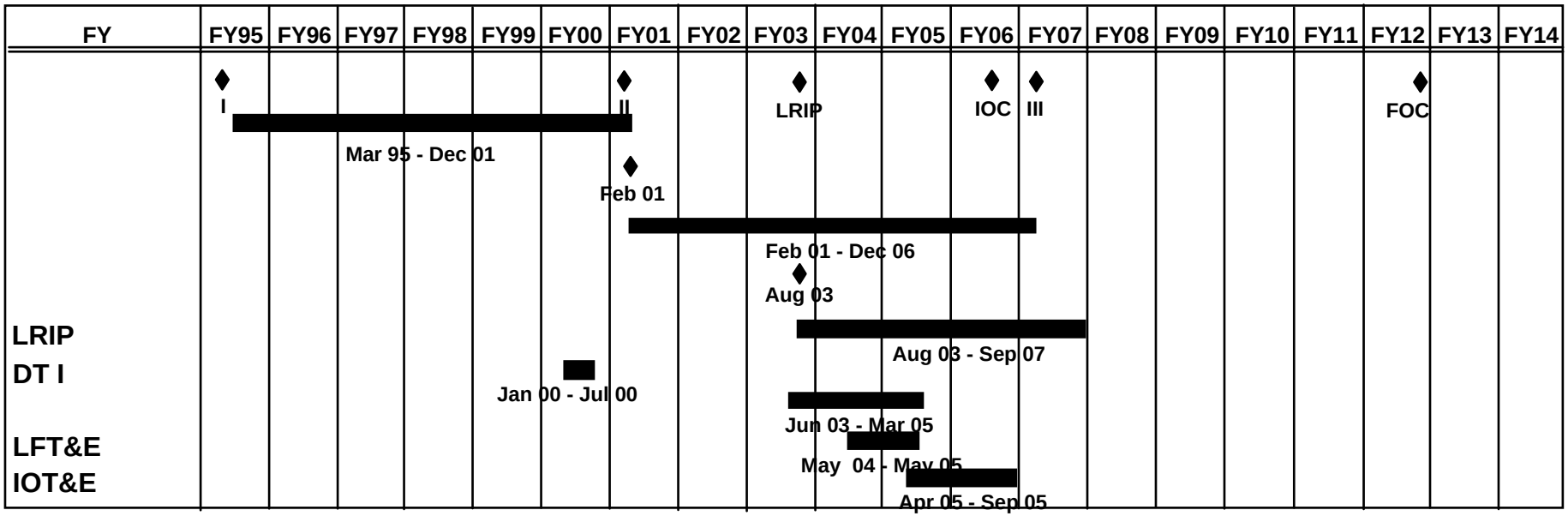
(U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems), Project C0021, AAV7A1.
(U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems), Project C2237, AVTB.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1997

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603611M Marine Corps Amphibious Assault Vehicles	B0020

D. (U) Schedule Profile

AAAV Budget Exhibit Schedule



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE September 1997

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	56788	96752
Support and Management	7967	5017	6520
Test and Evaluation	68	700	3400
Total	55732	62505	106672

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	56788	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 **September 1997**

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	1000	1100	261	5423
Misc. Contracts	CPFF	Various	8230	8230	2572	2763	750	2969	0	8230
Misc. Gov. labs	WR	Various	13707	13707	6242	2585	2967	2136	0	13707
Program Office Personnel Costs	WR	OCT 96	1700	1700	0	800	0	0	0	1700
Modeling & Simulation	WR	Various	3761	3761	2314	832	300	315	0	3761
Test and Evaluation Organizations										
Miscellaneous	Various	Various	5327	5327	1165	68	700	3400	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 **September 1997**

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	56788	96752	CONT.	CONT.
Subtotal Support and Management	13403	7967	5017	6205	CONT.	CONT.
Subtotal Test and Evaluation	1165	68	700	3715	CONT.	CONT.
Total Project	94592	55732	62505	106672	CONT.	CONT.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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	1993	2489	1791	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 AMCS program researches and develops assault minefield breaching capabilities that will neutralize current and future blast-hardened and complex-fuzed mines from a standoff position. AMCS will alleviate a critical deficiency in breaching minefields during amphibious operations. Current breaching assets are 1950s technology that do not meet breaching mission requirements.

(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 **September 1997**

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) $ 1000 Design COBRA Advanced Development Model. Start Fabrication.
- (U) $ 693 Conduct testing of COBRA advanced technology tunable camera.

(U)Total $ 1993

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	+8
(U) Current Budget Submit	0	0	1993

(U) Change Summary Explanation:

(U) Funding: The FY 1999 increase due to NWCF surcharge.

(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 September 1997
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 **September 1997**

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	40626	38164	41383	11754	3613	3123	2735	Continuing	Continuing
C1964 Antiarmor Weapon System	435	431	437	500	579	637	745	Continuing	Continuing
C2112 Howitzer, Medium Towed 155MM XM777 (LW 155)	13564	35303	29452	8516	0	0	0	0	107672
C2113 Predator Short Range Assault Weapon (SRAW)	26494	2430	10000	0	0	0	0	0	124309
C2250 Team Target Engagement Simulator (TTES)	133	0	0	0	0	0	0	0	133
C2251 JT ADV AMPHIBIOUS LOGISTICS/COMBAT SERVICE SUPPORT (JT AAL/CSS) TECHNOLOGY	0	0	747	1245	1492	1740	1990	Continuing	Continuing
C2255 Objective Individual Combat Weapon	0	0	0	622	796	746	0	0	2164
C2256 21 CENTURY LAND WARRIOR	0	0	747	871	746	0	0	0	2364
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 **September 1997**

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	431	437	500	579	637	745	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) $ 230 Engineering/Technical Support to monitor and participate in technical developments in the AAWS-H
- (U) $ 10 Prepare necessary Marine Corps documentation for AAWS-H Milestone I.

(U)Total $ 431

(U) FY 1999 Planned Program:

- (U) $ 196 Engineering/Technical Support to monitor and participate in PQT & P3I for Javelin.

- (U) $ 201 Engineering/Technical support to monitor and participate in developmental testing and technical developments in the AAWS-H program.
- (U) $ 40 Prepare necessary Marine Corps documentation for the AAWS-H program.

(U)Total $ 437

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	0	-10
(U) Current Budget Submit	435	431	437

(U) Change Summary Explanation: Decrease of $1 thousand in FY 1997 and $10 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	42,146	83,379	81,667	28,754	0	0	0	274,097

(U) Related RDT&E
PE 0604611A

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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	3Q 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 **September 1997**

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	35303	29452	8516	0	0	0	0	107672
Quantity of RDT&E Articles		8							

A. (U) <u>Mission Description and Budget Item Justification:</u> (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 **September 1997**

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) $ 23,099 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)Total $ 35,303

(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) $ 10,415 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 $ 29,452

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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	0	-4,463
(U) Current Budget Submit	13,564	35,303	29,452

(U) Change Summary Explanation:

(U) Funding: FY 1997 increase is based on revised Life Cycle Cost estimated validated by the Navy Center for Cost Analysis and approved at a MS II decision on 23 January 1996, and signed EMD contract cost for development engineering and prototype manufacturing. FY1999 funding reduction due to a revised cost estimate and Navy Working Capital Fund surcharge.

(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	10,190	88,359	120,035	125,381	121,834	100,003	565,802

(U) Related RDT&E: PE 0604854A (Artillery Systems-Engineering Development)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

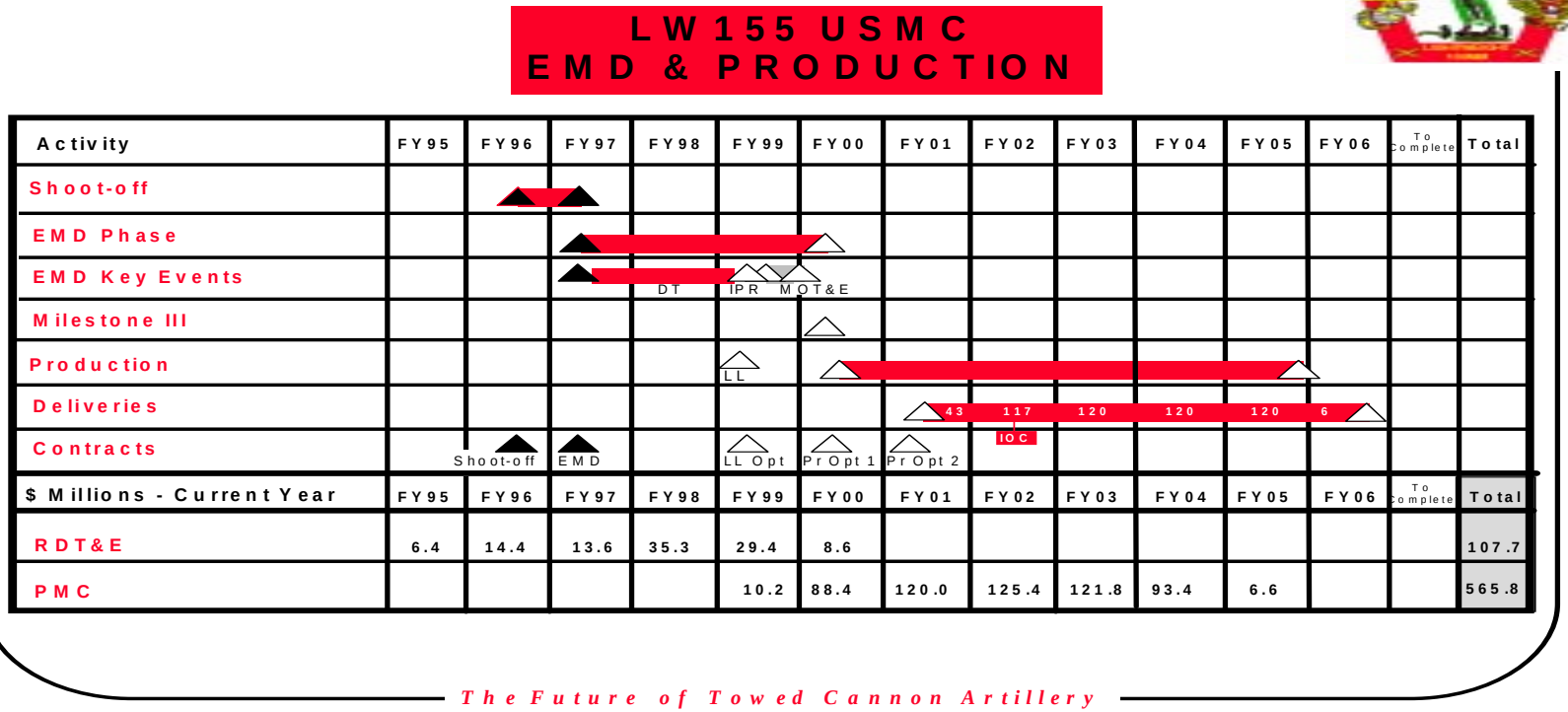
DATE **September 1997**

BUDGET ACTIVITY
4 - Demonstration/Validation

PE NUMBER AND TITLE
0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT
C2112

D. (U) Schedule Profile



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE **September 1997**

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	23,099	10,415
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	35303	29452

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE September 1997

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
Product Development Organizations										
Cadiliac Gage Textron, Inc., New Orleans, LA	CPIF	March 1997	41,704	41,704	0	6,170	23,099	10,415	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 September 1997

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
September 1997

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	10,017	10,707	30,539	2,234	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	20,735	13,564	35,303	29,452	CONT	CONT

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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)	26494	2430	10000	0	0	0	0	0	124309
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. The SRAW program has been identified as a FY 1999 Risk Reserve Pilot Program and $300 thousand has been identified for Risk Reserve.

(U) FY 1997 Accomplishments:

- (U) $ 18,687 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 $ 26,494

(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) $ 2250 Engineering/Technical support services for DT.

(U)Total $ 2,430

(U) FY 1999 Planned Program:

- (U) $ 1800 Conduct operational Testing.
- (U) $ 5450 Complete EMD phase.
- (U) $ 300 Achieve Milestone III approval for service use.
- (U) $ 2150 Engineering/Technical services to complete DT
- (U) $ 300 Risk Reserve Pilot Program targeted for mitigating unanticipated problem areas associated with developmental testing.

(U)Total $ 10,000

B. (U) Project Change Summary FY 1997 FY 1998 FY 1999

			DATE **September 1997**
BUDGET ACTIVITY **4 - Demonstration/Validation**		PE NUMBER AND TITLE **0603635M Marine Corps Ground Combat/Supporting Arms Systems**	

(U) Previous President's Budget	27,716	730	0
(U) Adjustments to Previous President's Budget	-1,222	1,700	10,000
(U) Current Budget Submit	26,494	2,430	10,000

(U) Change Summary Explanation:

(U) Funding: Decrease of $1,184 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 of $38 thousand. Increase of $1,700 thousand in FY 1998 and $10,000 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	29,789	28,308	27,966	28,895	223,104	338,062

(U) Related RDT&E: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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)

Task Name	6	1997		1998		1999		2000		2001		2002		2003	
	Qtr 3	Qtr 1	Qtr 3	Qtr 1	Qtr 3	Qtr 1	Qtr 3	Qtr 1	Qtr 3	Qtr 1	Qtr 3	Qtr 1	Qtr 3	Qtr 1	Qtr 3
Milestone II Approval															
Engineering and Manufacturing Design Phase															
Contract Award															
Preliminary Design Review (PDR)															
Fab & Test Engineering Models															
Critical Design Review (CDR)															
Fab Tech Eval Hardware															
Development Testing (DT)															
LRIP of IOT&E Hardware															
Initial Operational T&E (IOT&E)															
Production, Fielding/Deployment & Operation Support															
MS III Approval															
Full Rate Production															
Initial Operational Capability (IOC) (Q2 FY-01)															
Full Operational Capability (FOC) (Q2 FY-07)															

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE **September 1997**

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	6,455	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	1,696	2,500
i. Operational Testing	811	0	1,800
Total	26,494	2,430	10,000

B. Budget Acquisition History and Planning Information

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE **September 1997**

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	21,381	180	5,750	0	99261
Support and Management Organizations										
NSWC Dahlgren, VA	WR	1 Oct 96	20,194	20,194	11,502	4,192	2,150	2,350	0	20,194
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 **September 1997**

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	21,381	180	5,750	0	99,261
Subtotal Support and Management	13,435	4,192	2,250	2,450	0	22,327
Subtotal Test and Evaluation	0	921	0	1,800	0	2,711
Total Project	85,385	26,494	2,430	10,000	0	124,299

C. (U) Funding Profile: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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	747	1245	1492	1740	1990	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) $ 447 Award Advanced Development Model (ADM) contract.

(U)Total $ 747

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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	3
(U) Current Budget Submit	0	0	747

(U) Change Summary Explanation:

(U) Funding: FY 1999 increase is due to an NWCF surcharge.

(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 September 1997
BUDGET ACTIVITY **4 - Demonstration/Validation**	PE NUMBER AND TITLE **0603635M Marine Corps Ground Combat/Supporting Arms Systems**	PROJECT **C2251**

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

BUDGET ACTIVITY
4 - Demonstration/Validation

PE NUMBER AND TITLE
0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT
C2256

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	747	871	746	0	0	0	2364
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) $ 374 Studies, analysis and support services.

(U)Total $ 747

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	3
(U) Current Budget Submit	0	0	747

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE September 1997
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 surchage.

(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: September 1997

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	3,680	4,720	5,336	6,180	6,322	6,458	6,606	CONT.	CONT.
Q1317 Explosive Ordnance Disposal Diving Systems	2,908	5,981	5,597	5,189	4,868	3,060	2,810	CONT.	CONT.
TOTAL	6,588	10,701	10,933	11,369	11,190	9,518	9,416	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: September 1997

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									
	3,680	4,720	5,336	6,180	6,322	6,458	6,606	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. ($363) Forward finance for FY 98 requirements due to low execution rates. ($397) Forward finance for FY 98 requirements due to low execution rates.
- (U) ($1,086) Initiated DT-II on Advanced Radiographic System (ARS) project.
- (U) ($1,184) Initiated DT-IB on Lightweight Disposable Disrupter (LIDD) and DT-II on Main Charge Disrupter (MCD) projects. ($444) Forward finance for FY 98 requirements due to low execution rates.
- (U) ($25) Improved Ordnance Locator (IOL) project.

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. ($397) Forward finance for FY 99 requirements due to low execution rates.
- (U) ($2,570) Continue development of the RONS and MCD projects. ($444) Forward finance for FY 99 requirements due to low execution rates.
- (U) ($690) 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) ($1,244) 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: September 1997

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) 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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget:			
a. Adjustments:	+1,310		-816
(U) FY 1999 OSD/OMB Budget Submit:	3,680	4,720	5,336

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Increase in FY 97 due to Near Term Mine Warfare Plan and general adjustments. FY99 decrease due to low execution rates.
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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

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.

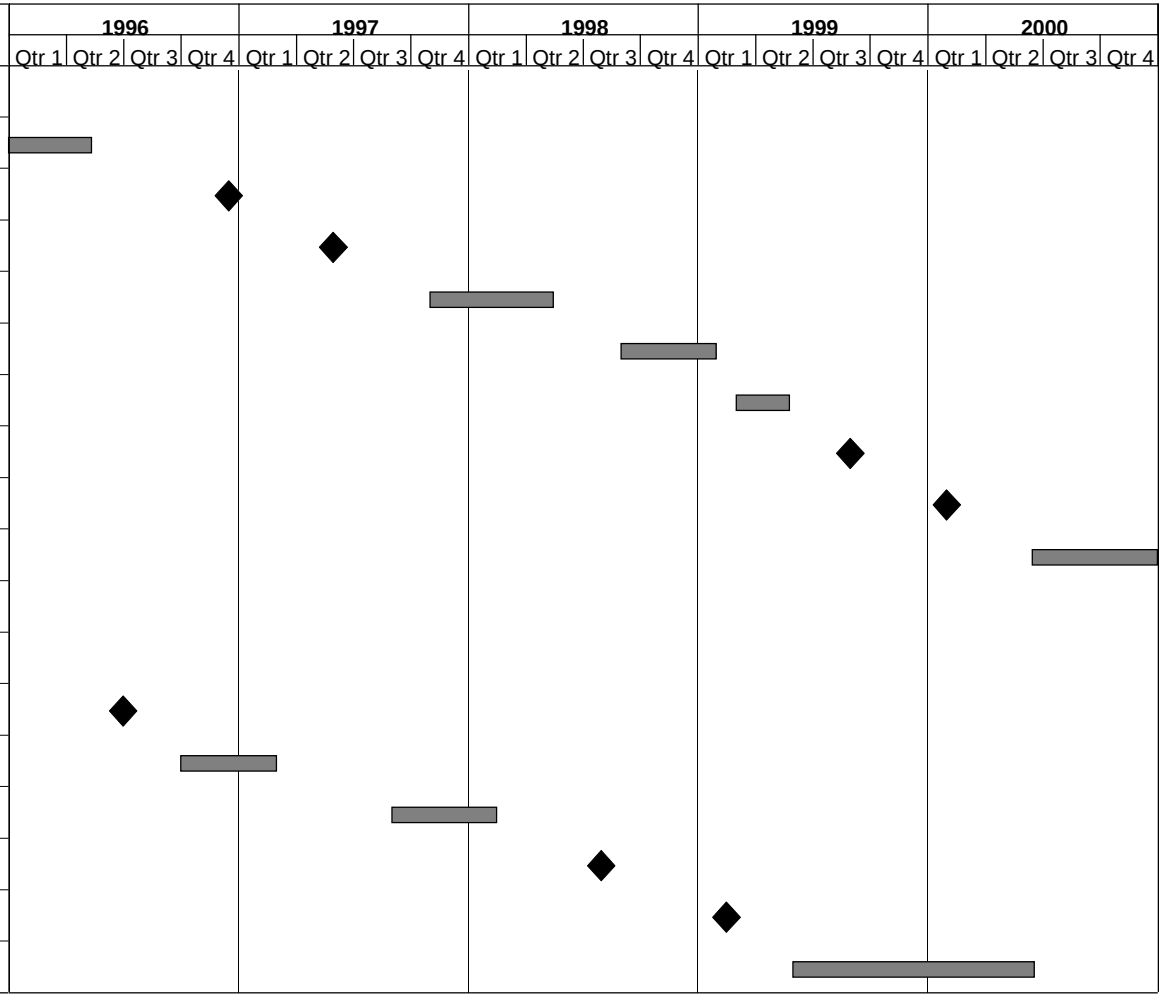
(U) RELATED RDT&E:

(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.

RDT&E MILESTONE CHART
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



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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

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

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. Primary Hardware Development	1,123	1,587	1,738
b. Software Development	0	150	50
c. ILS	690	780	840
d. Developmental T&E	995	1,135	1,433
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	3,680	4,720	5,336

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	2,894	4,420	4,996	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: September 1997

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

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	158,797	3,450	4,420	4,996	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	3,680	4,720	5,336	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	2,908	5,981	5,597	5,189	4,868	3,060	2,810	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) ($1,596) 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.

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) ($560) 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) ($3,702) 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) ($839) 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: September 1997

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) ($2,962) 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		
(U) Adjustments to FY 1997 Appropriated Value/FY 1998 President's Budget			
a. NWCF/General Adjustments	-111		-9
b. Update BTRs	+750		
(U) FY 1999 OSD/OMB Budget SUBMIT:	2,908	5,981	5,597

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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: Decrease in FY 97 due to General adjustments. Increase in FY 97 is due to a BTR for the Very Shallow Water Mine Countermeasures Unit.
(U) Schedule: Not applicable.
(U) Schedule: Not applicable.

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

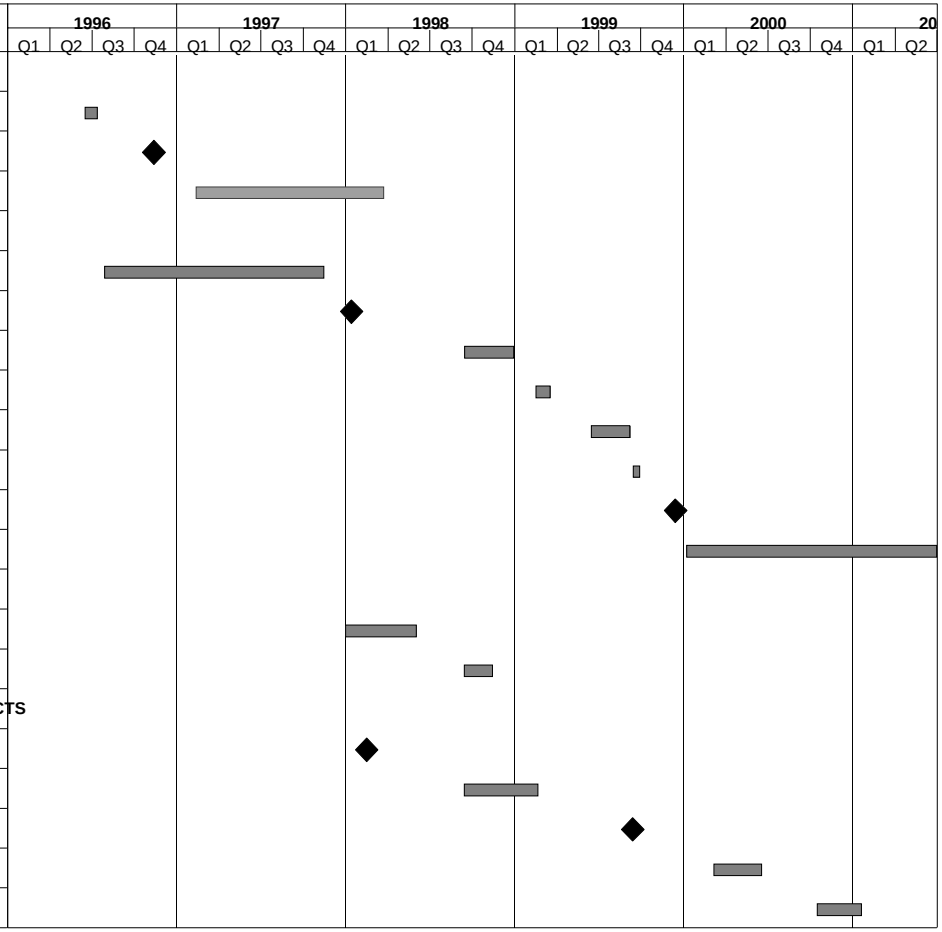
	FY 1997 ACTUAL	FY 1998 ESTIMATE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line 114000 (portion)									
	1,117	722	4,938	4,272	5,618	3,859	4,392	4,129	CONT.	CONT.

(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)



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	872	3,470	2,650
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	2,908	5,981	5,597

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	3,000	1,998	4,696	10,354
MISC	Various	1/96	CONT.	CONT.	29,481	2,703	2,620	3,171	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 PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	2,703	5,620	5,169	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	2,908	5,981	5,597	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4

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	139,229	133,951	87,366	70,053	90,902	55,100	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.

(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) ($51,360) Continue development of shipboard CES.
- (U) ($49,700) Continue development of airborne integration.
- (U) ($24,771) Continue integration with Naval systems.
- (U) ($13,398) Continue field support.

3. (U) FY 1999 PLAN:

- (U) ($51,904) Complete system development of shipboard CES.
- (U) ($38,700) Continue development of airborne integration.
- (U) ($32,747) Continue integration with Naval systems.
- (U) ($10,600) Continue field support.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)
PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability

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		
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 President's Budget:	-10,222		+46,395
(U) FY 1999 OSD Budget Submit:	224,281	139,229	133,951

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 change is due to due to Congressional Undistributed Reductions and minor pricing adjustments.
FY1999 change is due to program restructuring for airborne integration and frequency spectrum interference as well as minor pricing adjustments.

(U) Schedule: Shipboard / Airborne FOT&E shifted to FY 2001.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603658N PROJECT NUMBER: U2039
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC) PROJECT TITLE: Cooperative Engagement 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
OPN 260600		0	0	48,523	111,115	97,548	179,823	183,201	544,018	1,164,228
SCN Various		0	38,151	16,728	18,899	15,520	24,629	29,167	69,577	212,671
O&M 1D4D		10,911	15,488	22,437	25,267	26,564	26,989	27,106	CONT.	CONT.
APN (BA-5,1) 330000	500	5,300	11,000	39,940	29,440	70,880	65,220	270,660	492,940	
R&D (0204152N)		4,000	5,100	0	0	0	0	0	9,900	19,000

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

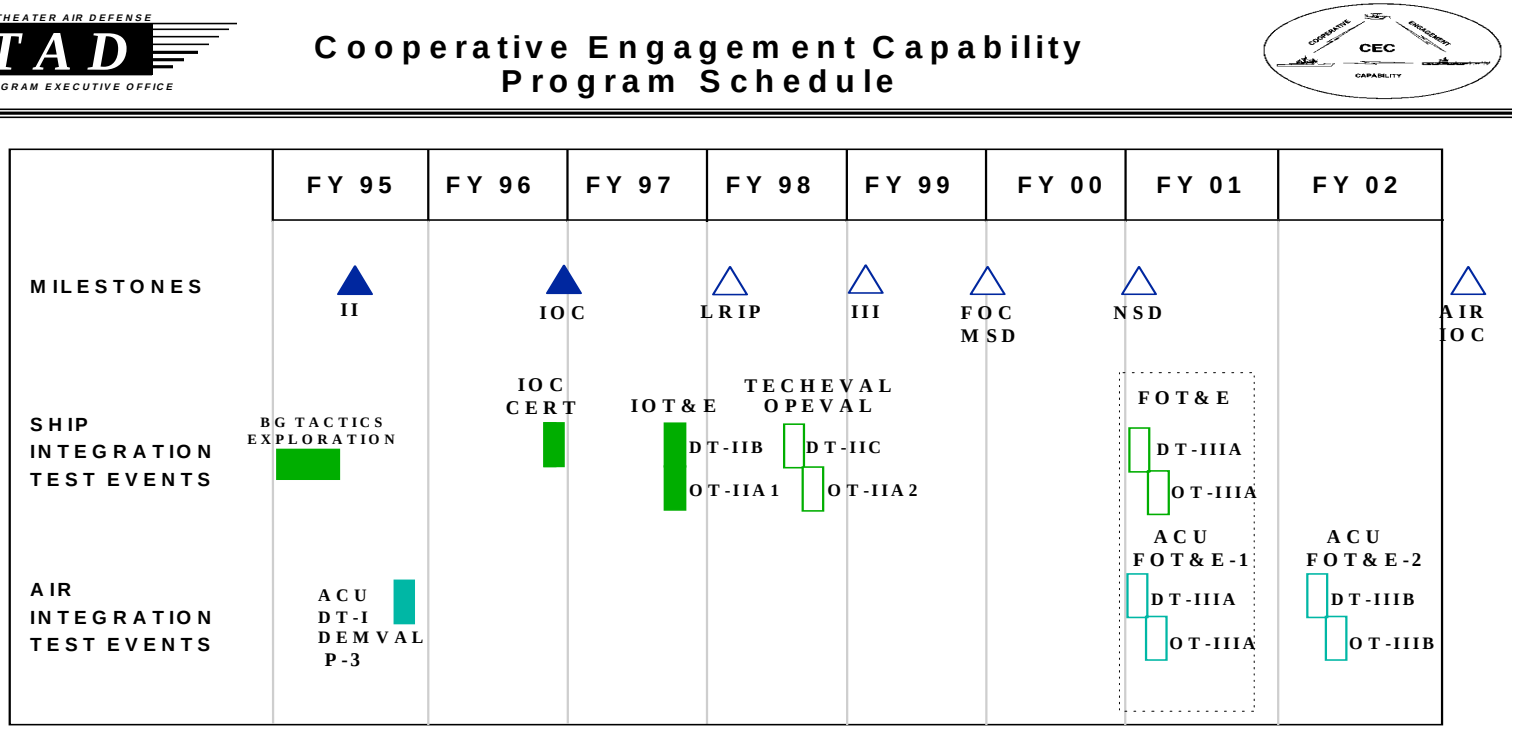
DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603658N
PROGRAM ELEMENT TITLE: Cooperative Engagement Capability (CEC)

PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability

D. (U) SCHEDULE PROFILE:



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FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT:0603658N
PROGRAM ELEMENT TITLE:Cooperative Engagement Capability

PROJECT NUMBER: U2039
PROJECT TITLE: Cooperative Engagement Capability

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

Project Cost Categories	FY 1997*	FY 1998	FY 1999
a. Program Management	12,400	5,560	5,274
b. Systems Engineering	49,811	24,830	29,295
c. Equipment Assembly	31,775	19,880	15,800
d. Software Development	33,500	18,725	15,213
e. Integration	62,242	44,176	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	11,813	3,500
Total	224,281	139,229	133,951

* 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT:0603658N PROJECT NUMBER: U2039
PROGRAM ELEMENT TITLE:Cooperative Engagement Capability PROJECT TITLE: Cooperative Engagement 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										
E-Systems St. Petersburg, FL	SS/CPFF	10/97	CONT.	CONT.	261,704	63,057	30,593	31,134	CONT.	CONT.
JHU/APL Laurel, MD	SS/CPFF	02/98	CONT.	CONT.	98,920	25,230	19,900	15,000	CONT.	CONT.
NAVSURFWARCENDIV Crane, IN	WR	Various	CONT.	CONT.	10,067	5,838	4,398	3,518	CONT.	CONT.
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	CONT.	CONT.	19,361	5,634	4,500	4,527	CONT.	CONT.
NAVSURFWARCENDIV Port Hueneme, CA	WR	Various	CONT.	CONT.	23,171	5,573	4,500	2,555	CONT.	CONT.
NORFOLK NAVAL SHPYD Norfolk, VA	SS/CPFF	Various	CONT.	CONT.	7,915	241	0	0	CONT.	CONT.
DRPM, AEGIS Washington, DC	PD	Various	153,513	153,513	71,115	21,498	22,300	13,247	25,353	153,513
NAVAIR PMA-231 Washington, DC	PD	Various	211,040	211,040	13,340	42,000	22,000	35,700	98,000	211,040
LOCKHEED AERO SYS CO Marietta, GA	C/FFP	10/97	49,283	49,283	11,000	29,783	8,500	0	0	49,283

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FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT:0603658N PROJECT NUMBER: U2039
PROGRAM ELEMENT TITLE:Cooperative Engagement Capability PROJECT TITLE: Cooperative Engagement Capability

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
Northrup/ Grumman Aerospace 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 Elect 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	9,663	19,395	CONT.	CONT
Support and Management										
Miscellaneous	Various	Various	CONT.	CONT.	11,454	4,550	5,875	3,875	CONT.	CONT.
Test and Evaluation										
Miscellaneous	Various	Various	CONT.	CONT.	6,821	2,850	7,000	5,000	CONT.	CONT.

GOVERNMENT FURNISHED PROPERTY - Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT:0603658N PROJECT NUMBER: U2039
PROGRAM ELEMENT TITLE:Cooperative Engagement Capability PROJECT TITLE: Cooperative Engagement Capability

	FY1996 &Prior	FY1997 Budget	FY1998 Budget	FY1999 Budget	To Complete	Total Program
Subtotal Product Development	593,528	216,881	126,354	125,076	CONT.	CONT.
Subtotal Support and Management	11,454	4,550	5,875	3,875	CONT.	CONT.
Subtotal Test and Evaluation	6,821	2,850	7,000	5,000	CONT.	CONT.
Total Project	611,803	224,281	139,229	133,951	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	4,038	4,085	3,928	3,986	3,972	4,164	CONT.	CONT.
S0394 Shallow Depth Diving Equipment	4,556	8,620	9,441	13,543	13,169	13,215	11,266	CONT.	CONT.
TOTAL	8,002	12,658	13,526	17,471	17,155	17,187	15,430	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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0099
PROGRAM ELEMENT TITLE: Ocean Engineering Development 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	4,038	4,085	3,928	3,986	3,972	4,164	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) ($3,198) 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.

3. (U) FY 1999 PLAN:

- (U) ($3,235) 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0099
PROGRAM ELEMENT TITLE: Ocean Engineering Development 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	0	0
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 President's Budget:			
a. Undistributed Reductions	-163	0	0
b. SBIR Assessment	-37	0	0
c. March 97 Update BTRs	-237	0	0
d. Deep Subm Biomed Dev Reduction	0	0	-109
e. NWCF Surcharge Correction	0	0	17
(U) FY 1999 OSD/OMB Budget Submit:	3,446	4,038	4,085

*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 undistributed reductions(-$163K), SBIR(-$37K) and BTRs(-$237K). The FY 99 net decrease of $92K results from NWCF surcharge correction(+$17K) and Deep Submergence Biomedical Development(-$109K).

(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: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	3,928	3,975
b. Program management support	100	110	110
Total	3,446	4,038	4,085

*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	900	1,065	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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0099
PROGRAM ELEMENT TITLE: Ocean Engineering Development 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	3,930	3,985	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	4,038	4,085	CONT.	CONT.

*FY 1996 and FY 1997 budgeted in Project M0099.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	8,620	9,441	13,543	13,169	13,215	11,266	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project is to develop systems to support submarine r escue 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 p rovide 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development 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) ($8,620) Submarine Rescue Diving and Recompression System: Complete 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) ($9,441) Submarine Rescue Diving and Recompression 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: September 1997

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	0	0
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 President's Budget:			
a. SBIR Assessment	-93	0	0
b. Undistributed Reductions	-198	0	0
c. March 97 BTRs	124	0	0
d. NWCF Surcharge Correction	0	0	+22
e. Submarine Rescue Restructuring	0	0	+4,000
(U) FY 1999 OSD/OMB Budget Submit:	4,556	8,620	9,441

(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 99 increase of $4,022K is for the NWCF surcharge correction($22K) and the Submarine Rescue Restructuring (+$4,000K).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

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

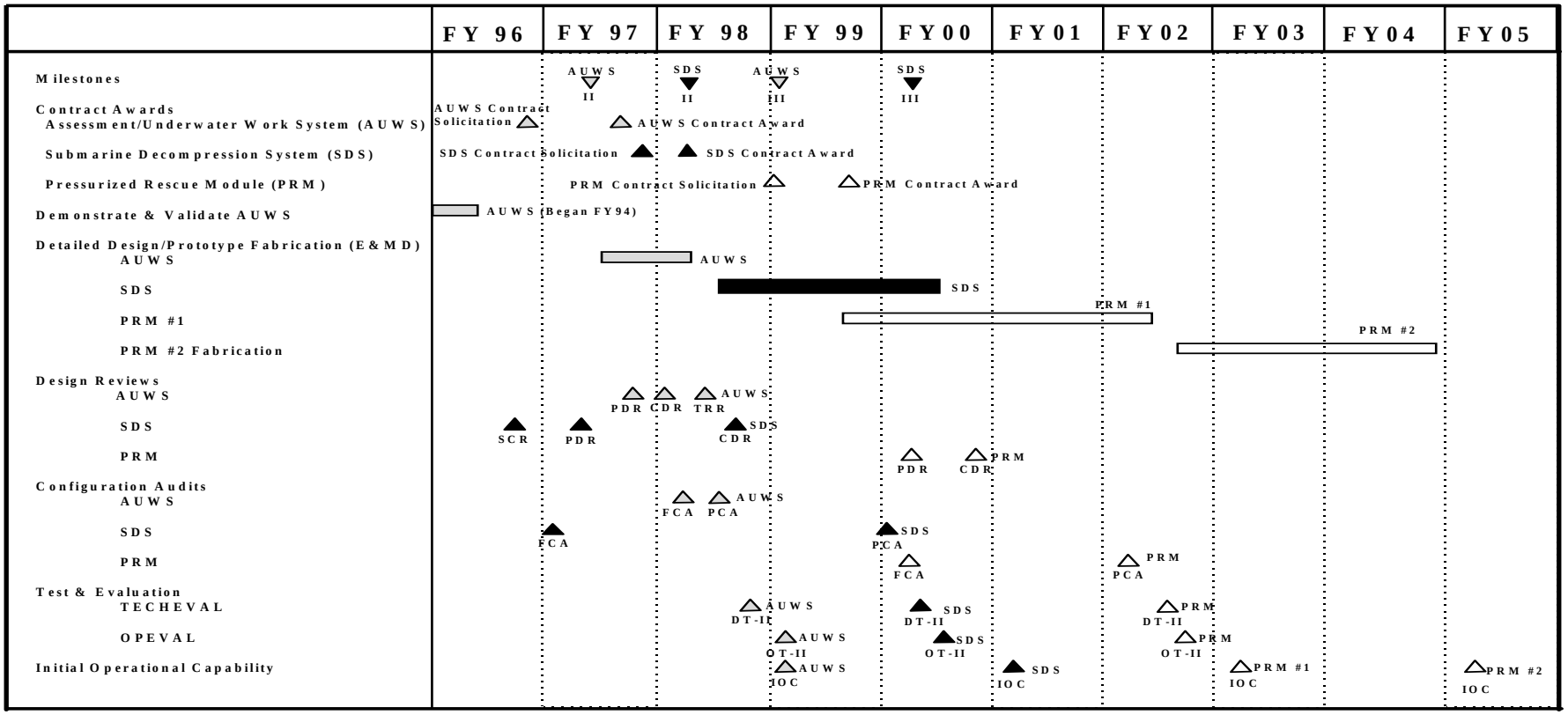
(U) RELATED RDT&E: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603713N PROJECT NUMBER: S0394
PROGRAM ELEMENT TITLE: Ocean Engineering Development PROJECT TITLE: Shallow Depth Diving Equip

D. (U) SCHEDULE PROFILE:

Submarine Rescue Diving and Recompression Schedule



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	7,338	8,041
b. Systems Engineering	500	900	1,000
c. Operational Test & Evaluation	150	300	300
d. Program Management Support	56	82	100
Total	4,556	8,620	9,441

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	8,238	9,041	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: September 1997

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	8,238	9,041	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	8,620	9,441	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: Sept 1997

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	41,269	47,346	56,383	49,091	26,821	25,405	CONT	CONT
W2210 Environmental Compliance	1,401	2,594	4,609	4,772	5,001	5,318	5,611	CONT	CONT
Y0817 Pollution Abatement Ashore	9,938	7,526	9,007	9,491	10,104	10,724	11,337	CONT	CONT
TOTAL	47,882	51,389	60,962	70,646	64,196	42,863	42,353	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: Sept 1997

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	41,269	47,346	56,383	49,091	26,821	25,405	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:

- ($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. Completed 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. Initiated development of backfit modification kit for a third surface ship 200-ton 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. Evaluated promising alternative non-ozone depleting substances firefighting technologies from science and technology community.

- (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 Reports to Congress on plan to comply with special area provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL), Annex V. Initiated development of management practices and systems for 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) ($10,405) Ozone Depleting Substances - Continue at-sea evaluation of first submarine refrigeration plants converted to HFC-134a. 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 a third surface ship 200-ton CFC-114 air conditioning plant design. Continue development of backfit modification kit for the surface ship 125-ton CFC-114 air conditioning plant design. Begin 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. Complete development of AFFADS for new ship construction. Evaluate next-generation non-ozone depleting fire suppression technologies.

- (U) ($19,316) 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); 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. Complete testing of Non-Seeping Grease Seal (NSGS) on submarine dive and steering gear. Complete testing of High Capacity Oil Water Separator (HCOWS).

- (U) ($6,432) 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.

- (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.

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 a third surface ship 200-ton CFC-114 air

conditioning plant design. 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 designs. Continue development of backfit modifications for remaining surface ship 200-ton and 250-ton CFC-114 air conditioning plants designs. 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. Continue evaluating next-generation non-ozone depleting fire suppression technologies.

- (U) ($20,500) 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); 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).

- (U) ($7,000) Solid Wastes - Continue development of management processes and systems for plastics for submarine application. Continue 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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection 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	0	0
(U) Adjustments FY 1998 President's Budget	-2,285	-1,012	2,502
(U) FY 1999 OSD/OMB Budget Submit:	36,543	41,269	47,346

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $2,285K reflects SBIR transfer ($-238K), FY 1997 Revised Economic Assumptions (-$47K), and minor reprogrammings (-$2,000K).
FY 1998: Decrease of $1012K reflects change in program requirement of (-$1,000K) and a Program Budget Decision Correction (-$12K).
FY 1999: Increase of $2,502K reflects change in program requirements ($-300K), minor pricing Adjustment ($-3K), PR-99 Environmental BAM Adjustments ($3,200K), Program Budget Decision Correction ($4K)and NWCF RDT&E Surcharge ($-399K).

(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: Sept 1997

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	4Q Comp Dev 200-ton CFC-114 AC Mod Kits 3Q Comp Dev 125-ton HFC-134a AC Plant	4Q Comp of 300-ton CFC-114 AC Mod Kits 4Q Comp Dev of AFFADS	4Q Comp Dev of 3rd 200-ton & 125-ton CFC-114 AC Mod Kits 4Q Comp Solvent Dev
INTEGRATED LIQUID WASTES	1Q Init Dev of NSGS	4Q Comp Tests of NSGS 3Q Comp Tests of HCOWS	4Q Comp Dev of OWS-10 Polisher 4Q Comp Dev of HCOWS
SHIPBOARD SOLID WASTES	1Q Init Dev Sub PP 1Q Report to Congress Surface Ship SW 2Q Comp SW EIS 4Q Comp SW EA 4Q Report to Congress (Addendum) Submarine SW	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: Sept 1997

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	10,405	14,500
b. Integr Liquid Waste	18,323	19,316	20,500
c. Solid Wastes	4,636	6,432	7,000
d. Hazardous & Other Major Ship Wastes	3,584	5,116	5,346
TOTAL	36,543	41,269	47,346

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

DATE: Sept 1997

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 Performing Activity	Contractor/ Government Fund Type	Contract Method/ 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	25,000	0	2,000	4,500	4,500	14,000	25,000
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	1,500	1,500	6,200	10,000
Rosenblatt & Son											
NewYork,NY	C	CPFF	10/95	13,000	13,000	0	3,377	2,500	2,500	4,623	13,000
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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: S0401
PROGRAM ELEMENT TITLE: Environmental Protection 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
NCCOSC										
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 Corporation										
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	15,000	4,875	1,776	2,000	2,000	4,349	15,000
Misc. Contr	C/CPFF	Various	Various	Various	4,419	1,500	1,788	4,840	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	13,000	12,500	Cont	Cont
Subtotal Support and Management	70	0	0	0	0	70
Subtotal Test and Evaluation	81,421	26,466	28,269	34,846	Cont	Cont
Total Program	112,481	36,543	41,269	47,346	Cont	Cont

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: W2210
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Environmental Compliance

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	2,594	4,609	4,772	5,001	5,318	5,611	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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: W2210
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Environmental Compliance

2. (U) FY 1998 PLAN:

- (U) ($1,715) 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) ($355) Continue to evaluate alternative aircraft materials, processes, and systems to eliminate or reduce the emission of hazardous materials.

- (U) ($524) 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) ($2,627) 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) ($968) Continue to evaluate alternative aircraft systems to eliminate or reduce the emission of hazardous materials.

- (U) ($1,014) 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: Sept 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: W2210
PROGRAM ELEMENT TITLE: Environmental Protection 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	0	0
(U) Adjustments from PRESBUDG:	-76		384
(U) FY 1999 OSD/OMB Budget Submit:	1,401	2,594	4,609

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997: Decrease of $76K reflects an SBIR transfer (-$15K), a revised economice assumption adjustment (-$2K), and a Congressional undistributed adjustments (-$59K).
FY 1999: Increase of $384K reflects NWCF rate 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: Sept 1997

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	2,594	4,609
TOTAL	1,401	2,594	4,609

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	1,754	1,401	2,594	4,609	CONT	CONT

Support and Management: Not applicable.

Test & Evaluation: Not applicable.

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

DATE: Sept 1997

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: W2210
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Environmental Compliance

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	1,754	1,401	2,594	4,609	CONT	CONT
Subtotal Support and Management	0	0	0	0	NA	NA
Subtotal Test and Evaluation	0	0	0	0	NA	NA
Total Project	1,754	1,401	2,594	4,609	CONT	CONT

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: Sept 1997

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	7,526	9,007	9,491	10,104	10,724	11,337	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: Sept 1997

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817

PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

2. (U) FY 1998 PLAN:

- (U) ($1,925) 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) ($1,513) 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) ($1,710) 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) ($1,338) 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) ($1,040) 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: Sept 1997

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817

PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

3.(U) FY 1999 PLAN:

- (U) ($2,351) 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) ($2,472) 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) ($1,744) 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) ($1,429) 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) ($1,011) 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: Sept 1997

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	0	0
(U) Adjustments to FY 1998 President's Budget	3,760	0	-105
(U) (a) SBIR transfer	-33	0	0
(U) (b) General undistributed reductions	-262	0	0
(U) (c) Rev Economic adjustments	-8	0	0
(U) (d) Environmental Test Bed Reprogramming from Army	3,813	0	0
(U) (e) NWCF rate changes	0	0	-105
(U) (f) Below Threshold Reprogramming	-12	0	0
(U) FY 1999 OSD/OMB Budget Submit:	9,938	7,526	9,007

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 Increase of $3,750K reflects a SBIR transfer (-$33K); 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 1999: Decrease of $105K reflects NWCF rate adjustments.

(U) Schedule Changes: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: Sept 1997

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817
PROGRAM ELEMENT TITLE: Environmental Protection PROJECT TITLE: Pollution Abatement Ashore

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
(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: Sept 1997

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817

PROGRAM ELEMENT TITLE: Environmental Protection 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	1,204	1,458
b. Prototype Development/ Acquisition	1,050	1,279	1,549
c. Testing & Evaluation	6,734	3,463	4,129
d. Technical Doc.	1,216	1,580	1,871
TOTAL	9,938	7,526	9,007

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

DATE: Sept 1997

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	2,650	2,861	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	1,402	1,791	CONT	CONT
NAVSURFWARCENDIV										
Ind Hd, MD	WR	3/96	N/A	N/A	3,366	935	1,256	1,632	CONT	CONT
NCCOSC										
SanDiego,CA	WR	11/95	N/A	N/A	14,805	1,957	1,446	1847	CONT	CONT
NRL										
Wash., DC	WR	12/95	N/A	N/A	1,590	578	307	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	315	537	CONT	CONT

Support & Management: Not applicable.

Test & Evaluation: Not applicable.

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

DATE: Sept 1997

ACTIVITY: 4 PROGRAM ELEMENT: 0603721N PROJECT NUMBER: Y0817

PROGRAM ELEMENT TITLE: Environmental Protection 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	7,526	9,007	CONT	CONT
Subtotal Support and Management	0	0	0	0	NA	NA
Subtotal Test and Evaluation	0	0	0	0	NA	NA
Total Project	57,577	9,938	7,526	9,007	CONT	CONT

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

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)	1,673	2,202	2,544	2,734	2,700	2,833	2,893	CONT.	CONT.
R0838 Mobility Fuels (ADV)	1,228	1,957	2,113	2,225	2,215	2,249	2,287	CONT.	CONT.
TOTAL	2,901	4,159	4,657	4,959	4,915	5,082	5,180	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports projects to evaluate, adapt, and develop 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) Joint Mission Areas/Warfare Areas (JMA/WA): This program directly supports the following JMA's: Forward Engagement/Deterrence, Maritime Support of Land Forces, and Strike; and WAs: Air Superiority, Strike, and Forward Deployed Combat Capable Forces.

(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: 26 September 1997

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	1,673	2,202	2,544	2,734	2,700	2,833	2,893	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 perceived 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) ($1,048) 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). Developed 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). 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.

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) ($1,352) 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. Support fuel cell technology demonstration for ship service power generation.

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) ($1,600) 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. Continue fuel cell technology demonstration involvement, 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) Adjustments from FY 1998 PRESBUDG:	-53	0	+1
(U) FY 1999 OSD/OMB Budget Submission:	1,673	2,202	2,544

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 adjustment is due to SBIR assessment (-51) and revised economic assumptions (-2). FY 1999 adjustment is due to Navy Working Capital Fund (NWCF) surcharge correction (-8) and other NWCF adjustments (+9).

(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)
(U) PE 0602122N (Aircraft Technology)
(U) PE 0602234N (Materials, Electronics, and Computer Technology)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation (ADV)

(U) PE 0603217N (Air Systems and Weapons Advanced Technology)
(U) PE 0603712N (Environmental Quality and Logistics Advanced Technology)
(U) PE 0604710N (Navy Energy Program (ENG))

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: 26 September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

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

Project Cost Categories	FY 1997	FY 1998	FY 1999
a. System Development and Integration	1,673	2,202	2,544

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

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	1,048	1,352	1,600	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 BUDGET ITEM JUSTIFICATION SHEET

DATE: 26 September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	47,429	1,673	2,202	2,544	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	1,673	2,202	2,544	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

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)	1,228	1,957	2,113	2,225	2,215	2,249	2,287	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: 26 September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) 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) ($579) 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) ($890) 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 has 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) ($1,067) 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) ($950) 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 the tests to evaluate the impact of fleet use of red-dyed diesel fuels.

- (U) ($1,163) 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) Adjustments from FY 1998 PRESBUDG:	-1	0	+27
(U) FY 1999 OSD/OMB Budget Submission:	1,228	1,957	2,113

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 adjustment is due to revised economic assumptions (-1). FY 1999 adjustment is due to Navy Working Capital Fund (NWCF) surcharge correction (-18) and other NWCF adjustments (+45).

(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)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: 26 September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) 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	1,228	1,957	2,113

(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	890	950	CONT.	CONT.
NAWC/AD Trenton					47,484	579	1,067	1,163	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: 26 September 1997

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	1,228	1,957	2,113	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	1,228	1,957	2,113	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603725N PROJECT NUMBER: Y0995
PROGRAM ELEMENT TITLE: Facilities Improvement PROJECT TITLE: Navy Facilities Systems

(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	1,720	1,983	2,007	1,945	1,761	1,786	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. 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 PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603725N PROJECT NUMBER: Y0995
PROGRAM ELEMENT TITLE: Facilities Improvement PROJECT TITLE: Navy Facilities Systems

- (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.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603725N PROJECT NUMBER: Y0995
PROGRAM ELEMENT TITLE: Facilities Improvement PROJECT TITLE: Navy Facilities Systems

(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) FY 1997 ACCOMPLISHMENTS (CONT'D):

- (U) ($1,168) Begin 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) ($1,628) 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) ($983) 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.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	2,239	1,720	2,020
(U) Appropriated Value:	2,149		
(U) Adjustments to Appropriated Value:			
a. SBIR Transfer	-22	-0-	-0-
b. General reductions	-3		-37
(U) FY 1999 OSD/OMB Budget Submit:	2,124	1,720	1,983

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 funding is decreased for a SBIR transfer ($22K) and reduced inflation ($3K); FY 1999 decreased for a NWCF correction ($19K) and NWCF rate adjustment ($18K).

(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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603725N PROJECT NUMBER: Y0995
PROGRAM ELEMENT TITLE: Facilities Improvement 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	395	460
b. Prototype Development	495	396	460
c. Prototype Fabrication	0	0	0
d. Test and Evaluation	1,050	843	963
e. Technical Documentation	85	86	100
Total	2,124	1,720	1,983

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603725N PROJECT NUMBER: Y0995
PROGRAM ELEMENT TITLE: Facilities Improvement PROJECT TITLE: Navy Facilities Systems

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION ($ in thousands)
PERFORMING ORGANIZATIONS
NFESC, Port Hueneme, CA

Government Performing Activity	Contractor/ 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	525	1,588	CONT.	CONT.
Const. Contractor	FP	N/A	N/A	N/A		931	1,195	395		
Support and Management										
Test and Evaluation										

GOVERNMENT FURNISHED PROPERTY: Not applicable

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement
PROJECT NUMBER: Y0995
PROJECT TITLE: Navy Facilities Systems

	Total FY 1996 & Prior	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	63,681	2,124	1,720	1,983	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	1,720	1,983		

FY 1999 RDT&E BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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
U2039 COOP ENGAGEMENT CAPABILITY (CEC)	224,281	0	0	0	0	0	0	CONT.	CONT.
Project U2039 transferred to Program Element 0603658N beginning in FY 1998 reflected in this budget as a reference.									
U2133 QUICK REACTION COMBAT CAPABILITY (QRCC)	7,641	3,587	4,620	4,606	4,714	4,812	4,922	CONT.	CONT.
U2136 LINK IRON	28,101	0	0	0	0	0	0	CONT.	CONT.
U2184 FORCE ANTI-AIR WARFARE COORDINATION TECHNOLOGY (FACT)	7,272	6,374	7,924	7,921	8,117	8,291	8,482	CONT.	CONT.
TOTAL	267,295	9,961	12,544	12,527	12,831	13,103	13,404	CONT.	CONT.

(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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1997	FY 1998 ACTUAL	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	3,587	4,620	4,606	4,714	4,812	4,922	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 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Quick Reaction Combat Capability

(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) ($1,956) Continue Integrated Ship Defense Modeling and Simulation Pilot. Complete phase I.
   - (U) ($1,631) 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) ($2,325) Continue Integrated Ship Defense Modeling and Simulation Pilot. Complete phase II.
   - (U) ($2,295) 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: September 1997

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		
(U) Adjustments to FY 1997 Appropriated Value / FY 1998 Presidents Budget.	+1564		-39
(U) FY 1999 OSD/OMB Submit:	7,641	3,587	4,620

(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 1999 is due to minor pricing adjustments (-39).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

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)	19,177	5,841	23,497	59,535	62,433	66,528	65,964	CONT.	CONT.
(U) O&MN 14D90 Wpn. Maint. QRCC	4,161	5,300	7,003	6,430	6,296	6,414	6,487	CONT.	CONT.

(U) RELATED RDT&E:

(U) PE 0604755N (SHIP SELF DEFENSE)

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

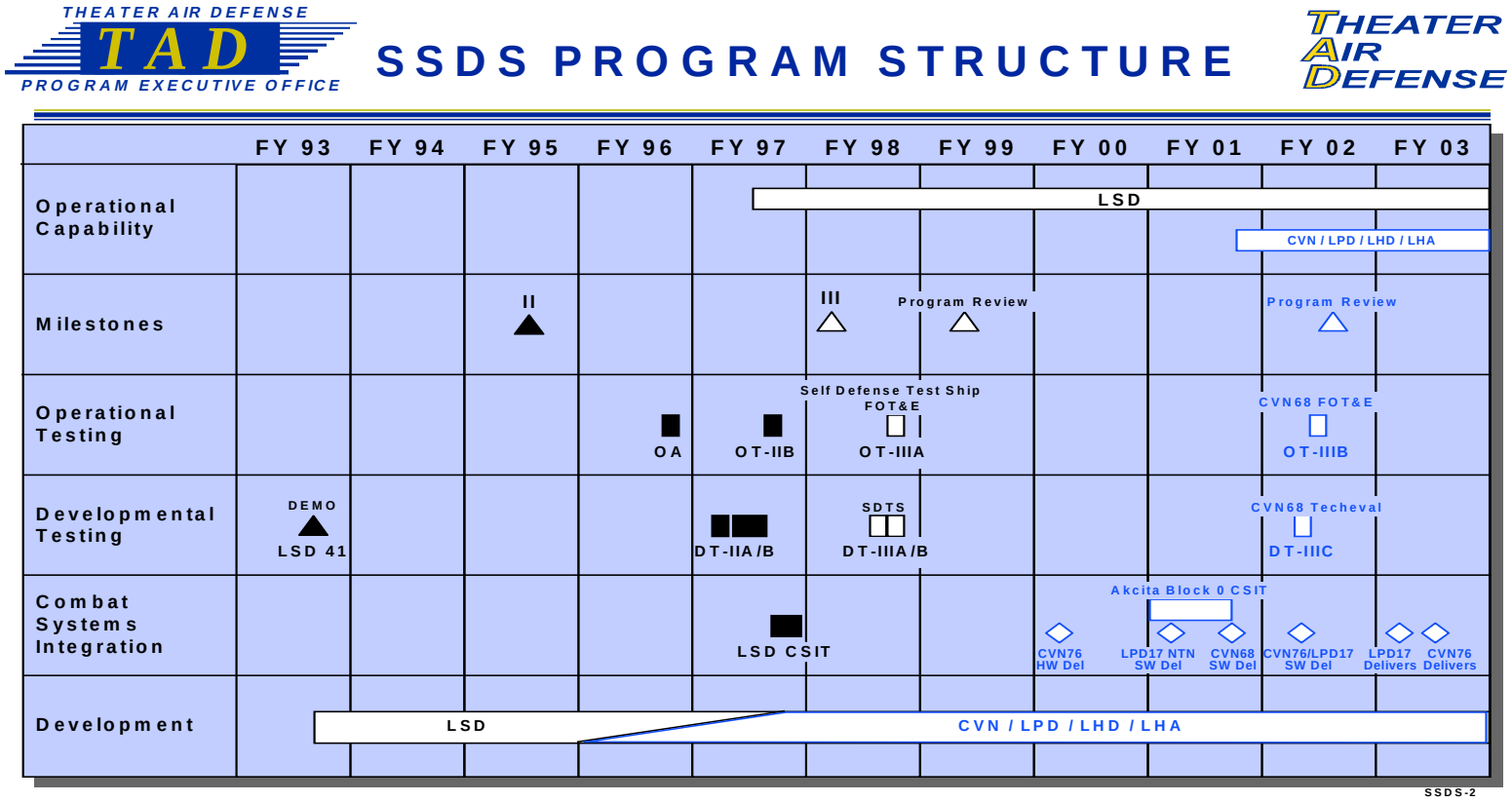
DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
PROJECT TITLE: Quick Reaction Combat Capability

D. (U) SCHEDULE PROFILE:



FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense 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	710	810
b. Test and Evaluation	1,300	800	961
c. Government Engineering Support	1,477	1,309	1,795
d. Program Management Support	954	568	854
e. Documentation	100	200	200
Total	7,641	3,587	4,620

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	6,015	6,015	6,015	0	0	0	0	6,015
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	17,315	17,315	17,315	0	0	0	0	17,315
Miscellaneous	WR	Various	1,946	1,946	1,946	0	0	0	0	1,946
Support and Management										
Techmatics, Inc. Arlington, VA	SS/FP	01/93	4,450	4,450	3,150	0	0	0	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	3,800	3,800	3,800	0	0	0	CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	7,106	6,341	2,787	3,659	CONT.	CONT.
Test and Evaluation										
NAVSURFWARCENDIV Port Hueneme, CA	WR	Various	CONT.	CONT.	12,200	0	0	0	CONT.	CONT.
NAVSURFWARCENDIV Dahlgren, VA	WR	Various	3,000	3,000	3,000	0	0		CONT.	CONT.
Miscellaneous	Various	Various	CONT.	CONT.	2,228	1,300	800	961	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2133
PROGRAM ELEMENT TITLE: Ship Self Defense 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	0	0	0	0	42,851
Subtotal Support and Management	25,921	6,341	2,787	3,659	CONT.	CONT.
Subtotal Test and Evaluation	17,428	1,300	800	961	CONT.	CONT.
Total Project	861200	7,641	3,587	4,620	CONT.	CONT.

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	6,374	7,924	7,921	8,117	8,291	8,482	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.

(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) ($1,600) Continue development of capability to integrate DNMFL and JTIDS into CEC to produce a unified, coherent Battle Group picture.
- (U) ($1,090) Continue RDE development and integration with FTEWA and CEC.
- (U) ($484) 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).
- (U) ($1,800) Continue development of capability to integrate DNMFL and JTIDS into CEC to produce unified, coherent Battle Group picture.
- (U) ($1,354) 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603755N PROJECT NUMBER: U2184
PROGRAM ELEMENT TITLE: Ship Self Defense PROJECT TITLE: Force Anti-Air Warfare Coordination Technology (FACT)

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		
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 President's Budget:	-523		+82
(U) FY 1999 OSD/OMB Budget Submit	7,272	6,374	7,924

(U) CHANGE SUMMARY EXPLANATION:
(U) Funding: Decrease in FY1997 is due to Undistributed Reductions (-317) and minor pricing adjustments (-206). Increase in FY 1999 is due to minor pricing adjustments (+82).
(U) Schedule: Not applicable.
(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.
(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: September 1997

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	6,374	7,924
Total	7,272	6,374	7,924

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION : Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	3,607	0	0	0	0	0	0	28,121
R/X2017 Advanced Underwater Acoustic Modeling Project (AUAMP)	1,262	1,509	0	0	0	0	0	0	6,715
V/X0823 Sensor Performance Prediction (SPP)	7,196	6,590	0	0	0	0	0	0	82,892
TOTAL	12,887	11,706	0	0	0	0	0	0	117,728

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 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

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)

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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: R/X0120
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) 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	3,607	0	0	0	0	0	0	28,121

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) ($1,070) 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) ($859) 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.

2. (U) FY 1998 PLAN:

- (U) ($1,707) 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	0	-6,852
(U) FY 1999 OSD/OMB Submit:	4,429	3,607	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

(U) FY 1997: (-$73K) SBIR adjustment. (-$6K) Minor Navy adjustments.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: R/X0120
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

(U) FY 1999: (-$6,852K) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDTE under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($BMDA^3$) Program Architecture.

(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: September 1997

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	3,629	2,907
b.	Ancillary Hardware Development	0	0
c.	Development Support Equipment	0	0
d.	Miscellaneous	800	700
	Total	4,429	3,607

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: R/X0120
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT TITLE: Advanced Environmental Acoustic Support (AEAS)

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	1,795	1,400		0	0
3,445											
PSI, McLean, VA	C/CPFF	05/03/93	N/A	N/A	350	1,865	1,718	1,200	0	0	5,133
SAIC, McLean, VA	C/CPFF	11/02/94	N/A	N/A	0	600	100	200	0	0	900
Loral, Manassass and Reston, VA	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: September 1997

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	3,607	0	0	28,121
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	3,607	0	0	28,121

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: R/X0120
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) 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/X2017 Advanced Underwater Acoustic Modeling Project (AUAMP)	1,262	1,509	0	0	0	0	0	0	6,715

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.

- (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) ($1,150) 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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)

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	0	-1,969
(U) FY 1999 OSD/OMB Submit:	1,262	1,509	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

(U) FY 1997: (-$31K) SBIR assessment. (-$2K) 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: September 1997

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	1,130
b. Ancillary Hardware Development	0	0
c. Development Support Equipment	350	379
d. Miscellaneous	0	0
Total	1,262	1,509

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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)

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	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	509	0	0	2052
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

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

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)

	Total FY 1995 & Prior	FY 1996 Budget	FY 1997 Budget	FY 1998 Budget	FY 1999 Budget	To Complete	Total Program
Subtotal Product Development	2,410	1,534	1,262	1,509	0	0	6,715
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	1,509	0	0	6,715

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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
V/X0823 Sensor Performance Prediction (SPP)	7,196	6,590	0	0	0	0	0	0	28,249

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.

- (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) ($2,043) 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.

- (U) ($2,109) 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) ($1,318) 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: V/X0823
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT TITLE: Sensor Performance Prediction (SPP)

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	0	-8,847
(U) FY 1999 PRESBUDG Submit:	7,196	6,590	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding:

(U) FY 1997: (-$71K) SBIR adjustment. (-$9K) Minor Navy Adjustments.

(U) FY 1999: (-$8,847K) Zero sum restructuring of the Oceanographer of the Navy's program by consolidating all RDT&E under a single Program Manager; reducing total number of projects and aligning them with the new Battlespace METOC Data Acquisition, Assimilation, and Applications ($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 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 BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: V/X0823
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) 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	3,690
c.	Systems Engineering	1,125	1,100
d.	Configuration Management	150	150
e.	Development Test & Evaluation	1,100	1,025
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	6,590

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: V/X0823
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) 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	3,595	0	0	9,673
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
Support and Management											

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603785N PROJECT NUMBER: V/X0823
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA) PROJECT TITLE: Sensor Performance Prediction (SPP)

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	525	0	0	2,532
Miscellaneous	N/A	N/A	4,021	4,021	996	900	1,100	1,025	0	0	4,021

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	5,040	0	0	21,696
Subtotal Support and Management	662	720	625	525	0	0	2,532
Subtotal Test and Evaluation	996	900	1,100	1,025	0	0	4,021
Total Project	8,115	6,348	7,196	6,590	0	0	28,249

* Only FY 1995 dollars are shown

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

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)	9,385	13,330	11,194	11,125	11,806	12,014	12,209	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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

(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.
   - (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) ($34) Supported work related to the U.S./United Kingdom Trimaran Demonstrator Project.

2. (U) FY 1998 PLAN:
   - (U) ($3,550) Support on-going Navy efforts on the U.S./Japanese Cooperative Material Project for Advanced Steel initiated with OSD funding.
   - (U) ($2,960) Support on-going work on the High-Speed Protocol Project with France initiated with OSD funding.
   - (U) ($110) Support on-going work on the U.S./Norway joint project on Composite Hull Embedded Sensor System initiated with OSD funding.
   - (U) ($2,960) Support on-going Navy work related to the U.S./United Kingdom development of the ICR Gas Turbine Engine.

- (U) ($1,100) Support work on the Unmanned Undersea Vehicle cooperative R&D project between the U.S. and France initiated with OSD funding.
- (U) ($2,650) Support on-going work on the U.S./U.K. Trimaran Demonstrator Project initiated with OSD funding.

3. (U) FY 1999 PLAN:
- (U) ($1,500) Support on-going work related to the U.S./Australian Anti-Torpedo Torpedo cooperative R&D project.
- (U) ($1,000) 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) ($1,500) Support on-going work on the multilateral Interoperable Secure Networks Project initiated with OSD funding.
- (U) ($1,300)Support on-going work on the U.S./U.K. Bottom Mounted Sensor System Project initiated with OSD funding.
- (U) ($1,894) Support work on the multilateral Naval Gun Fire Support Computer Codes Development Project initiated with OSD funding.
- (U) ($2,500) Support work on the Vector Project between the U.S., Germany and Sweden.
- (U) ($1,500) Support efforts on the U.S./United Kingdom Lightweight 155mm Howitzer Project initiated by OSD funding.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1997	FY 1998	FY 1999
(U) FY 1998 President's Budget:	9,528	13,330	11,267
(U) Adjustments from FY 1998 PRESBUDG:	-143	0	-73
(U) FY 1999 OSD/OMB Budget Submission:	9,385	13,330	11,194

(U) CHANGE SUMMARY EXPLANATION:

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: 26 September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

(U) Funding: FY 1997 adjustment is due to SBIR assessment (-131) and revised economic assumptions (-12). FY 1999 adjustment is due to Navy Working Capital Fund (NWCF) surcharge correction (-54) and other NWCF adjustments (-19).

(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: 26 September 1997

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603790N
PROGRAM ELEMENT TITLE: NATO Research and Development
PROJECT NUMBER: R2293
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	9,385	13,330	11,194

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	2,960	0	CONT.	CONT.
NUWC-Newport	WX				0	0	0	2,800	CONT.	CONT.
NSWC-CD	WX	1/31/97			0	2,500	3,450	0	CONT.	CONT.
NCCOSC	WX				0	0	2,300	2,300	CONT.	CONT.
Miscellaneous					0	4,239	4,620	6,094	CONT.	CONT.

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: 26 September 1997

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 0603790N
PROGRAM ELEMENT TITLE: NATO Research and Development
PROJECT NUMBER: R2293
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	9,385	13,330	11,194	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	9,385	13,330	11,194	CONT.	CONT.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

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
K2156 Naval Surface Fire Support	52,595	37,809	52,958	39,459	31,415	32,052	32,798	CONT.	CONT.
K2323 Vertical Gun Advanced Ship (VGAS)	0*	0	25,613	41,000	44,000	44,000	46,000	CONT.	CONT.
K2325 Naval Surface Fire Support System Integration	0	0	22,000	28,000	32,000	27,000	20,000	CONT.	CONT.
K2326 Land Attack Warfare Center	0	0	0	4,100	4,200	4,200	4,400	CONT.	CONT.
TOTAL	52,595	37,809	100,571	112,559	111,615	107,252	103,198	CONT.	CONT.

* Funding provided in S2196/0603563N

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Naval Surface Fire Support (NSFS) Mission will be met by gun, missile and weapons control systems development programs. The NSFS Program Office will acquire all gun/improved 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. Gun 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

Exhibit R-2

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION (con't):

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: SEPTEMBER 1997

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	37,809	52,958	39,459	31,415	32,052	32,798	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.

Exhibit R-2

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2156
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology 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) ($19,644) Continue development of EX-171 EDMs for ERGM.
- (U) ($ 2,372) Continue development of EX-171 Advanced Solid Propellant Charge.
- (U) ($12,793) Continue development of 5" MK 45 Modification and GFP preparation.
- (U) ($ 1,529) Continue development of 5" MK 45 Modification Gun Fire Control and investigate required interfaces.
- (U) ($ 851) Analyze life cycle costs and evaluate tradeoffs.
- (U) ($ 620) Continue effort on Warfare Mission Planning System to allow effective use of NSFS.

3. • (U) FY 1999 PLAN:
- (U) ($33,923) Continue development of EX-171 EDMs for ERGM.
- (U) ($ 2,592) Continue development of EX-171 Advanced Solid Propellant Charge.
- (U) ($ 6,873) Continue development of 5" MK 45 Modification and GFP preparation.
- (U) ($ 3,942) 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.

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2156
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology 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		
(U) Adjustments to FY 1997 Appropriated Value/ FY 1998 PRESIDENT'S BUDGET:			
a) Undistributed Reductions/DBOF	-2,198	0	- 27
b) SBIR Assessment	-1,002		
c) BTR	+3,591	0	0
(U) FY 1999 OSD/OMB Budget Submit:	52,595	37,809	52,958

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 1997 increase of $ 391K results from undistributed reductions (-$2,198K), SBIR Assessment ($-1,002) and BTRs (+$3,591K). The FY 1999 decrease of $ 27K is the result of 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	27,900	8,411	25,998	47,800	74,800	CONT.	CONT.

(U) RELATED RDT&E: Not applicable.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2156
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT TITLE: Naval Surface Fire Support

D. (U) SCHEDULE PROFILE.

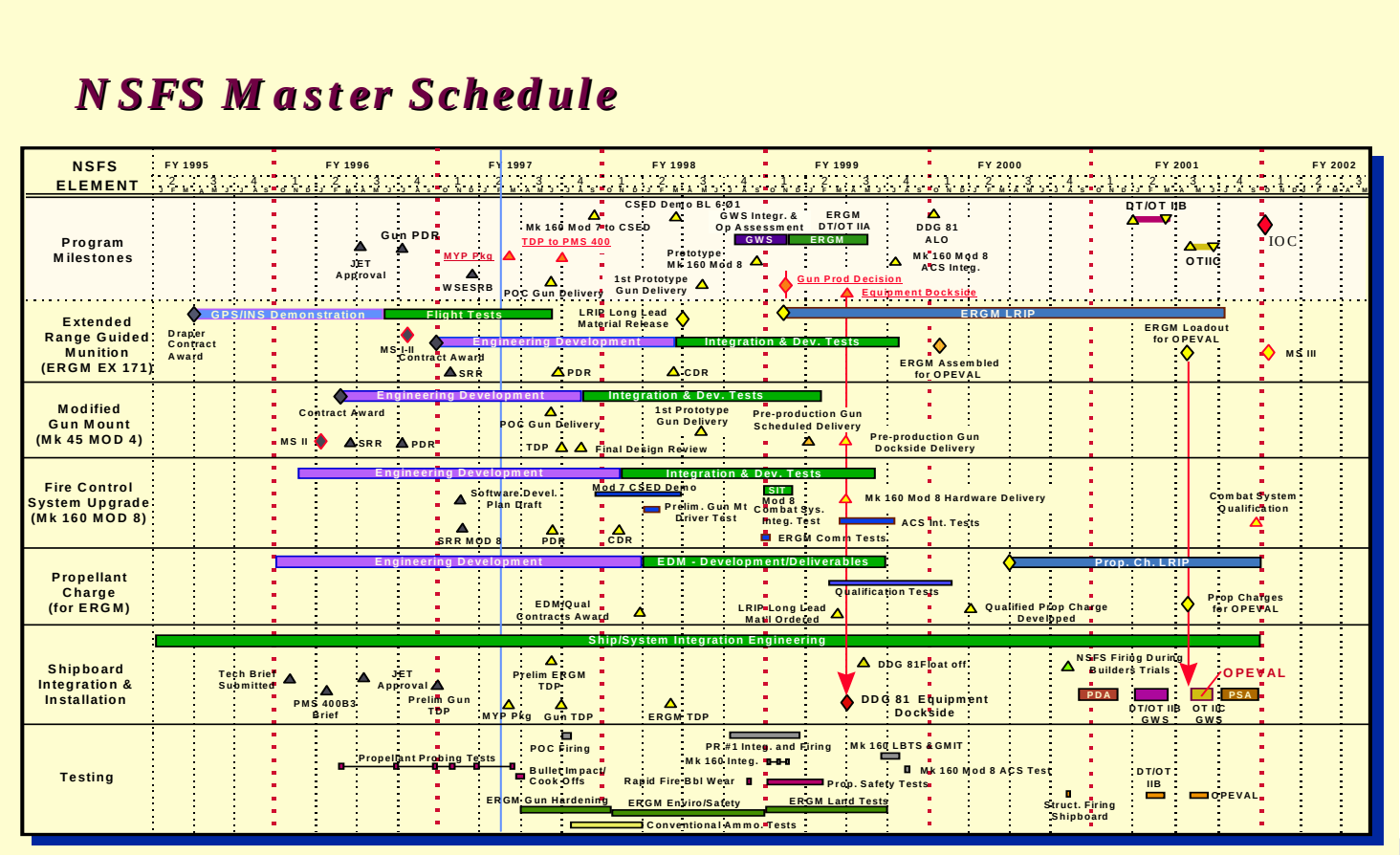


Exhibit R-2

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2156
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology 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	34,809	46,988
b. Software Development	4,453	1,634	3,132
c. Systems Engineering	2,666	985	2,585
d. Specialty Engineering	474	381	253
Total	52,595	37,809	52,958

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2156
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology 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	12,324	4,500	CONT.	CONT.
TEXAS INSTRUMENTS, LEWISVILLE, TX	CP	VAR	CONT.	CONT.	4,200	10,160	15,915	14,267	CONT.	CONT.
NSWC DAHLGREN, VA	WR	VAR	CONT.	CONT.	20,091	10,478	3,496	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	1,655	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	14,136	14,136	8,637	5,499	0	0	0	14,136
MISCELLANEOUS	VAR	VAR	CONT.	CONT.	21,790	1,763	3,686	4,885	CONT.	CONT.

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: SEPTEMBER 1997

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	37,809	49,358	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	37,809	52,958	CONT.	CONT.

Exhibit R-3

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2323
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology 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	25,613	41,000	44,000	44,000	46,000	CONT.	CONT.

* Funding is 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.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603795N PROJECT NUMBER: K2323
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology PROJECT TITLE: Vertical Guns Advanced Ship (VGAS)

(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) ($14,613) Award competitive contract(s) to develop prototype gun system for land-based testing.
- (U) ($ 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) Adjustments to FY 1997 Appropriated Value/ FY 1998 PRESIDENT'S BUDGET:	0	0	0
(U) FY 1999 OSD/OMB Budget Submit:	0	0	25,613

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Provide 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.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

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

Exhibit R-2

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: SEPTEMBER 1997

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	19,613
b. Government Engineering	0	0	4,250
c. Systems Engineering	0	0	1,750
Total	0	0	25,613

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: SEPTEMBER 1997

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	18,363	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	0	0
Test and Evaluation					0	0	0	0	0	0
GOVERNMENT FURNISHED PROPERTY - Not applicable.										
Subtotal Product Development					0	0	0	25,613	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	25,613	CONT.	CONT.

Exhibit R-3

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

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	22,000*	28,000	32,000	27,000	20,000	CONT.	CONT.

* NEW START PROGRAM

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, AFATDS, ATWCS, NAVSSI, 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.

Exhibit R-2

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: SEPTEMBER 1997

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) ($5,000) 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) Adjustments to FY 1997 Appropriated Value/ FY 1998 PRESIDENT'S BUDGET:	0	0	0
(U) FY 1999 OSD/OMB Budget Submit:	0	0	22,000

(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

Exhibit R-2

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: SEPTEMBER 1997

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	3,000
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	22,000

Exhibit R-3

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: SEPTEMBER 1997

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.				8,000	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	0	0
Test and Evaluation								0	0	0
Government Furnished Property - Not applicable.										
Subtotal Product Development								22,000	CONT.	CONT.
Subtotal Support and Management								0	0	0
Subtotal Test and Evaluation								0	0	0
Total Project								22,000	CONT.	CONT.

Exhibit R-3

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603800N PROJECT NUMBER: D2209
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM 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	243,289	448,855	461,437	244,958	26,330	0	0	0	1,633,073
Current Program Value	243,305								
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) ($152,537) 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) ($ 8,219) Commenced technology maturation demonstrations and assessments in the area of prognostics and health management.

- (U) ($ 9,583) Continued technology maturation demonstrations and assessments in the area of supportability and training.

- (U) ($ 10,117) Continued modeling and simulation activities to support strike warfare mission area analysis.

- (U) ($ 12,628) Continued requirements analysis efforts including Cost & Operational Performance Trades (COPT) to facilitate the Services' joint requirements definition.

- (U) ($ 16,665) Continued mission support, including program office functions; Congressionally directed OSD Force Structure Analysis.

- (U) ($644,476) Total

3. (U) FY 1998 PLAN: (Breakout reflects Navy, Air Force, DARPA, UK, Multi-Lateral and Canadian funding)

- (U) ($720,154) 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) ($ 20,000) Continue the Alternate Engine Program.

- (U) ($ 13,510) Continue technology maturation demonstrations and assessments in the area of prognostics and health management.

- (U) ($206,007) 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) ($ 11,374) Continue technology maturation demonstrations and assessments in the area of supportability and training.

- (U) ($ 11,913) Continue modeling and simulation activities to support strike warfare mission area analysis.

- (U) ($ 7,287) Continue requirements analysis efforts including COPT to facilitate the Services' joint requirements definition.

- (U) ($ 9,462) Continue mission support, including program office functions.

- (U) ($999,707) 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) ($187,046) 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) ($ 11,770) Continue technology maturation demonstrations and assessments in the area of prognostics and health management.

- (U) ($ 13,850) Continue technology maturation demonstrations and assessments in the area of supportability and training.

- (U) ($ 9,424) Continue modeling and simulation activities to support strike warfare mission area analysis.

- (U) ($ 5,776) Continue requirements analysis efforts including COPT to facilitate the Services' joint requirements definition; receive Joint Operational Requirements Document (JORD) from the Services.

- (U) ($ 8,998) Continue mission support, including program office functions.

- (U) ($962,348) 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	$256,833			
(U) Adjustments from PRESBUDG:	-2,787		+17,915	+11,974
(U) FY 1999 OSD/OMB Budget Submit:	$243,289	$448,855	$461,437	$1,633,073

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1997 net decrease reflects reprogramming (+$3,999), SBIR transfer (-$6,035), program adjustment (-$441) and economic rescission (-$310). FY 1999 net increase of +$17,915 reflects the increase (+$25,000) to restore funding, increase of NWCF (+ 2,897), offset by 2% reduction (-$9,400) and program adjustment (-$582).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

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	458,052	456,311	240,539	23,641	0	0	0	1,595,226
(U) RDT&E 0603800E	70,261	23,900	0	0	0	0	0	0	123,078
(U) UNITED KINGDOM	71,000	55,000	34,000	26,000	0	0	0	0	200,000
(U) MULTI-LATERAL	8,300	9,600	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	548,534	1,371,882	1,877,420	TBD*	TBD*
(U) RDT&E 0603800N	0	0	0	0	545,349	1,371,064	1,876,580	TBD*	TBD*

* TBD pending determination of impact of PR-99/99APOM 2% FYDP reduction.

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: September 1997

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 ARPA	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	720,154	702,484
b.	Alternate Engine Program	25,000	20,000	23,000
c.	Technology Maturation and Systems Engineering Support Total	152,537	206,007	TBD
	Breakout:			
	Technology Maturation			
	Airframe	8,380	15,183	TBD
	Flight Systems	38,460	31,347	TBD
	Manufacturing and Producibility	6,577	4,017	TBD
	Propulsion	23,382	25,193	TBD
	Mission Systems	37,043	61,805	TBD
	Subtotal Technology Maturation	113,842	137,545	TBD
	Plus: Systems Engineering Support	38,695	68,462	47,253
		152,537	206,007	47,253
d.	Prognostics and Health Management	8,219	13,510	11,770
e.	Supportability and Training	9,583	11,374	13,850

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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 ARPA	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	22,745	19,200	15,200
	Breakout:			
	Modeling and Simulation	10,117	11,913	9,424
	Analysis, Threat/Intelligence, Cost & Operational Performance Trades (COPT) and Core Team Support	12,628	7,287	5,776
g.	Mission Support	14,026	9,462	8,998
h.	USN/USAF/DARPA General Reductions	2,639		
	Total	644,476	999,707	962,348

Funding Resources:			
0603800N	243,289	448,855	461,437
0603800F	251,626	458,052	456,311
0603800E	70,261	23,900	0
United Kingdom	71,000	55,000	34,000
Multi-Lateral	8,300	9,600	7,600
Canada		4,300	3,000
Total	644,476	999,707	962,348

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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)										
Miscellaneou	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
Miscellaneou	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
Miscellaneou	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: September 1997

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	661,802	661,802 *		72,208	194,827	238,684	156,083	661,802
Lockheed	C/CPFF	Nov 96	718,800	718,800 *		105,900	215,200	246,900	150,800	718,800
Pratt & Whitn	SS/CPAF	Nov 96	832,046	832,046		231,619	310,127	216,900	73,400	832,046
West Palm Beach FL										
SUBTOTAL			2,212,648	2,212,648		409,727	720,154	702,484	380,283	2,212,648
*includes government managed equipment										
Alternate Engine Program										
GE	SS/CPFF	Nov 95	105,000	105,000	7,000	25,000	20,000	23,000	30,000	105,000
Technology Maturation										
Airframe										
McAir	SS/CPFF	Dec 94	0	0	12,100	7,140	12,970			
Miscellaneou	Various	Various	0	0	1,861	24	334			
Fld. Activ.	Various	Oct98-Sep99	0	0	1,788	1,116	1,779			
SUBTOTAL					15,749	8,280	15,083	TBD	TBD	TBD
Flight Systems										
Lockheed	C/CPFF	Dec 94	0	0	15,296	16,088	10,529			
McAir	C/CPFF	Dec 94	0	0	14,701	16,900	15,700			
Miscellaneou	Various	Various	0	0	6,898	1,535	656			
Fld. Activ.	Various	Oct98-Sep99	0	0	5,926	3,887	4,374			
SUBTOTAL					42,821	38,410	31,259	TBD	TBD	TBD
Manufacturing and Producibility										
Hughes	C/CPFF	Dec 94	0	0	3,035	2,030				
Los Angeles CA										
Lockheed	C/CPFF	Dec 94	0	0	2,897	1,836	2,767			
General Res. Corp.	C/CPFF	Dec 94	0	0	1,945					
Huntsville AL										
New Contrac	C/CPFF	Nov 97	0	0						
Scaled Comp	C/CPFF	Jun 97	0	0		2,000				
City/State										
Miscellaneou	Various	Various			830	178	435			
Fld. Activ.	Various	Oct98-Sep99	0	0	1,925	533	815			
SUBTOTAL					10,632	6,577	4,017	TBD	TBD	TBD

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	0	0	5,448					
GE	SS/CPFF	Dec 94	0	0	5,681					
Cincinnati OH										
Pratt/Whitney	SS/CPFF	Nov 95	0	0	30,000					
Pratt/Whitney	SS/CPFF	Feb 97	0	0		10,859	17,243			
General Elec	SS/CPFF	Nov 97	0	0		3,000				
Pratt & Whitn	SS/CPFF	Mar 97	0	0		3,640				
Pratt & Whitn	SS/TBD	Sep 97	0	0		2,400	5,600			
Miscellaneou	Various	Various	0	0	12,895					
Fld. Activ.	Various	Oct98-Sep99	0	0	2,214	3,483	2,350			
SUBTOTAL					56,238	23,382	25,193	TBD	TBD	TBD
Mission Systems										
TI	C/CPFF	Dec 94	0	0	2,464					
Plano TX										
Lockheed	SS/CPFF	Dec 95	0	0	3,006	2,250	1,600			
McAir	SS/CPFF	Dec 95	0	0	2,674	2,250	1,600			
Hughes	C/CPFF	Dec 95	0	0	5,153	8,619	13,502			
Westinghous	C/CPFF	Dec 95	0	0	4,788	7,660	13,498			
Baltimore MD										
Boeing	C/CPFF	Mar 96	0	0	300	3,874	11,000			
Lockheed	C/CPFF	Mar 96	0	0	300	3,843	11,000			
New Contrac	C/CPFF	Dec 97	0	0			2,900			
New Contrac	C/CPFF	Dec 98	0	0						
New Contrac	C/CPFF	Dec 98	0	0						
Hughes	C/CPFF	Dec 94	0	0	2,628	1,053				
Miscellaneou	Various	Various	0	0	18,853	930	1,314			
Fld. Activ.	Various	Oct98-Sep99	0	0	10,982	6,564	5,104			
SUBTOTAL					51,148	37,043	61,518	TBD	TBD	TBD
Systems Engineering Support										
Miscellaneou	Various	Various	18,474	18,474		4,780	4,923	5,071	3,700	18,474
Fld. Activ.	Various	Oct98-Sep99	188,430	188,430		33,511	63,089	41,682	50,148	188,430
SUBTOTAL						38,291	68,012	46,753	53,848	206,904

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	7,000	7,000		750	2,400	1,950	1,900	7,000
Lockheed	C/CPFF	Apr 97	13,200	13,200		2,050	4,100	4,350	2,700	13,200
New Contrac	C/CPFF	Sep 97	6,000	6,000		600	2,400	2,000	1,000	6,000
Pratt & Whitn	C/CPFF	Jun 97	8,000	8,000		3,920	2,610	1,470		8,000
New Contrac	C/CPFF	Dec 97	4,000	4,000			1,800	1,800	400	4,000
Miscellaneou	Various	Various	500	500		500				500
Fld. Activ.	Various	Oct98-Sep99	999	999		399	200	200	200	999
SUBTOTAL						8,219	13,510	11,770	6,200	39,699
Supportability and Training										
Classified										
Project 3	C/CPFF	Dec 94	13,037	13,037	2,262	3,000	4,000	925	2,850	13,037
Project 4	C/CPFF	Dec 94	9,199	9,199	1,038	2,400	1,986	925	2,850	9,199
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 Contrac	C/CPFF	Jan 99	28,323	28,323				7,800	20,523	28,323
Miscellaneou	Various	Various	2,376	2,376	2,127	249				2,376
Fld. Activ.	Various	Oct98-Sep99	11,306	11,306	3,044	1,914	2,613	1,170	2,565	11,306
SUBTOTAL					8,471	9,563	11,349	13,820	28,788	71,991
Modeling and Simulation										
Miscellaneou	Various	Various	32,381	32,381	4,341	6,541	8,514	6,697	6,288	32,381
Fld. Activ.	Various	Oct98-Sep99	12,191	12,191	1,807	3,086	3,149	2,477	1,672	12,191
SUBTOTAL					6,148	9,627	11,663	9,174	7,960	44,572
Analysis, Threat, COPT and Core Support										
Miscellaneou	Various	Various	29,230	29,230	7,298	10,598	5,575	3,042	2,717	29,230
Fld. Activ.	Various	Oct98-Sep99	16,783	16,783	8,794	1,800	1,482	2,484	2,223	16,783
SUBTOTAL					16,092	12,398	7,057	5,526	4,940	46,013
Mission Support										
Institute for Defense An	Grant	Jan 97	2,500	2,500		2,500				2,500
Fld. Activ.	Various	Oct98-Sep99	22,560	22,560	7,896	4,217	3,510	3,620	3,317	22,560
SUBTOTAL					7,896	6,717	3,510	3,620	3,317	25,060

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: September 1997

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	18,932	18,932	9,793	5,028	4,111			18,932
New Contrac	C/CPFF	Feb 00	9,097	9,097				3,613	5,484	9,097
Miscellaneou	Various	Various	22,444	22,444	8,024	3,575	3,271	3,315	4,259	22,444
SUBTOTAL					17,817	8,603	7,382	6,928	9,743	50,473
TEST AND EVALUATION: (included above)										
GOVERNMENT FURNISHED PROPERTY: N/A										
Subtotal Product Development					398,361	633,234	992,325	955,420	561,725	3,541,065
Subtotal Support and Management					17,817	8,603	7,382	6,928	9,743	50,473
USN/USAF/DARPA General Reductions						2,639				2,655
Subtotal Test and Evaluation					0	0	0	0	0	0
Total Project					416,178	644,476	999,707	962,348	571,468	3,594,193
Funding Resources										
0603800N					208,204	243,289	448,855	461,437	271,288	1,633,073
0603800F					165,057	251,626	458,052	456,311	264,180	1,595,226
0603800E					28,917	70,261	23,900			123,078
United Kingdom					14,000	71,000	55,000	34,000	26,000	200,000
Multi-Lateral						8,300	9,600	7,600	6,700	32,200
Canada						0	4,300	3,000	3,300	10,600
Total					416,178	644,476	999,707	962,348	571,468	3,594,177

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE **September 1997**

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	16807	22990	24144	24741	25336	25930	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 September 1997
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) $ 2100 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 September 1997

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)Total $ 16,807

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) $ 5263 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 $ 22,990

	DATE
	September 1997

BUDGET ACTIVITY	PE NUMBER AND TITLE
4 - Demonstration/Validation	0603851M Non-Lethal Warfare DEM/VAL

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	0	-525
(U) Current Budget Submit	9326	16807	22990

(U) Change Summary Explanation:

(U) Funding: Decrease of 265k in FY 97 is due to SBIR and reduced inflation. Decrease of 525k in FY 1999 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	2000	1000	1997	1996	1996	2000	Cont.	Cont.

D. (U) Schedule Profile N/A

DATE: September 1997

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	2,993	0	0	0	0	0	Cont.	Cont.
TOTAL	0	2,993	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.

DATE: September 1997

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	2,993	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) ($2,500) Provide engineering support, system development, and test and evaluation for JPALS.
- (U) ($493) Provide JPALS aircraft integration/A-kit development.

2. (U) FY 1999 PLAN: Not Applicable.

DATE: September 1997

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603860N PROJECT NUMBER: W2329
PROGRAM ELEMENT TITLE: JPALS 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	0	0
(U) Adjustments from PRESBUDG:	0	0	0
(U) FY 1999 NAVCOMPT Budget Submit:	0	2,993	0

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Not applicable.

(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)

DATE: September 1997

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				

DATE: September 1997

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	1200	0
b. Systems Engineering Sup	0	993	0
c. T & E Support	0	500	0
d. Project Management Sup	0	260	0
e. Travel	0	40	0
Total	0	2,993	0

DATE: September 1997

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	2,193	0	Cont.	Cont.
Support and Management Miscellaneous		Various	-	-	0	0	300	0	Cont.	Cont.
Test and Evaluation Miscellaneous		Various	-	-	0	0	500	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	2,193	0	Cont.	Cont.
Subtotal Support and Management	0	0	300	0	Cont.	Cont.
Subtotal Test and Evaluation	0	0	500	0	Cont.	Cont.
Total Project	0	0	2,993	0	Cont.	Cont.

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

Date: Sept 97

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	FY2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J2331 Hardened Target Munitions	N/A	4,987	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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.

EXHIBIT R-2

1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN Date: Sept 1997

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) ($4,987) 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

Exhibit R-2

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

Date: Sept 1997

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) Adjustment from 1998 President's:	0	0	0
(U) FY 1999 OSD budget:	0	4,987	0

(U) CHANGE SUMMARY EXPLANATION: N/A

(U) Schedule: N/A

(U) Technical: N/A

Exhibit R-2

FY 1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: Sept 1997

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)

Exhibit R-2

1999 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: Sept 1997

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	4,987	0

Exhibit R-3

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

Date: Sept 1997

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	950	950			950			950
CSDL	SS/CPFF	10/97	300	300			300			300
SPA	SS/CPFF	10/97	157	157			157			157

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				1,900			1,900
SNL	MIPR	10/97				1,680			1,680

Exhibit R-3

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng 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 200 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	1,301	1,617	1,635	1,742	1,741	2,000	2,045	Cont.	Cont.
X2144 SEW Engineering	4,875	4,088	7,708	7,853	8,162	7,995	6,753	Cont.	Cont.
X2357 Maritime Battle Center				9,000	10,116	5,000			24,116
TOTAL	6,176	5,705	18,343	19,711	14,903	9,995	8,798	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, and Reconnaissance (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 Command, Control, Communications, Computers and Intelligence (C4I), Surveillance, and Command and Control Warfare (C^2W) 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 “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.

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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

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 2002 ESTIMATE	FY 2003 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	1,301	1,617	1,635	1,742	1,741	2,000	2,045	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, to: Demonstrate 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 of Navy Battle Force Information Architecture.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

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) ($539) 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.

- ($693) 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-t- 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

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:

- ($276) Develop hardware/software packages for Command and Control (C2) aircraft on a cooperative basis with industry and the Air Force.

- ($715) 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.

- ($644) 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

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:	-76		-182
(U) FY 1999 OSD/OMB Budget Submit:	1,301	1,617	1,635

(U) CHANGE SUMMARY EXPLANATION:

FY 1997: $-48K other Navy adjustments. $-28K NWCF rate adjustments.

FY 1999: $-179K other Navy adjustments. $-23K NWCF rate 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: September 1997

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	45
b. System Test and Evaluation	668	791	775
c. Prototyping and Demonstration	203	276	276
d. Engineering	177	235	262
e. Fleet Support	216	280	277
Current Allocation	1,301	1,617	1,635

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: N/A

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 060407N
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	4,875	4,088	7,708	7,853	8,162	7,995	6,753	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, 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 Command, Control, Communications, Computers and Intelligence (C4I), Surveillance, and Information Warfare components are effectively integrated into the C^4ISR architecture. The Project additionally ensures that (1) 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 “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 C^4ISR 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: September 1997

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 060407N 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 is the lead service for planning, coordination and execution of FY 97's Joint Warrior Interoperability Demonstration (JWID). As lead service, coordinated all participation and develop 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 and Strike Warfare, and maintaining documentation describing these Operational Architectures; (2) 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) ($748) Developed high-level systems and operational architecture processes to support long range planning for "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), Theater Ballistic Missile Defense, and Amphibious Warfare, Strike Warfare, and integration into the DII. 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.

- (U) ($1,493) The U.S. Navy is the lead service for planning, coordination and execution of FY 97's Joint Warrior Interoperability Demonstration (JWID 97). FY 97 funding provided for the establishment of a JWID 97 program office, stood up under the leadership of Office of the Chief of Naval Operations, Space, Information Warfare, Command and Control (DCNO N6). Enhanced RDTE,N funding for technical support of the Navy lead of JWID 97 was authorized by 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 is the central point for planning activities for JWID 97 and provides support to the JWID 97 sponsoring CINC, United States Atlantic Command. As lead service, the Navy coordinates all participation and develops plans for the integration of maturing system developments, military and commercial technologies that support enhanced operational capability in the 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 (2W), integrated landfight architecture, trusted systems/multi-level security, improved sensors/strike planning, common tactical/operational picture, theater air defense/force protection, and combat identification.

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) ($1,523) 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 Amphibious systems architecture will be completed. 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 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) ($3,314) 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 maintain documentation describing the Operational Architectures; (2) provide 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. Three additional systems architectures will be completed. Amphibious Warfare operational architecture will be updated.

- (U) ($231) Update the high-level systems and operational architecture processes to support long range planning for “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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 060407N

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:	+1,308	+1,000	+2,868
(U) FY 1999 FMB Budget Submit:	4,875	4,088	7,708

(U) CHANGE SUMMARY EXPLANATION:

(U) FY 1997: Changes reflect a decrease of $47K for SBIR and an increase of $1,355K for JWID 97.
(U) FY 1998: An increase of $1,000K is for additional C4ISR requirements.
(U) FY 1999: An increase of $4,440K is for C4ISR requirements. $-1,514 to fund fleet battle experiments. $-58 NWCF rate 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.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: September 1997

BUDGET ACTIVITY: 4
PROGRAM ELEMENT: 060407N
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	748	565	231
b. Systems A&E and Validation	1,730	1,523	6,477
c. Joint Warrior Interoperability Demonstrations	2,397	1,000	1,000
d. Systems Validation		200	
e. Systems Engineering		800	
Current Allocation	4,875	4,088	7,708

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 060407N
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	4,875	4,088	7,708	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	4,875	4,088	7,708	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	4,875	4,088	7,708	Cont.

GOVERNMENT FURNISHED PROPERTY: None

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 060407N
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			9,000	10,116	5,000				24,116

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of the Maritime Battle Center (MBC) is to develop an environment and process for supporting concept development with fleet tests and experimentation and technological and organizational innovations. The MBC environment consists of distributed, networked, interactive naval resources existing within the Naval Warfare Centers, other Service Battle Commands and laboratories, and the Joint Battle Center. MBC will provide the process and tools for assimilating innovations into naval warfighting capabilities. 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, especially the maritime forces in the process of turning concept and technical innovations into proven warfighting capability. 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 research, experimentation, testing, acquisition support, system engineering, technology insertion, and operational demonstrations.

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 060407N

PROGRAM ELEMENT TITLE: SEW Architecture/Eng. Support

PROJECT NUMBER: X2357

PROJEC TITLE: Maritime Battle Center

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 PLAN:

- (U) ($1,000) MBC Planning - The Director of the MBC responsible for the overall management and coordination of MBC activities. This element has the core competencies to conceive and evaluate advanced operational concepts. Drawing upon sources such as experienced military leaders, warfighting CINC stated requirements, Decision Support Center (DSC) analyses, Maritime Force (Navy, Marine Corps and Coast Guard) operational needs, coalition warfare needs, etc. This element defines the Advanced Operational Concepts that are pursued in the MBC. Examples are: Network Centric Warfare, Ring of Fire, Silent Fury, Focused Logistics.

- (U) ($500) Concept Development - The President of the Naval War College (NWC) will lead Concept Development for the MBC. The NWC will consolidate intellectual inputs expected from a variety of sources including the Strategic Studies Group, Naval Postgraduate School, the fleet, CNO staff, other services, the Joint Staff, allies, and industry. The NWC will evaluate their potential for future warfighting and evaluate and further develop these concepts as required. Concepts that are deemed mature enough to proceed to fleet testing will be forwarded to the MBC Director for incorporation into the Fleet Battle Experiment (FBE) series. NWC will develop FBE scenarios and experimentation plans in support of the MBC Director.

- (U) ($6,000) Experimentation - The numbered 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. C2F and C3F will conduct the FBE as resources permit with the full support of the MBC upon a mutually agreed upon schedule promulgated by the MBC Director.

- (U) ($1,500) 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.

B. (U) PROGRAM CHANGE SUMMARY: Not applicable.

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

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

FY 1999 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: September 1997

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 060407N
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 Planning			1,000
b. Concept Development			500
c. Experimentation			6,000
d. Technical			1,500
Current Allocation			9,000

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: N/A