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DEPARTMENT OF THE NAVY

SUPPORTING DATA FOR FY 1991 BUDGET ESTIMATES DESCRIPTIVE SUMMARIES (U)

SUBMITTED TO CONGRESS JANUARY 1990

RESEARCH, DEVELOPMENT, TEST & EVALUATION, NAVY

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NAVY RDT&E
PROGRAM ELEMENT DESCRIPTIVE SUMMARIES

INTRODUCTION AND EXPLANATION OF CONTENTS

1. General. This document has been prepared to provide information on the Department of the Navy Research, Development, Test and Evaluation Program to Congressional committees during the FY 1991 hearings. The Descriptive Summaries provide narrative information on all non-special access RDT&E Program Elements and Projects.

2. Comparison of FY 1990 Data. A direct comparison of FY 1990 data in the Program Element Descriptive Summaries dated January 1989 and the Revised President's Budget of April 1989 will reveal significant differences. Many of the differences are attributable to the following factors:

a. FY 1990 reductions as a result of Congressional action on the appropriation.

b. FY 1990 reductions, transferred to other appropriations to fund Congressionally directed requirements for Coast Guard support, support for Jordan and the Department of Energy reactivation of Savannah River Reactors.

c. FY 1989 funding changes including RDT&E Reprogramming Actions.

d. Reclassification of FY 1989 and FY 1990 data to achieve comparability with the program structure for FY 1991.

3. Relationship with FY 1991 Budget Structure to the FY 1990 Budget Approved by Congress. The following program elements/projects, which do not appear on the Base for Reprogramming Action (DD 1414) for the Navy RDT&E, were prepared pursuant to final Congressional action of the FY 1990 DoD Budget Submission to Congress.

Program Element/Project	Title
0204413N/S1980	Amphibious Tactical Support Units
0603721N/T2042	Plactic Substitution
0604213N/W2088	Medium Lift Replacement

4. Classification. Classified information is identified by use of brackets as [ ].

5. Table of Contents. The Table of Contents will be presented in two different formats this year - Alphabetically and in R-1 Line Item Order.

per telecon

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STATEMENT "A" per Diane Glaister
Navy Budget Office/NCBG, Pentagon
TELECON 3/28/90

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Dist	Special
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6. Highly Classified Programs. The following program elements are funded in FY 1991, however, due to classification are not provided in this document:

Program Element	Title
0301327N	Tech Reconn & Surv
0304111N	Special Activities
0603525N	Pilot Fish
0603536N	Retract Juniper
0603551N	Link Saki
0603576N	Chalk Eagle
0603591N	Joint Adv System
0603734N	Chalk Coral
0603737N	Link Hazel
0603740N	Link Laurel
0603746N	Retract Maple
0603748N	Link Plumeria
0603750N	Chalk Weed
0603751N	Retract Elm
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0603787N	Special Process
0604233N	Adv Tactical Aircraft

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SECTION I

RDT&E,N DESCRIPTIVE SUMMARIES

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Fleet Ballistic Missile Systems

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J0091	SLBM System Improvement Program	23,047	19,572	32.929	CONT.	CONT.
S1265	Sub Acoustic Warfare Development *	(7,927)	(16,385)			

* Transferred out to Program Element 0101226N.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports developments related to deployed Fleet Ballistic Missile Systems, as well as other improvement projects for SSBNs. Current efforts are related to modifications to the strategic weapon system which are aimed at extending effectiveness and survivability of the POSEIDON (C3) and TRIDENT I (C4) Fleet Ballistic Missile Weapon Systems in response to emerging threats.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Fleet Ballistic Missile Systems
PROGRAM NUMBER: J0091 PROJECT TITLE: Fleet ballistic Missile System

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 19[illegible] ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J0091	FBM System Improvement Program	23,047	19,572	32,[illegible]	CONT.	CONT.

B. (U) DESCRIPTION: This project currently provides assessments of and supports improvements to POSEIDON (C3), TRIDENT I (C4) Fleet Ballistic Missile Weapon Systems and (beginning in FY91) TRIDENT II (D-5). It has the objective of extending the effectiveness and survivability of these vital strategic weapon systems. This project includes vulnerability and effectiveness assessments, and integration of the NAVSTAR Global Positioning System (GPS) capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued vulnerability and effectivness efforts of the FY 1988 program including:

(1) (U) Effort to determine the need and extent of countermeasures resulting from the threat of rapidly maturing sensors and related advanced state-of-the-art sensor/signal processing improvements will achieve full implementation. This effort will also provide a technical base for potential future strategic systems.

(2) (U) Effort increased on the investigation of Missile Guidance System vulnerability to potential boost and post-boost threats.

(3) (U) Started investigations into critical signature characteristics of the C3 and C4 weapon systems.

b. (U) Continued the FY88 planning and validation effort for integration of NAVSTAR GPS.

3. (U) FY 1990 Program:

a. (U) Continue vulnerability and effectiveness efforts to include:

(1) (U) Determine the need and extent of countermeasures resulting from the threat of rapidly maturing sensors and related advanced state-of-the-art sensor/signal processing improvements.

(2) (U) Evaluate threat postulations.

(3) (U) Investigate Missile Guidance System vulnerability to potential boost and post-boost threats.

(4) (U) Assess survivability implications of subsystem operations and formulate corrective measures.

(5) (U) Investigate potential system improvements.

(6) (U) Investigate methods for reducing submarine observability by increasing the interval between navigation fixes.

PROGRAM ELEMENT: 0101221N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Fleet Ballistic Missile Systems
PROGRAM NUMBER: J0091 PROJECT TITLE: Fleet ballistic Missile System

(7) (U) Investigate critical signature characteristics of the C3 and C4 weapon systems.

b. (U) Continue planning and validation effort for integration of NAVSTAR GPS.

3. (U) FY 1991 Plans:

a. (U) Continue vulnerability and effectiveness efforts conducted in FY 1990 and expand to include D5. This is the first year that the TRIDENT II (D5) Stategic Weapon System will be integrated into the program.

b. (U) Continue development effort for integration of the NAVSTAR Global Positioning System (GPS) receiver equipment into the navigation subsystem.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Strategic Systems Programs, Washington, DC. CONTRACTORS: Charles Stark Draper Laboratory, Cambridge, MA; Kaman Sciences Corporation, Colorado Springs, CO; Lockheed Missiles and Space Company, Sunnyvale, CA; Rockwell International Corporation, Anaheim, CA; UNISYS Corp., Shipboard and Ground Systems Group, Great Neck, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None
2. (U) Schedule changes: None
3. (U) Cost changes: None

F. (U) PROGRAM DOCUMENTATION:
Vulnerability and Effectiveness Program NAPDD - 4/86
NAVSTAR GPS Receiver Equipment NAPDD - 5/86

G. (U) RELATED ACTIVITIES: Program Element 0604363N, TRIDENT II - Engineering development of the TRIDENT II (D5) Strategic Weapon System; Program Element 0604777N, NAVSTAR GPS - Development of the NAVSTAR Global Positioning System.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Millions)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN 1/	364.2	61.5	115.1	CONT.	CONT.
LI's - 535800, 902010, 902090					
WPN 2/	6.5	5.0	4.9	CONT.	CONT.
LI's - 112000, 612010, 612090					

1/ These funds provide for the procurement of test instrumentation; equipment for maintenance, calibration, handling, data processing and tests at shore

PROGRAM ELEMENT: 0101221N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Fleet Ballistic Missile Systems
PROGRAM NUMBER: J0091 PROJECT TITLE: Fleet ballistic Missile System

facilities; alterations to tactical hardware; new tactical hardware; and initial and replenishment spares and repair parts.
2/ These funds, in support of the POSEIDON missile programs provides for conversion of POSEIDON MK-3 reentry body shells to test configuration, and spares and repair parts.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) MILESTONE SCHEDULE: Not applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: SSBN Security Technology Program
PROJECT NUMBER: R0092 PROJECT TITLE: SSBN Security Technology

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0092	SSBN Security	42,370	40,793	43,131	CONT.	CONT.

B. (U) DESCRIPTION: The SSBN Security Program's purpose is to maintain the current covert mobility of the Fleet Ballistic Missile Submarine Force with respect to expanding Soviet ASW capabilities and emerging applications of advanced technology in the ocean environment. This program identifies requirements for maintaining, or enhancing the current tactical superiority and stealth characteristics of the Fleet Ballistic Missile Submarine Force.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Upgraded detectability assessment and defined specifications for countermeasure development.

b. (U) Continued investigation.

c. (U) Continued detectability assessment of including an at sea test assessing detectability limits and countermeasure sensors.

d. (U) Continued detectability assessments and evaluated requirements for development.

e. (U) Conducted a major

f. (U) Performed three at sea tests with new sensors to characterize noise fields.

g. (U) Continued technological and modeling assessments of several

h. (U) Accelerated program assessing

i. (U) Continued tactical development, including promulgation, of new OPORDs for the

j. (U) Continued Patrol Habit analysis

k. (U) Conducted major sea test to evaluate

l. (U) Continued programs in

m. (U) Continued program in

n. (U) Conducted sea test to evaluate active

o. (U) Conducted tests of sensor concepts for protection.

p. (U) Conducted initial assessment of

PROGRAM ELEMENT: 0101224N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: SSBN Security Technology Program
PROJECT NUMBER: R0092 PROJECT TITLE: SSBN Security Technology

2. (U) FY 1990 Program:
   a. (U) Continue tactical development and operations analysis

   b. (U) Conduct major sea test to evaluate acoustic sensor concept.
   c. (U) Continue programs in acoustics, protection.
   d. (U) Upgrade detectability assessment and define specifications for countermeasure development.
   e. (U) Perform at sea measurements of submarine characteristics.
   f. (U) Conduct major sea test to evaluate capability.
   g. (U) Accelerate

   h. (U) Upgrade assessments of identified as potential threats from previous years studies.
3. (U) FY 1991 Plans:
   a. (U) Continue tactical development and operations analysis.
   b. (U) Conduct sea test to evaluate ,protection concepts.
   c. (U) Continue programs in acoustics.
   d. (U) Finalize detectability assessments and transfer technology to appropriate advanced development program.
   e. (U) Continue detection investigation.
   f. (U) Conduct major sea test to ascertain false alarm rate

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In House: DTNSRDC, Bethesda, MD; NAVOCEANSYSCEN, San Diego, CA; NAVOCEANO, Bay St. Louis, MS; NUSC, New London, CT; NRL, Washington D.C. Contractors: Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; TRW, McLean, VA; SRI International, Menlo Park, CA: Science Applications Inc., LaJolla, CA & McLean, VA; BB&N Laboratories, Cambridge, MA., Dynamics Technology Inc. Torrence, CA; Arete Associates Kodak; AT&T Technologies, Arlington, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
   1. (U) Technical changes: NONE
   2. (U) Schedule changes: NONE
   3. (U) Cost changes: NONE

F. (U) PROGRAM DOCUMENTATION: NAPDD #011-02 1/86

G. (U) RELATED ACTIVITIES: PE 0603588N, SSBN Survivability.

PROGRAM ELEMENT: 0101224N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: SSBN Security Technology Program
PROJECT NUMBER: R0092 PROJECT TITLE: SSBN Security Technology

H. (U) OTHER APPROPRIATED FUNDS: None. This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Continuing program; no milestones apply.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101226N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development
PROGRAM NUMBER: S1265 PROJECT TITLE: Sub Acoustic Warfare Development

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1265	Sub Acoustic Warfare Development	(7,927)*	(16,385)*	31,271	CONT.	CONT.

* Previously funded under PE 0101221N, S1265.

B. (U) DESCRIPTION: This project was formerly part of PE 0101221N and has been separately identified under this new PE number. This project develops a Submarine Defensive Warfare System to improve the effectiveness and survivability of all classes of US submarines. It develops advanced sonar and torpedo countermeasures, external countermeasure launchers, a countermeasure command and control unit and a new sonar intercept system.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) CSA MK 2:
      (1) (U) M/S III approved for low rate production (ALRP).
      (2) (U) Awarded production contract.
      (3) (U) Commenced SSN 688 launcher system design.
      (4) (U) Acquired SSN 688 EDM system and components.
   b. (U) ADC MK 3:
      (1) (U) M/S III approved for low rate production (ALRP).
      (2) (U) Awarded production contract.
   c. (U) ADC MK 4:
      (1) (U) Completed Preliminary Design Review (PDR).
      (2) (U) Commenced Critical Design Review (CDR)-1.
   d. (U) New Sonar Intercept System (NSIS):
      (1) (U) Completed operational requirement (OR).
      (2) (U) Prepared program startup documentation and requirements.
      (3) (U) Commenced Advanced Development Model (ADM) specifications
2. (U) FY 1990 Program:
   a. (U) CSA MK 2:
      (1) (U) Complete SSN 688 launcher system design.
      (2) (U) Deliver SSN 688 system and components.
   b. (U) ADC MK 4: Complete CDR-1 and commence EDM fabrication.
   c. (U) New Sonar Intercept System (NSIS):
      (1) (U) Issue OR.
      (2) (U) Complete spec and ADM contract procurement package.

PROGRAM ELEMENT: 0101226N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development
PROGRAM NUMBER: S1265 PROJECT TITLE: Sub Acoustic Warfare Development

d. (U) NLQ-1 Device:
(1) (U) Complete program startup documentation/requirements.
(2) (U) Commence Design of Advanced Development Models (ADMs).
e. (U) Mobile Multi-Function Device (MMD):
(1) (U) Complete program startup documentation/requirements.
(2) (U) Commence design of ADMs.
f. (U) C/M Command and Control Unit (CMC_2):
(1) (U) Complete program startup documentation/requirements.
(2) (U) Conduct feasibility testing with adv prototype model.
(3) (U) Complete specification for ADM.

3. (U) FY 1991 Plans:
a. (U) CSA MK 2: Award production contract for SSN 688 systems.
b. (U) ADC MK 2: Complete fabrication and test of EDM units. Commence STM fabrication.
c. (U) NSIS:
(1) (U) Award competitive ADM system contract.
(2) (U) Commence design of ADM system.
d. (U) NLQ-1 Device: Complete design and fabricate ADM units.
e. (U) MMD Device: Complete design and fabricate ADM test units.
f. (U) CMC_2: Complete design and begin fabrication of ADM system.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSEA, Washington, DC; NCSC, Panama City, FL; NUSC, New London Lab/New London, CT. CONTRACTORS: NORDEN Systems, Melville, NY; Bendix Inc., Sylmar, CA; Librascope, Glendale, CA; Hazeltine Corp., Braintree, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology Changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION:

SYSTEM	TOR	DOP	OR	TEMP
CSA MK2	N/A	N/A	12/76	#581 (03/86)
ADC MK 3	N/A	N/A	12/76	#619 (12/85)
ADC MK 4	N/A	N/A	12/76	#1171 (03/88)
NSIS	9/85	6/86	IN PROCESS	FY 90
NLQ-1	3/86	11/87	7/88	FY 90
MMD	3/86	11/87	7/88	FY 90
CMC_2	3/86	11/87	7/88	FY 90

G. (U) RELATED ACTIVITIES: Submarine Torpedo Defense (SMTD), PE 0603737D; and Low Frequency Analyzer, PE 0603588N, Project S1871.

PROGRAM ELEMENT: 0101226N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development
PROGRAM NUMBER: S1265 PROJECT TITLE: Sub Acoustic Warfare Development

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

PROCUREMENT	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE CONT.	TOTAL PROGRAM CONT.
OPN-BA-2 Line item 69	13,132	21,856	27,384		

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: N/A

J. (U) MILESTONE SCHEDULE:

	ADV DEV SYSTEM	MILESTONE II	FSED CONTRACT	OPEVAL	MILESTONE III (AFP)
CSA MK 2	N/A	N/A	N/A	1Q/88	1Q/89
ADC MK 3	N/A	N/A	N/A	1Q/88	IQ/89
ADC MK 4	N/A	3Q/88	4Q/88	FY/92	FY/92
NSIS	FY/91	FY/94	FY/94	FY/97	FY/97
NLQ-1	N/A	FY/91	FY/92	FY/96	FY/97
NMD	N/A	FY/92	FY/93	FY/96	FY/97
CMC_2	N/A	FY/93	FY/94	FY/96	FY/97

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101228N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT I
PROJECT NUMBER: S0004 PROJECT TITLE: TRIDENT Submarine System Improvements

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0004	TRIDENT I	29,484	32,535	37,400	CONT.	CONT.

B. (U) DESCRIPTION: The TRIDENT operational system development program conducts improvement and system integration to maintain the OHIO Class submarine capability against the Soviet threat throughout the life cycle of this key element of the strategic deterrent of TRIAD. The Ohio Class submarine is a long term U.S. Navy program for the modernization and orderly replacement of earlier deployed submarine ballistic missile systems (POLARIS and POSEIDON). This program is required to maintain an effective strategic deterrent against nuclear attack on the U.S. or its allies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued development of the following TRIDENT CIP items: Type 8J Periscope EHF, LF/HF Scanner, RAM (Type 15L Periscope).

b. (U) Initiated development of the following CIP items:

(1) (U) TRIDENT Compact Very Low Frequency (CVLF) Receivers.

(2) (U) Submarine Acoustic Warfare System 6" Countermeasure.

(3) (U) Sonar Tactical Recording Improvements.

(4) (U) UHF Satcom Buoy.

c. (U) Continued TRIDENT CCS E&I efforts.

d. (U) Continued development site support associated with CIP item efforts.

e. (U) Continued Ship Control OPEVAL efforts.

f. (U) Continued development and integration of CCS MK2 and AN/BQQ-5E into TRIDENT CCS.

2. (U) FY 1990 Program:

a. (U) Continue development of the following TRIDENT CIP items: RAM (Type 15L Periscope), CVLF Receivers, EHF (Type 8J Periscope), SAWS 6" Countermeasure, Sonar Tactical Recording Improvements.

b. (U) Continue TRIDENT CCS E&I efforts.

c. (U) Continue development site support associated with CIP item efforts.

d. (U) Continue Ship Control OPEVAL efforts.

e. (U) Continue development and integration of CCS MK2 and AN/BQQ-5E into TRIDENT CCS.

3. (U) FY 1991 Plans:

a. (U) Initiate development of the following CIP items: EHF (Integrated Radio Room).

PROGRAM ELEMENT: 0101228N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT I
PROJECT NUMBER: S0004 PROJECT TITLE: TRIDENT Submarine System Improvements

b. (U) Complete development of the following CIP items: EHF (Type 8J Periscope), SAWS 6" Countermeasure.
c. (U) Continue development of the following CIP items: CVLF Receivers, RAM (Type 15L Periscope), Sonar Tactical Recording Improvements.
d. (U) Continue TRIDENT CCS E&I efforts.
e. (U) Continue development site support associated with CIP item efforts.
f. (U) Continue Ship Control OPEVAL efforts.
g. (U) Continue development and integration of CCS MK 2 and AN/BQQ-5E into TRIDENT CCS.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: Space and Naval Warfare Systems Command, Washington, DC; Naval Sea Systems Command, Washington, DC; David W. Taylor Research Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI, and New London, CT; Naval Undersea Warfare Engineering Station, Keyport, WA; TRIDENT Command and Control System Maintenance Activity, Newport, RI; Naval Ship System Engineering Station, Philadelphia, PA; Naval Coastal Systems Center, Panama City, FL; and Naval Weapons Systems Center, Crane, IN. Contractors: Electric Boat Division of General Dynamics Corp., Groton, CT; John Hopkins University, Applied Physics Laboratory, Laurel, MD; UNISYS Corp., St. Paul, MN; SPEARS Associates, Philadelphia, PA; General Electric, Camden, NJ; International Business Machines, Manassas, VA and Raytheon, Newport, RI.

E. (U) COMPARISON WITH REVISED FY1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical: None.
2. (U) Schedule: None.
3. (U) Cost: None.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Fleet Ballistic Missile System, PE 0101221N; TRIDENT II, Program Element 0604363N; SSBN Security, PE 0101224N; Extremely Low Frequency Communications, PE 0101401N; Navy Strategic Communications, PE 0101402N; Combat Control System Program, PE 0604562N; Submarine Sonar Program, PE 0604503N.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN Strat Plat Supt Equip (24)	38,400	59,300	58,395	CONT.	CONT.

PROGRAM ELEMENT: 0101228N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT I
PROJECT NUMBER: S0004 PROJECT TITLE: TRIDENT Submarine System Improvements

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

(CONTINUED)	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN Strat Plat Supt Equip (101 & 106)	58,900	88,700	147,900	CONT.	CONT.
OPN Strat Plat Supt Equip (227)	336,700	22,400	20,400	CONT.	CONT.

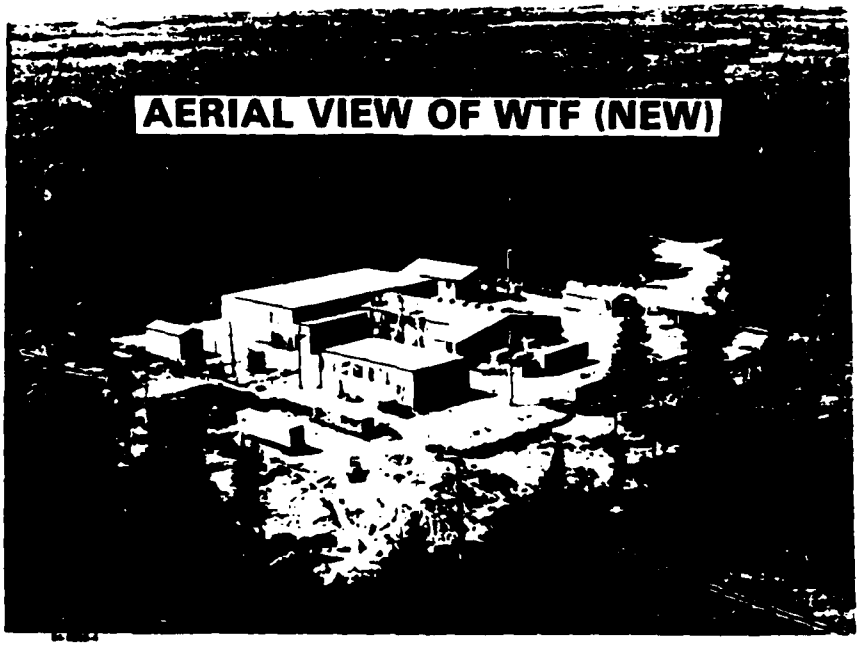
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	Milestone	Date
1.	(U) Complete CCS Rev 5.0 Integration at LBEF	3Q/FY89
2.	(U) Complete CCS Rev 5.0 Certification at LBEF	4Q/FY89
3.	(U) Commence CCS Rev 4.3 and AN/UYK-43 Installation	2Q/FY88
4.	(U) Commence CCS Rev 5.0 Installation	1Q/FY90
5.	(U) Commence CCS Rev 5.1 Integration at LBEF	1Q/FY90
6.	(U) Commence CCS Rev 5.1 Certification at LBEF	4Q/FY90
7.	(U) Commence CCS Rev 5.2 Integration at LBEF	4Q/FY90
8.	(U) Commence CCS Rev 5.2 Certification at LBEF	4Q/FY91

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101401N BUDGET ACTIVITY: 3-Strategic
PROGRAM ELEMENT TITLE: ELF Communications System
PROJECT NUMBER: X0792 PROJECT TITLE: ELF



A. (U) SCHEDULE/BUDGET INFORMATION:

	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES			FOC 2Q91	
ENGINEERING MILESTONES	STE 3Q89			
T&E MILESTONES				
CONTRACT MILESTONES				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	978	0	0	125,127
SUPPORT CONTRACT	1,005	0	0	65,252
IN-HOUSE SUPPORT	992	100	103	Continuing
OTHER/ GFE	0	0	0	2,800
TOTAL	2,975	100	103	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101401N BUDGET ACTIVITY: 3-Strategic
PROGRAM ELEMENT TITLE: ELF Communications System
PROJECT NUMBER: X0792 PROJECT TITLE: ELF

B. (U) DESCRIPTION: The Extremely Low Frequency Communications /(ELF) system will provide a unique capability that will fulfill an important and immediate submarine command and control requirement by freeing the submarine from vulnerabilities and limitations of near the surface operations. Because current communications systems are unable to penetrate the ocean more that a few tens of feet, a submerged submarine must have a receiving antenna at or near the surface of the water. The ELF communications system will provide a capability to maintain continuous broadcast connectivity while submarines maneuver or transit at speeds and depths incompatible with Very Low Frequency reception capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. Completed MTF antenna grounds safety testing.
   b. Completed MTF System Test and Evaluation (STE).
   c. Performed Wisconsin Transmitter Facility (WTF)/MTF synchronous testing.
2. (U) FY 1990 Program: Continue T&E.
3. (U) FY 1991 Plans:
   a. Full Operational Capability (FOC) 2Q91.
   b. Collect and analyze mission data and optimize antenna patterns.
4. (U) Program to Completion:
   a. Analyze potential jamming threat scenarios; assess performance gain from new signal processing algorithms.
   b. Assess new technology applications to ELF.

D. (U) WORK PERFORMED BY: IN-HOUSE: NUSC, New London, CT. CONTRACTORS: General Telephone and Electronic Corporation, Needham Heights, MA, (prime contractor); IIT Research Institute, Chicago, IL.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technical changes: N/A
2. (U) Schedule changes: N/A
3. (U) Cost changes: N/A

F. (U) PROGRAM DOCUMENTATION:

CNO Requirement Letter	12/81
NDCP (MSII)	10/82
NDCP (MSIII)	6/87
NPDM (MSIII)	6/87
ILSP	6/87
TEMP	6/87

G. (U) RELATED ACTIVITIES: ELF communications capability will be installed in: TRIDENT Submarines - PE 0101228N; Fleet Ballistic Missile Submarines - PE 0101221N; Attack Submarines - PE 0204281N.

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1989 ESTIMATE	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN 102 TRIDENT	Not applicable.				
SCN 1&2 TRIDENT					
SCN 4&5 SSN 688					
SCN 6&7 SSN 21					

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Navy Strategic Communications

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0793	TACAMO	24,391	14,451	10,335	24,102	95,617
W1438	E-6A	3,172	0	0	0	360,791
X1083	Shore-to-Ship Communications	23,788	16,565	6,781	CONT.	CONT.
TOTAL		51,351	31,016	17,116	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This project develops communications systems which provide positive command and control of deployed ballistic missile submarines (SSBNs). Presently in this program are efforts which provide enhancements to current shore-to-ship transmitting and receiving systems and the TACAMO airborne communications relay aircraft. The Block I Upgrade (High Power Transmitter System) project provides for integration of systems into the TACAMO/E-6A. This integration is required to insure communications compatibility with the World Wide Airborne Command Post (WWABNCP) aircraft and other USAF components that link TACAMO/E-6A with strategic communications platforms and systems. It also develops a VLF/LF high power transmitter system, dual trailing wire antenna system, and provides an improved antenna coupler system. Block II includes integration of MILSTAR and GPS into the E-6A aircraft. Additional reliability and maintainability enhancements to the communications system are also included. The Enhanced Verdin System (EVS) provides a two phase replacement for the obsolescent Verdin processor and modulator/demodulator system: Phase I, Enhanced Verdin processor (EVP), provides a form, fit, and function replacement processor that will host phase II (EVS), improvements. Phase II provides for modulator/demodulator modifications and communications performance improvements. The Compact VLF (CVLF) system will replace the VLF/LF receiver/demodulator and transmitter/modulator (with the exception of the high power elements) and the Verdin and EVS Processors.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: W0793 PROJECT TITLE: TACAMO

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0793	TACAMO	24,391	14,451	10,335	24,102	95,617

B. (U) DESCRIPTION:

1. (U) HPTS - The VLF/LF High Power Transmitter System (HPTS) and Dual Trailing Wire Antenna (DTWA) Systems for the E-6A TACAMO and the Air Force Airborne Command Post (E-135) are required to communicate with the strategic missile and submarine forces. The transmitter equipment (200KW) provides the E-6A TACAMO aircraft with a state-of-the-art system replacing tube-type equipment that is logistically unsupportable. The replacement DTWA will provide the E-6A TACAMO both short and long wire capability as well as provision for a utility wire deployment.

2. (U) BLOCK II - Additional upgrade of the E-6A TACAMO systems are required to ensure communications compatibility with World Wide Airborne Command Post (WWABNCP) aircraft, the USAF components that link TACAMO with other strategic communications platforms and systems. EHF MILSTAR, MILSTAR Processor, Time/Frequency Switching Distribution System (T/FSDS), and GPS upgrades will be installed aboard the E-6A TACAMO as a Block II Upgrade Program. The installation of these systems will provide a significant increase in reliability and maintainability, enhance system communications capability, and provide increased supportability. Production of both HPTS and Block II are scheduled for concurrent installation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Delivered HPTS EDM's 1-6 for contractor demo and test.
   b. (U) Contractor Installation/Test of HPTS on E-6A TACAMO aircraft.
   c. (U) Submitted program change acquisition document to combine BLOCK II programs.
   d. (U) Developed draft RFP for Block II.
   e. (U) Developed draft acquisition plan for Block II
   f. (U) Awarded contract to Smith Industries to modify FMCS computer for GPS inputs.
   g. (U) Developed Block II integration plan at NADC.
   h. (U) Awarded T/FSDS development effort to NAC.
   i. (U) Awarded MILSTAR processor software effort to NOSC.
   j. (U) Continued HPTS Logistics Support Analysis.
   k. (U) Prepared Support Equipment Requirements Data (SERDS) for Support equipment
   l. (U) Prepared software support agency plan and distribute
   m. (U) Built HPTS EDM's
   n. (U) Developed HPTS test plans
   o. (U) Started lab tests of HPTS EDM's

PROGRAM ELEMENT: 0101402N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: W0793 PROJECT TITLE: TACAMO

2. (U) FY 1990 Program:
   a. (U) Complete test and acceptance of HPTS Peculiar Support Equipment and training equipment.
   b. (U) Lab Support for MILSTAR EDM's.
   c. (U) Release RFP for Block II full scale development effort.
   d. (U) Award FSD contract for Block II.
   e. (U) Complete integration support efforts for Block II contract.
   f. (U) Complete HPTS Logistics Support Analysis.
   g. (U) Develop HPTS test procedures.
   h. (U) Evaluate Software Support Agency inputs and decide on Software Support Agency.
   i. (U) Installation design completed.
   j. (U) Complete HPTS lab test of EDM's.
   k. (U) Install HPTS on E-6A
   l. (U) Ground and flight tests of HPTS on E-6A.
   m. (U) Perform HPTS Configuration Audits.
3. (U) FY 1991 Plans:
   a. (U) Complete HPTS residual tasks/documentation from OPEVAL.
   b. (U) Accomplish TECHEVAL of HPTS.
   c. (U) Prepare for and start tailored OPEVAL for HPTS.
   d. (U) Install Block II equipment.
   e. (U) Conduct OPEVAL/TECHEVAL of Block II.
4. (U) Program to Completion: Award Contract for Block II installation and integration production concurrent with HPTS production effort.

D. (U) WORKED PERFORMED BY: IN-HOUSE: NADC Warminster, PA; NATC Patuxent, River, MD; NAC Indianapolis, IN; NOSC San Diego, CA; NAEC Lakehurst, NJ. CONTRACTORS: Rockwell for HPTS; Boeing; Smith's Industries; Block II contract award winners.

E. (U) COMPARISON WITH REVISED FY-1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: The reduction of -2,293 will delay CVLF receiver and TACAMO message processing system.

F. (U) PROGRAM DOCUMENTATION:
1. (U) HPTS

a. (U) NAVY/AF MOA	JUN 86
b. (U) ACQ PLAN	AUG 86
c. (U) NAVY PMP	APR 87
d. (U) FSD CONTRACT	APR 87

PROGRAM ELEMENT: 0101402N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: W0793 PROJECT TITLE: TACAMO

2. (U) BLOCK II

a. (U) PMP	JUN 89
b. (U) DRAFT ACQ PLAN	JUL 89
c. (U) INSTALLATION CONTRACT	AUG 90

G. (U) RELATED ACTIVITIES: PE 0303131F (Air Force) Minimum Essential Emergency Communications Network.

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program

APN-5 - Procurement starts in FY 1992.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE:

1. (U) HPTS

a. (U) Contract Award	30 APR 1987
b. (U) Critical Design Review (CDR)	30 MAY - 2 JUN 1988
c. (U) E-6A Flight Test	NOV 1989-JAN 1991
d. (U) Navy TECHEVAL	FEB-APR 91
e. (U) Navy OPEVAL	MAY-JUL 91 1991
f. (U) Complete FSD	JUL 1991
g. (U) Navy Production Option	AUG 1991

2. (U) BLOCK II:

a. (U) Block Equipment Development	FY-89 - FY-91
b. (U) RFP Preparation (FSD)	FY-89 - FY-90
c. (U) Contract Award (FSD)	FY-90
d. (U) Start Prototype Installation	FY-91
e. (U) TECHEVAL/OPEVAL	FY-91
f. (U) AFP	FY-92
g. (U) Production Installation	FY-93

FY-93(1), FY-94(3), FY-95(3), FY-96(4), FY-97(4), FY-98(1)Retrofit

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: X1083 PROJECT TITLE: Shore-to-Ship Comms

A. (U) RESOURCES: (DOLLARS IN THOUSANDS)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1083	Shore to Ship Communications	23,788	16,565	6,781	CONT.	CONT.

B. (U) DESCRIPTION: BRIEF DESCRIPTION OF ELEMENT: This project develops communications systems which provide positive command and control of deployed ballistic missile submarines (SSBNs). Presently in this program are efforts such as propagation model parameter validation and high power component improvements which provide enhancements to current shore-to-ship transmitting systems and development of the Compact VLF receiver system.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Continued VLF propogation model development and parameter validation.
b. (U) Continued high power component development.
c. (U) Conducted CVLF operational assessment.
d. (U) Continued Strategic Communications Assessment Program and VLF system improvements.
2. (U) FY 1990 Program:
a. (U) Continue VLF propogation model development and parameter validation.
b. (U) Continue high power component development.
c. (U) Commence CVLF development contract for receiver enhancements.
d. (U) Continue SCAP and FVLF system improvements.
e. (U) Obtain authority for CVLF low rate initial production.
3. (U) FY 1991 Plans:
a. (U) Continue VLF propogation model development and parameter validation.
b. (U) Continue high power component development.
c. (U) Continue CVLF enhancement developments.
d. (U) Continue SCAP and FVLF system improvements.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC San Diego, CA; NRL Washington, DC; Commander, Naval Sea Systems Command Washington, DC; Naval Electronics System Engineering Center Vallejo, CA; and Naval Civil Engineering Laboratory, Port Hueneme, CA. CONTRACTORS: MITRE Corp., McLean, VA; International Business Machines, Manassas, VA.

PROGRAM ELEMENT: 0101402N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: X1083 PROJECT TITLE: Shore-to-Ship Comms

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: (CVLF) Acquisition Plan (7/89), OR (6/86), ILSP-Update (3/90), TEMP-Rev 1 (6/89).

G. (U) RELATED ACTIVITIES: PEs 0101221N, 0101228N, and 0303131N.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN #135, 136, 139	7,111	8,306	14,700	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONES SCHEDULE: (CVLF)

1.	(U) DT IIC/OT IIA (TECHNICAL)	JUN 89
2.	(U) MS III - AFP	JAN 90
3.	(U) PRODUCTION CONTRACT AWARD	NOV 90

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0102427N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Naval Space Surveillance System
PROJECT NUMBER: X0125 PROJECT TITLE: NAVSPASUR

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0125	NAVSPASUR	688	755	866	Cont.	Cont.

B. (U) DESCRIPTION : The Naval Space Surveillance System (NAVSPASUR) is a one-of-a-kind, ground based radar system comprised of nine large antenna sites on a great circle ranging from Glenville, GA to San Diego, CA. The system provides continuous detection of space objects orbiting over the continental United States and does not require prior knowledge of launch, maneuver, or breakup. A catalog of space objects is maintained at the Systems Computational Center in Dahlgren, VA where ocean area as well as unit-specific reconnaissance vulnerability reports are compiled and transmitted to fleet units. NAVSPACECOM is responsible to the U.S. Space Command, Colorado Springs, CO for those space object data collection functions performed as part of the National Space Detection and Tracking System, the United States Space Command Alternate Space Surveillance Center, and the Alternate Space Defense Operations Center. This project performs engineering studies to define options for meeting surveillance requirements in the year 2000 and beyond and provides for research and development of improved receivers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Started physical, functional and operational audit of system, subcomponents and interfaces related to digital receiver hardware.
2. (U) FY 1990 PROGRAM:
   a. (U) Complete audit of digital receiver hardware.
   b. (U) Write system specification reflecting audit results.
   c. (U) Start reliability assessment and recommend changes and/or replacements required to improve system operational availability.
3. (U) FY 1991 PLANS:
   a. (U) Start development of receiver hardware for a modernized surveillance system.
   b. (U) Complete reliability assessment and develop changes and/or replacement hardware.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Test and introduce improvements to receiver hardware.
   b. (U) Test and introduce reliability replacement hardware.

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(APPN/P-1)#116	10,324	83	2,493	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204134N Budget Activity: 4
Program Element Title: A-6 Squadrons
Project Number: W1638 Project Title: A-6E Weapons Integration

POPULAR NAME: INTRUDER

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars In Thousands)*

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		E250 DT	E250 OT	
Engineering Milestones	E250 CDR	E250 VRR	E260 SCRB	
T&E Milestones		E250 TECHEVAL	E250 OPEVAL	
Contract Milestones				
BUDGET ($K)	**FY 1989**	**FY 1990**	**FY 1991**	**Program To Complete**
Major Contract				
Support Contract				
In-House Support	2,480	8,553	7,257	Continuing
GFE/ Other (Trainers)		17,939	14,200	Continuing
Total	2,480	26,492	21,457	Continuing

Program Element: 00204134N Budget Activity: 4 Program
Element Title: A-6 Squadrons
Project Number: W1638 Project Title: A-6E WEAPONS INTEGRATION

B. (U) DESCRIPTION: This Program Element funds the continuing development and/or integration of the A-6 avionics, weapon systems and air vehicle to accomodate these system changes. Enhances A-6 all-weather reliability/maintainability, capability and survivability. System Weapons Integration Program (SWIP) provides for integration of a variety of standoff weapons (HARM, HARPOON IC, IR Maverick, Laser Maverick, SLAM, WALLEYE and AIWS) along with the advanced data link pod (AWW-13). Lessons learned during the REAL NIGHT ANALOG Night Attack Navigation system development will also be examined for possible retrofit. Additional Block I, II and III systems will also be evaluated for incorporation and operability. In addition, the completion of development of the A-6 Weapon System Trainer (WST) is funded under this PE. Schedule milestones are for operational flight computer programs 250/260.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed FAC-TDC OPEVAL.
   b. (U) Commenced weapon delivery accuracy (WDA) Improvement program.
   c. (U) Continued integration of AWW-13 and the SLAM missile.
   d. (U) Completed IR Maverick OPEVAL.

2. (U) FY 1990 Plans:
   a. (U) Continue TECHEVAL and OPEVAL of AWW-13 (E240) and SLAM integration (E250).
   b. (U) Commence extended range HARPOON Night Vision Compatible Cockpit, Integrated Defensive Avionics Program (IDAP) integration (E260).
   c. (U) Continue weapon delivery accuracy improvement program.
   d. (U) Complete HARM Block III integration.
   e. (U) Continue development of A-6 WST.
   f. (U) Complete development of E250 Operational Flight Program (OFP).
   g. (U) Evaluate Mission Computer compatibility with future OFP development.
   h. (U) WALLEYE/AIWS integration.

3. (U) FY 1991 Plans:
   a. (U) Complete OPEVAL on AWW-13 and SLAM integration, and WDA program development.
   b. (U) Continue development of HARM Block III, extended range HARPOON, INVS and IDAP integration.
   c. (U) Continue development of A-6 WST.
   d. (U) Commence development of E260 OFP.

4. (U) Program To Completion: This is a continuing program.

Program Element: 0204134N Budget Activity; 4
Program Element Title: A-6 Squadrons
Project Number: W1638 Project Title: A-6E Weapons Integration

D. (U) WORK PERFORMED BY: IN-HOUSE: NATC, Patuxent River, MD; NWC, China Lake, CA; PMTC, Point Mugu, CA; CONTRACTORS: Grumman Aerospace Corporation, Long Island, NY; Boeing Military Airplane, Wichita, KS; McDonnell Douglas, St. Louis, MO.

E. (U) COMPARISON WITH AMENDED FY 1990/1991 PRESIDENT'S BUDGET

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable

2. (U) SCHEDULE CHANGES: Not Applicable

3. (U) COST CHANGES: Not Applicable

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: P.E. 0205601N, HARM Improvement; P.E. 0603306N SLAM.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY1991 Congressional Data Sheet.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204136N
Program Element Title: F/A-18 IMPROVEMENT
Budget Activity: 4

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1662	F/A-18 Improvements	10,080	14,500	14,495	Cont.	Cont.
W2065	Radar Upgrade	0	21,457	64,720	Cont.	Cont.
	TOTAL	10,080	35,957	79,215	Cont.	Cont.

B. (u) DESCRIPTION: The F/A-18 is capable of using selected external equipment to perform either fighter or attack missions. The capabilities of the F/A-18 weapon system can be upgraded to accommodate and incorporate new or enhanced weapons as well as advances in technology to respond effectively to emerging future threats. Continued development capability is required to successfully integrate the F/A-18 weapon system into the Fleet. Additionally, continued improvements in reliability and maintainability are necessary to ensure maximum benefit is achieved through reduced cost of ownership and to provide enhanced availability. The F/A-18 Naval Strike Fighter program transitioned from full-scale engineering development to operational systems development during FY 1983. As F/A-18 squadrons report discrepancies and requirements, a continuing capability is needed to perform post-FSD technical evaluations, investigative flight testing, software support, and incorporate pre-planned product improvements (i.e., capability enhancements). The F/A-18 radar, AN/APG-65,

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204136N Budget Activity: 4
Program Element Title: F/A-18 IMPROVEMENT
Project Number: W1662 Project Title: F/A-18 HORNET

POPULAR NAME: HORNET

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	Program Milestones for this project are complete			
Engineering Milestones				
T&E Milestones				
Contract Milestones				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	5,211	5,706	4,580	Continuing
Support Contract				
In-House Support	4,869	8,794	9,915	Continuing
GFE/ Other				
Total	10,080	14,500	14,495	Continuing Continuing

Program Element: 0204136N Budget Activity: 4
Program Element Title: F/A-18 IMPROVEMENT
Project Number: W1662 Project Title: F/A-18 HORNET

B. (U) DESCRIPTION: The F/A-18 is a multimission strike fighter aircraft that is used in fighter and attack roles through selected use of external equipment (such as external fuel tanks, targeting and navigation FLIR, and LTD/SCAM). The capabilities of the F/A-18 weapon system are being upgraded to accommodate and incorporate new or enhanced weapons including the AMRAAM, I2R Maverick, Harpoon, and SLAM as well as other advances in technology such as night attack, reconnaissance, and radar upgrade to respond effectively to emerging future threats. Continued development capability in terms of software and hardware improvements is required to successfully optimize new F/A-18 weapon system capabilities in the fleet. Continued improvements in reliability and maintainability for the airframe, avionics, and engines are necessary to ensure maximum benefit is achieved through reduced cost of ownership and enhanced availability. As F/A-18 squadrons report discrepancies and requirements, a continuing capability is needed to perform post-FSD technical evaluation, investigative flight testing, software support, and incorporate capability enhancements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Conducted technical and operational evaluations of Night Attack configured F/A-18.

b. (U) Conducted integration tests for the ASPJ.

c. (U) Conducted evaluations of the following integrations: I2R MAVERICK, HARM BLOCK III, AWW-13 Advanced Data Link.

d. (U) Analyzed data from Navy flight testing and operational flights and initiate appropriate software modification/development.

e. (U) Contractor conducted investigation of aeronautical design modifications/changes to the F/A-18 fuselage, and any structural deficiencies identified during deployments of the F/A-18 aircraft.

f. (U) Engineering and technical support for AAS-38 tracker and F/A-18 C/D WSSA.

g. (U) Provided support to ATARS program for preliminary testing of RECCE/ATARS common nose and associated air data computer (ADC) algorithms.

h. (U) Initiated integration of full HARPOON and SLAM capability.

i. (U) Continued contractor effort for integration of AMRAAM.

j. (U) Contributed toward system development of ALE-47 CMDS.

2. (U) FY 1990 Program:

a. (U) Contractor investigation of aeronautical design modifications/changes to the F/A-18 fuselage, and any structural deficiencies identified during deployments of the F/A-18 aircraft.

b. (U) Continue technical and operational evaluations of Night Attack configured F/A-18.

c. (U) Continue integration tests for AMRAAM and ASPJ.

d. (U) Continue flight testing at Naval Air Test Center, Patuxent River, MD, and Naval Weapons Center, China Lake, CA centered around fleet reported problems and recommended improvements.

e. (U) Initiate system development of GPS.

f. (U) Provide support to ATARS program for testing of flight control computer software.

g. (U) Investigate pre-planned product improvement (P3I) design efforts to integrate an all weather reconnaissance capability into the upgraded APG-65 radar.

h. (U) Contribute toward a shared development program for an AYK-14 upgrade.

3. (U) FY 1991 Plans:

a. (U) Contractor investigation of aeronautical design modifications/changes to the F/A-18 fuselage and any structural deficiencies identified during deployment of the F/A-18 aircraft.

b. (U) Continue hardware and software integration tests for RECCE.

c. (U) Continue flight testing at Naval Weapons Center, China Lake, CA centered around fleet reported problems and recommended improvement.

d. (U) Continue system development and integration testing of GPS.

e. (U) Continue preliminary software development program required to integrate an all weather reconnaissance capability into the upgraded APG-65 radar.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Engineering Center, Lakehurst, NJ; Naval Air Propulsion Center, Trenton, NJ; Naval Ordnance Station, Indian Head, MD.; Naval Weapons Center, China Lake, CA; Naval Weapons Engineering Support Activity, Washington, D.C.; Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD; Naval Research Laboratory, Washington, D.C. CONTRACTORS: McDonnell Aircraft Company, St. Louis, MO (airframe and weapon system integration); General Electric Company, Lynn, MA (F-404 Engine); Hughes Aircraft Company, Culver City, CA (radar subcontractor to McDonnell); Northrop Aircraft Division, Hawthorn, CA (center/aft fuselage subcontractor to McDonnell); Pratt Whitney, East Hartford, CT. (F-404 engine); Control Data Corporation, Minneapolis, MN (ATARS).

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

F/A-18 DCP	9/86
F/A-18 C/D TEMP	9/87

Program Element: 0204136N Budget Activity: 4
Program Element Title: F/A-18 IMPROVEMENT
Project Number: W1662 Project Title: F/A-18 HORNET

G. (U) RELATED ACTIVITIES: P.E. 0604214N AV-8B; P.E. 0604314N AMRAAM; P.E. 0604226N ASPJ.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204136N Budget Activity: 4
Program Element Title: F/A-18 IMPROVEMENT
Project Number: W2065 Project Title: F/A-18 RADAR UPGRADE

POPULAR NAME: RADAR UPGRADE (RUG)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY1991	To Complete
Program Milestones	II 06/89		IIIA 5/91	IIIB 1/93 IIIC 3/94
Engineering Milestones		PDR 05/90	CDR 11/91	
T&E Milestones	TEMP 04/89		BNCH TST 06/91	DT-II 12/92 OT-II 08/93
Contract Milestones	PR AP J&A AUDIT	FSED CONTRACT 02/90		

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract		19,962	60,376	244,521 153,784
Support Contract				
In-House Support		1,495	4,344	6,300
GFE/ Other				
Total	0	21,457	64,720	244,521 160.084

Program Element: 0204136N Budget Activity: 4
Program Element Title: F/A-18 IMPROVEMENT
Project Number: W2065 Project Title: F/A-18 RADAR UPGRADE

B. (U) DESCRIPTION: The F/A-18 radar, AN/APG-65

The proposed AN/APG-65 radar upgrade follows and capitalizes on AN/APG-70 and AN/APG-71 developmental programs and maximizes SRA commonality. This results in an effective developmental program providing for minimum risk and affordable improvement to the F/A-18 to counter the current and projected enemy threats.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not applicable.

2. (U) FY 1990 Program:
   a. (U) Initiate radar hardware design/development.
   b. (U) Initiate design/development of Special Test Equipment (STE).
   c. (U) Define software requirements.
   d. (U) Initiate software design.
   e. (U) Initiate design of MCAIR/China Lake radar benches.

3. (U) FY 1991 Plans:
   a. (U) Complete installation of MCAIR/China Lake benches.
   b. (U) Perform bench integration with MC's display.
   c. (U) Place orders for flight instrumentation recorders.
   d. (U) Complete hardware design/development.
   e. (U) Fabricate and assemble EDM radars.
   f. (U) Complete software design/coding.
   g. (U) Roofhouse integration of radar hardware and software.
   h. (U) Conduct Milestone IIIA for approval of Low Rate Initial Production.

4. (U) Program to Completion:
   a. (U) Perform environmental qualification testing.
   b. (U) Aircraft layup and modification.
   c. (U) Perform initial bit assessment.
   d. (U) Perform reliability development testing.
   e. (U) Initiate submittal of preliminary software data items.
   f. (U) Conduct flight testing development of upgraded radar.
   g. (U) Completion of flight development.
   h. (U) Submittal of final software documentation.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Engineering, Lakehurst, NJ; Naval Weapons Center, China Lake, CA; Naval Weapons Engineering Support Activity, Washington, D.C.; Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD; Naval Research Laboratory, Washington, DC. CONTRACTORS: McDonnell Aircraft Company, St. Louis, MO (airframe and weapon system integration); Hughes Aircraft Company, Culver City, CA (Radar subcontractor to McDonnell).

Program Element: 0204136N Budget Activity: 4
Program Element Title: F/A-18 IMPROVEMENT
Project Number: W2065 Project Title: F/A-18 RADAR UPGRADE

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:
OR #199-05-88 promulgated - 27 Jan 88.

G. (U) RELATED ACTIVITIES: P.E. 0205667N F-14D radar development is directly related to the APG-65 upgrade with a hardware (SRA) commonality of 60%.

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Negotiations are underway with Canada to define a cooperative development program. Canada currently owns and operates the F/A-18 and has signed a Statement of Intent (SOI) to actively work to define a cooperative development program. Finalization of a Memorandum of Understanding (MOU) is planned for FY 1990.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204152N Budget Activity: 4
Program Element Title: EARLY WARNING AIRCRAFT SQUADRONS
Project Number: W0463 Project Title: CV BASED AEW A/C - E2C

POPULAR NAME: HAWKEYE

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	UDP II (ALP) 3/89	UDP I AFP UDP II ALP	UDP II ALP	UDP II ALP/92 UDP II AFP/93
Engineering Milestones				
T&E Milestones	UDP I TECH UDP II DT/ OT-IIB 1/89	UDP I OPEV UDP II DT IIC	UDP II TECH UDP II DTIIE UDP II OT IID	UDP II OPEV
Contract Milestones				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	10,800	25,000	13,700	62,932 0
Support Contract				
In-House Support	11,762	12,818	23,750	66,200 8,573
GFE/ Other				
Total	22,562	37,818	37,450	129,132 8,573

Program Element: 0204152N Budget Activity: 4
Program Element Title: EARLY WARNING AIRCRAFT SQUADRONS
Project Number: W0463 Project Title: CV BASED AEW A/C - E2C

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

OR 31-20	12/66
DCP (Rev 1)	6/71
NDCP W-0463-AA	4/88
TEMP 760 (Rev 3)	4/89

G. (U) RELATED ACTIVITIES: P.E. 0602232N, Command and Control Technology and P.E. 0602111N, AAW/ASUW Technology, for radar system improvements and P.E. 0603220N, ATS.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) APPN/P-1 APN #22, 23, 53	Not applicable			Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

Program Element: 0204152N Budget Activity: 4
Program Element Title: EARLY WARNING AIRCRAFT SQUADRONS
Project Nunber: W0463 Project Title: CV BASED AEW A/C - E2C

B. (U) DESCRIPTION: The E-2C is an all-weather, carrier-based airborne early warning aircraft, with a crew of five. This weapon system extends the task force defense perimeter by providing early warning of approaching enemy units (surface and air), vectoring of interceptors into attack position, and providing air and surface situation data to other fleet elements. This program provides preplanned product improvements for the evolution of E-2C aircraft capability in support of naval warfare command and control requirements. It funds development for the modification/replacement of selected weapon replaceable assemblies of current installed E-2C subsystems. These expanded capabilities will permit offensive weapons systems to be more effective in countering the tactical threat thus enhancing the Navy's warfighting capability. Included are two sub-projects: Update Development Program (UDP) Group I and II. Group I modifications to the APS-138 radar will result in redesignation as APS-139. Improvements include improved surface detection in high sea state/clutter, improved counter-measures, and automatic channel monitor/selection capability. Modifications to the tactical program include increased active track capacity, display prioritization and new radar controls. Group II modifications to the APS-139, or combined Group I and II modifications to the APS-138, result in redesignation as APS-145. Improvements include extended range and the environmental processor.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted OT-IIB of Group II.
   b. (U) Completed DT-IIF/DT-IIIA (TECHEVAL/BIS) of Group I.
   c. (U) Continued flight testing and integration of Group II hardware.

2. (U) FY 1990 Program:
   a. (U) Conduct Navy flight evaluation of Group II, DT-IIC.
   b. (U) Operational Evaluation of Group I.

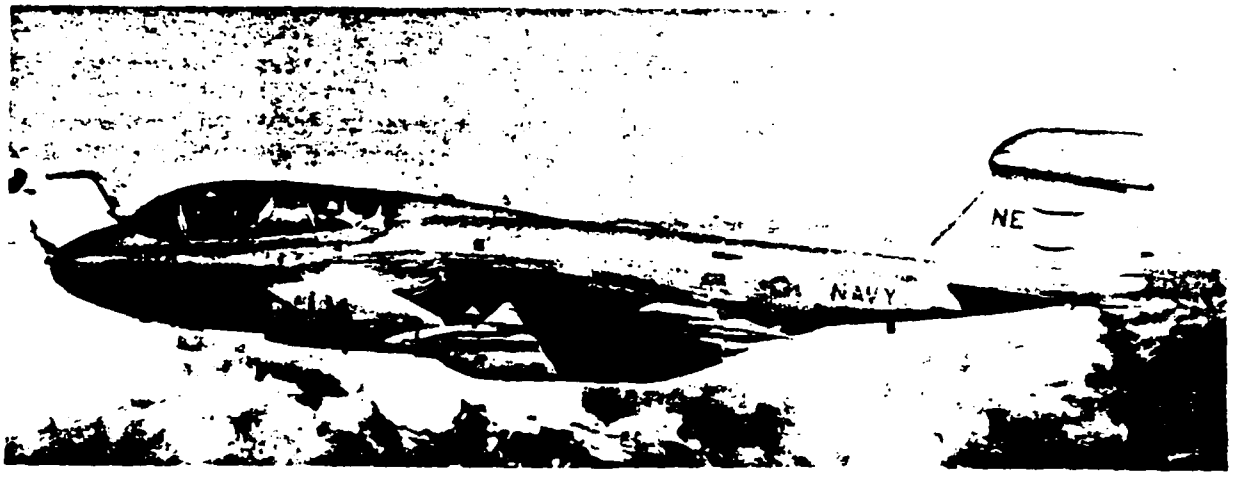
3. (U) FY 1991 Plans:
   a. (U) Conduct DT-IIE/DT-IIIA (TECHEVAL/BIS) of Group II.
   b. (U) Commence software ground and flight test evaluation, DT-IIF, for Group II.

4. (U) Program To Completion:
   a. (U) Operational Evaluation of Group II.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Test Center, Patuxent River, MD; Naval Research Laboratory, Washington, DC; Fleet Combat Direction Systems Support Activity, San Diego, CA; Naval Air Development Center, Warminster, PA. CONTRACTORS: Grumman Aerospace Corporation, Bethpage, NY; General Electric, Utica, NY.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204154N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SEA BASED EW SQUADRONS
PROJECT NUMBER: W2056 PROJECT TITLE: EA-6B IMPROVEMENT PROGRAM



POPULAR NAME: EA-6B IMPROVEMENT PROGRAM

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES		PRODUCTION RELEASE		COMPLETE
ENGINEERING MILESTONES				
T&E MILESTONES	PERFORMANCE VERIFICATION	PERFORMANCE TEST	FLIGHT TEST	COMPLETE
CONTRACT MILESTONES				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	0	9,266	1,703	10,969
SUPPORT CONTRACT	0	0	0	0
IN-HOUSE SUPPORT	0	434	0	434
GFE/OTHER	0	0	0	0
TOTAL	0	9,700	1,703	11,403

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204154N BUDGET ACTIVITY: 4
PROGAM ELEMENT TITLE: SEA BASED EW SQUADRONS
PROJECT NUMBER: W2056 PROJECT TITLE: EA-6B IMPROVEMENT PROGRAM

B. (U) DESCRIPTION: This program/project will develop enhancements necessary for the EA-6B for the EA-6B airframe, flight avionics and related onboard systems, and a J52 derivative jet engine. The derivative jet engine, a J52-P-409, will provide additional thrust required to match an increased aircraft weight associated with the advanced capability weapons system and addition of two outer wing weapon stations. The increased engine performance will: (1) ensure a single engine positive rate of climb for hot day conditions; (2) provide increased maneuverability and speed during low altitude, high mach number condition; and (3) provide improved fuel consumption. Avionics improvements planned under this project include upgrades or changes to Navigation and Instrumentation systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENT: N/A

2. (U) FY 1990 PLANS:

a. (U) Continue altitude performance tests by Pratt and Whitney and the Naval Propulsion Center. (Previously initiated and funded under PE 0604268, A/C Engine CIP.)

b. (U) Continue the accelerated simulated mission endurance test (ASMET) by Pratt and Whitney. (Previously initiated and funded under PE 0604268, A/C Enigine CIP.)

c. (U) Analyze test results and prepare test reports.

d. (U) Verify a conversion kit on two engines at Naval Aviation Depot, Jacksonville, Florida.

e. (U) Conversion of three J52-P-408A main fuel pumps, main fuel controls, and pressurizing and dump (P&D) valves to J52-P-409 main fuel pumps, main fuel controls, and P&D valves by Pratt and Whitney.

f. (U) Conduct sea level calibration on J52-P-409 engines for the flight test thrust drag correlation program by Pratt and Whitney.

g. (U) On site engine support and data analysis at Naval Aviation Depot, Jacksonville, Florida to produce test cell performance correlation curves by Pratt and Whitney.

h. (U) Engineering and logistic support for the J52-P-409 engines for the EA-6B Vehicle Enhancement Program (VEP) and Avionics Improvement Program (AIP) flight test programs by Pratt and Whitney.

i. (U) Procure, fabricate and deliver J52-P-409 hardware to support EA-6B Advance Capability (ADVCAP) flight test programs (VEP and AIP).

4. (U) FY 1991 PLANS:

a. (U) Conduct flight tests of the J52 P-409 engine in the EA-6B Advanced Capability (ADVCAP) aircraft at Grumman Corporation and the Naval Air Test Center.

b. (U) First production engine delivered.

5. (U) PROGRAM TO COMPLETION: NOT APPLICABLE

D. (U) WORK PERFORMED BY: IN HOUSE: Naval Aviation Depot, Jacksonville, FL; Pacific Missile Test Center, Point Mugu, CA.; Naval Air Test Center, Patuxent River, MD; Naval Research Laboratory, Washington, D.C.; Naval Air Propulsion Center, Trenton, NJ.; Naval Weapon Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; Naval Weapons Support Center, Crane, IN; COMOPTEVFOR, Norfolk, VA. CONTRACTORS: Grumman Aerospace Corporation, Bethpage, NY; Pratt and Whitney, West Palm Beach, FL; Applied Physics Laboratory, Laurel, MD and Sanders Associates, Nashua, NH.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION: PMP 3/88

G. (U) RELATED ACTIVITIES:

1. (U) This Project funds development of non-EW mission airframe related flight avionics. PE 0604270N, CONSOLIDATED EW/ PROJECT W0556, EW COUNTER RESPONSE funds continuing development of EW mission avionics systems for the Advance Capability (ADVCAP) EA-6B weapons systems.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

APPN/P-1	FY-1989 ACTUAL	FY-1990 ESTIMATE	FY-1991 ESTIMATE	TO COMPLETE
APN-1/#3,4	Procurement justification material does not			
APN-5/#32	contain this level of detail.			

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUTION: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fleet Telecommunications (Tactical)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0661	COMBINATION RADIO	7,086	4,973	3,199	Cont.	Cont.
X0725	COMMUNICATION AUTOMATION	1,539	893	717	Cont.	Cont.
X2083	SHIPBOARD SINCGARS/VHF RELAY PALLET	*	3,410	5,069	Cont.	Cont.
	TOTAL	8,625	9,276	8,985	Cont.	Cont.

* Funded from Project Number W0661 in FY 89

B. (U) DESCRIPTION: This Program Element develops anti-jam radios, antennas, VHF Relay Pallets, high speed broadcast data transmission systems and intra battle group networking. It also provides for integration of ECCM radios in Navy ships. Included additionally in this Program Element is the Communications Support System (CSS) which is an initiative to develop a comprehensive integrated communication support system for Naval Forces.

FY 1991 RDT&E, NAVY DESCRIPTION SUMMARY

PROGRAM ELEMENT: 0204163N BUDGET ACTIVITY:4
PROGRAM ELEMENT TITLE: Fleet Telecommunications (Tactical)
PROJECT NUMBER: W0661 PROJECT TITLE: Combination Radio

C. (U) DESCRIPTION: This project develops airborne tactical anti-jam radio systems providing DOD/NATO interoperability. The AN/ARC-210 Electronic Counter Counter-Measures (ECCM) Combination Radio provides small, secure, jam resistant UHF/VHF communications utilizing HAVE QUICK I/II and Single Channel Ground and Airborne Radio System (SINCGARS) waveforms.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Commenced AN/ARC-210 Design Approval Tests.
   b. (U) Continued AN/ARC-210 integration into F/A-18.
   c. (U) Started AN/ARC-210 reliability development test (RDT).
   d. (U) Continued shipboard SINCGARS Electromagnetic Interference (EMI) analysis.

2. (U) FY 1990 PROGRAM:
   a. (U) Complete AN/ARC-210 integration into F/A-18.
   b. (U) Conduct TECHEVAL for AN/ARC-210 ECCM Radio.
   c. (U) Complete AN/ARC-210 reliability development test (RDT).
   d. (U) Start AN/ARC-210 Helo integration.

3. (U) FY 1991 PLANS:
   a. (U) Complete AN/ARC-210 OPEVAL and interoperability tests.
   b. (U) Complete AN/ARC-210 Helo integration.
   c. (U) Complete Full Scale Engineering Development (FSED) and obtain Milestone III production decision for AN/ARC-210.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRDEVCEN, Warminster, PA; NAVAIRTESTCEN, Patuxent River, MD; NAVAVIONICCEN, Indianapolis, IN; NRL, Washington, DC. CONTRACTOR: Rockwell-Collins Corp., Cedar Rapids, IA; McDonnell Aircraft Co., St. Louis, MO; VITRO Corp., Silver Spring, MD; Chelton Electrostatics, London, UK.

F. (U) RELATED ACTIVITIES: Air Force HAVE QUICK/HAVE SYNC, Program Element 0207423F; Army SINCGARS, Program Element 0604805A.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1989	FY 1990	FY 1991	TO COMPLETE
APN #10	N/A	N/A	N/A	CONTINUING

H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fleet Telecommunications (Tactical)
PROJECT NUMBER: X0725 PROJECT TITLE: Communications Automation

C. (U) DESCRIPTION: This program consists of three sub-projects: Afloat Automated Network (AAN), Navy Standard Teleprinter (NST), and High Speed Fleet Broadcast (HSFB). The AAN will develop provisions for high data rate message transfer within the Navy Modular Automated Communications System (NAVMACS). It will be a phased development providing stand alone network for processing messages intra-battle group, with follow-on development to integrate the network onto NAVMACS. NST is an ongoing effort which establishes replacement equipment for 30 year old Navy teletypes. HSFB resolves long standing throughput and system flexibility shortcomings by replacing the existing Fleet Broadcast with a more efficient, volume responsive, broadcast.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) AAN: Continued software development.
   b. (U) NST: Completed development and transitioned to production.
   c. (U) HSFB:
      (1) Conducted shorebased simulation of HSFB.
      (2) Completed functional description of software requirements.
2. (U) FY 1990 PROGRAM:
   a. (U) AAN: Start software feasibility demonstration Phase I.
   b. (U) HSFB:
      (1) Award Full Scale Development (FSD) hardware contract.
      (2) Start Full Scale Engineering Development (FSED).
      (3) Start software modifications for Navy Communications Processing and Routing System (NAVCOMPARS).
      (4) Start software integration testing.
      (5) Procure three systems to start testing.
3. (U) FY 1991 PLANS:
   a. (U) AAN: Continue software feasibility demonstration Phase I.
   b. (U) HSFB:
      (1) Continue Full Scale Engineering Development (FSED).
      (2) Continue software modifications for NAVCOMPARS.
      (3) Continue software integration testing.
      (4) Procure eleven additional systems to continue testing toward OPEVAL.
4. (U) PROGRAM TO COMPLETION:
   a. (U) AAN and HSFB are continuing programs.

E. (U) WORK PERFORMED BY: IN-HOUSE: COMSPAWARSYSCOM, Washington DC; NRL, Washington DC; NESEC Portsmouth, VA. CONTRACTORS: UNISYS, St. Paul, MN; North Atlantic, Long Island, NY; SEMCOR, Arlington, VA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE
(U) PROCUREMENT OPN #132	64	8,675	11,967	CONT.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N BUDGET ACTIVITY:4
PROGRAM ELEMENT TITLE: Fleet Telecommunications (Tactical)
PROJECT NUMBER: X2083 PROJECT TITLE: SHIPBOARD SINCGARS/VHF RELAY PALLET

C. (U) DESCRIPTION: This project will meet interoperability requirements with the Marine Corps in amphibious operations by providing a VHF(FM) jam resistant radio, Digital Communications Terminals (DCT) and a VHF relay pallet aboard Naval Gun Fire Support and Amphibious ships. Shipboard SINCGARS will be a Non-Developmental Item (NDI) radio using an Army SINCGARS radio modified for Navy use. Modifications will include development of filters and multicoupler devices to provide an integrated shipboard ECCM communications system.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under Project W0661)
a.(U) Continued shipboard SINCGARS Electromagnetic Interference (EMI) analysis.
b (U) Started interface test with Digital Communications Terminal (DCT) and associated radio equipment.
c. (U) Completed "breadboard" of airborne relay.

2. (U) FY 1990 PROGRAM:
a. (U) Complete shipboard Electromagnetic Interference (EMI) analysis.
b. (U) Start design of the airborne relay pallet.
c. (U) Complete interface testing with DCT and radio equipment.

3. (U) FY 1991 PLANS:
a. (U) Award contract to develop filters and multicouplers, and integrate the NDI radio to formulate the shipboard SINCGARS system.
b. (U) Procure and modify radios for testing.
c. (U) Install test radios onboard designated ships and start development testing.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVAVIONICCEN, Indianapolis, IN; NRL, Washington, DC; NAVELEXACT, St. Inigoes, MD; NAVELEXENGCEN, Portsmouth, VA. CONTRACTOR: VITRO Corp., Silver Spring, MD; RS Data Systems, Washington, DC.

F. (U) RELATED ACTIVITIES: Air Force HAVE SYNC, Program Element 0207423F; Army SINCGARS, Program Element 0604805A.

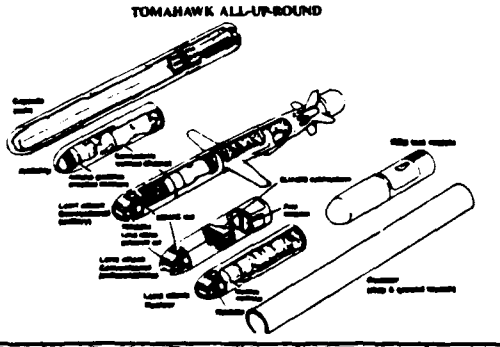
G. (U) OTHER APPROPRIATION FUNDS:

	FY 1989	FY 1990	FY 1991	TO COMPLETE
OPN (NARM #33304000)	0	0	0	7,632

H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204229N Budget Activity: 4
Program Element Title: SURF. COMB ORD/MISSILE-TOMAHAWK
Program Number: W0545 Project Title: TOMAHAWK



POPULAR NAME: TOMAHAWK Cruise Missile

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS 2 Blk 3 MS 3B SWG-3 MS 3A TLAM/D	IOC Flex-ship	MS 3A Blk 3 MS 3B TLAM/D	MS 3B Blk 3 IOC Blk 3 IOC Flex sub
Engineering Milestones	Eng Dev Blk 3, Flex	DES Rev. Blk 3	DT/OT Blk 3	
T&E Milestones			DT/OT Blk 3	POT&E Blk 3
Contract Milestones	Dev Flex Int Blk 3 VLS Int	Flex Blk 3 VLS Int.	Flex Blk 3, VLS Int.	Flex Blk 3 VLS Int.

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(22,418)	18,228	21,314	Continuing
Support Contract				
In-House Support	(9,629)	13,109	12,386	Continuing
GFE/Other				
Total	(32,047)*	31,337	33,700	Continuing Continuing

Note: BLK 3 means TLAM C/D Block III
* Costs associated with Mission Planning have been removed to allow comparisons with FY90/beyond missile-only costs.

Program Element: 0204229N Budget Activity: 4
Program Element Title: SURF. COMB ORD/MISSILE
Project Number: W0545 Project Title: TOMAHAWK

B. (U) DESCRIPTION: The TOMAHAWK Cruise Missile provides an attack capability against targets at sea (TOMAHAWK Anti-ship Missile) and on land (TOMAHAWK Land-Attack Missile). The Land-Attack missile can be fitted with either conventional unitary warhead (TLAM/C), nuclear warhead (TLAM/N) or submunition dispenser (TLAM/D).

The TOMAHAWK anti-ship mission is to destroy seaborne targets at stand-off ranges and complement U.S. aircraft war-at-sea strikes against combatant ships. The Tomahawk conventional land attack mission is to destroy naval targets ashore; fleet command, control and logistic systems; industrial or other high value targets; and ground based air defense systems. The TOMAHAWK nuclear land attack mission is to provide a highly survivable, world-wide theater nuclear capability. TOMAHAWK cruise missiles are capable of being launched from a variety of submarine and surface platforms. TOMAHAWK does not replace any existing weapon system, but instead, complements and increases the survivability of carrier battle group strike capacity at sea and ashore while expanding U.S. Navy offensive capability to units other than the aircraft carriers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: (From PE 0604367N) Continued the development engineering of TLAM/C Block III, Flexible Targeting, VLS integration and Independent Software Nuclear Safety Analysis (ISNSA).

2. (U) FY 1990 Program: Continue the development engineering of TLAM/C Block III, TWCS Block III, Flexible Targeting, VLS Integration, and ISNSA.

3. (U) FY 1991 Plans: Complete the development of Ship Flexible Targeting. Continue the development engineering of TLAM Block III (both variants TLAM/C and /D), then begin full system operational testing leading to limited then full production decisions. This testing includes at-sea flight tests. Continue development of TWCS Block III, VLS integration, Submarine Flexible Targeting and ISNSA.

4. (U) Program to Completion: Complete Engineering Development and final testing of TLAM Block III, Submarine Flexible Targeting and TWCS Block III. Continue ISNSA and VLS integration.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapon Center, China Lake, CA; Naval Undervater Systems Center, Nevport RI; Naval Surface Weapons Center, Dahlgren, VA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Ship Weapon System Engineering Station Port Hueneme, CA; Naval Avionics Center, Indianapolis, IN; Naval Ocean System Center, San Diego, CA. Contractors: McDonnell Douglas Missiles System Company, St. Louis, MO; General Dynamics/-Convair, San Diego, CA; Logicon, San Pedro, CA; Tiburon System Inc., San Jose, CA; General Dynamics/Electronics, San Diego, CA.

Program Element: 0204229N Budget Activity: 4
Program Element Title: SURF. COMB ORD/MISSILE
Project Number: W0545 Project Title: TOMAHAWK

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:

	TOR	DOP	OR	NDCP	TEMP
TOMAHAWK Missile (All-up Round)	N/A	N/A	N/A	9/88	8/88
TOMAHAWK Launch platforms	N/A	N/A	N/A	9/88	8/88

G. (U) RELATED ACTIVITIES: Program Element 0604367N (Theater Mission Planning Center), Program Element 0604707N (Over-The-Horizon Targeting), and Program Element 0604370N (SSN-688 Vertical Launch).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
WPN/# 6, 7	684,700	584,800	827,000	Continuing
OPN/# 224	32,900	36,700	29,400	Continuing
OPN/# 225	2,600	6,100	7,100	Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Undersea Surveillance Systems
PROJECT NUMBER: X0766 PROJECT TITLE: Integrated Undersea Surveillance (IUSS) Development

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0766	IUSS Dev	43,239	39,712	46,849	CONT.	CONT.

B. (U) DESCRIPTION: IUSS provides the majority of the U.S. Navy's open remains the cornerstone of the Navy's ASW effort.

This program provides for the design and development of the shore-based acoustic signal processing systems; the intra-system acoustic and data handling/transmission systems; the underwater electronic and cable technology as they relate to improving IUSS sensitivity and performance; and SURTASS Reduced Diameter Array (RDA) tasks.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Completed Integrated Acoustic Display/Wide Band Acoustic Recall (IAD/WBAR) and Inter-Array Processor (IAP II) interface development.

b. (U) Continue development of

c. (U) Tested multiple , selected production configuration and conducted sea tests.

c. (U) Conducted preliminary and critical design reviews for RDA receiver.

2. (U) FY 1990 Program:

a. (U) Commence development program for , acoustic signal processing, phase III backfit.

b. (U) Award FSED contract for active receive , and fixed price contract for

c. (U) Conduct RDA critical design review, continue fabrication and in-plant testing of RDA EDM, and begin fabrication of RDA modules for second source qualification.

d. (U) Commence design of Surveillance Direction System (SDS) Sector Evaluation Center (SEC) element required for improved data fusion and data transfer command and control.

3. (U) FY 1991 Plans:

a. (U) Continue at reduced level the development program for phase III backfit.

b. (U) Commence lightwave cable locator.

c. (U) Continue development.

PROGRAM ELEMENT: 0204311N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Undersea Surveillance Systems
PROJECT NUMBER: X0766 PROJECT TITLE: Integrated Undersea Surveillance (IUSS) Development

d. (U) Deliver RDA EDM and conduct array subsystem tests on leased RV.

e. (U) Continue SDS design of SEC element and initiate SADR II element design.

f. (U) Commence Advanced Surveillance System (ASAPS) development.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NOSC, San Diego, CA; NAVCI, Port Heuneme, CA. Contractors: AT&T Technologies Inc., Greensboro, NC; Hughes Aircraft Co., Buena Park, CA; ARL University of Texas, Austin, TX.

E. (U) COMPARISON WITH REVISED FY 1990/FY 1991 PRESIDENT'S BUDGET

1. (U) Technical changes: Not applicable.
2. (U) Schedule changes: Not applicable.
3. (U) Cost changes: The department's budget reduction of -$4,078K in FY 91 may require restructuring of the Surveillance Direction System (SDS) effort.

F. (U) PROGRAM DOCUMENTATION:

Milestone I Decision	13 May 1986
Navy Decision Coordination Paper (NDCP)	13 May 1986
Test and Evaluation Master Plan (TEMP)	25 Aug 1986
NDCP #78	28 Jan 1980
AP 89-22 (SOSUS) (Revision in Process)	7 Aug 1989
OR 038-95-88	5 Jul 1985
AP 86-16	27 Oct 1986
OR 246-02-89 (SDS)	5 Jun 1989
AP 88-03 (LFA)	12 Jun 1989
Test and Evaluation Master Plan (TEMP) (LFA)	7 Nov 1989

G. (u) RELATED ACTIVITIES: PE 0604784N, Fixed Distributed System (FDS) - a PE 0204313N, Surveillance Towed Array Sensor (SURTASS) System - provides mobile, long range, passive undersea surveillance capability; PE 0603747N, Advanced ASW Technology Demonstration - proves active and passive concepts through laboratory and at-sea demonstrations; PE 0603792N, Critical Sea Test - provides a series of extensive at sea experiments.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN #70	27,101	21,096	31,318	CONT.	CONT.

PROGRAM ELEMENT: 0204311N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Undersea Surveillance Systems
PROJECT NUMBER: X0766 PROJECT TITLE: Integrated Undersea Surveillance (IUSS) Development

Quantities cannot be specified since there is no one subsystem component item that characterizes the mix of hardware and equipments included in SOSUS backfit and future deployments/procurements.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (u) *MILESTONE SCHEDULE:*

Conduct RDA TECHEVAL/OPEVAL concurrent with SURTASS Block Upgrade FY 1991.
Conduct RDA FOT&E concurrent with SURTASS Block Upgrade FY 1992.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204313N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surveillance Towed Array Sensor System (SURTASS)
PROJECT NUMBER: X0758 PROJECT TITLE: SURTASS

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0758	SURTASS	5,260	5,397	5,798	CONT.	CONT.

B. (U) DESCRIPTION: The Surveillance Towed Array Sensor System (SURTASS) provides a mobile, long range, passive undersea surveillance capability against current and projected threat submarines. SURTASS also provides flexibility in expanding present undersea surveillance operations supporting tactical Anti-Submarine Warfare (ASW) forces. The SURTASS Block Upgrade Program provides improved detection and classification capability to SURTASS It includes additional signal processing to improve

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Completed Preliminary and Detailed Design Review; completed Critical Design Review; Began software code and test.
2. (U) FY 1990 Program: Continue Block Upgrade software code and test.
3. (U) FY 1991 Plans: Continue Block Upgrade software code and test; Develop Operational Readiness Inspection (ORI) hardware specifications.
4. (U) Program Plan to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NOSC, San Diego, CA. Contractors: Hughes Aircraft Company, Fullerton, CA.

E. (U) RELATED ACTIVITIES: PE 0204311N, Undersea Surveillance System - Provides the Reduced Diameter Array (RDA) portion of the SURTASS Block Upgrade; PE 0603785N, ASW Environmental Acoustic Support (AEAS) - provides acoustic data and modeling support and testing of modified arrays.

F. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
SCN #20	58,820	68,710	0	CONT.	CONT.
OPN #74	5,472	15,347	2,367	CONT.	CONT.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S1980 PROJECT TITLE: Amphibious Over-The-Horizon (OTH) Command and Control

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1980	OTHAC2	0	0	4,097	1,036	5,133

B. (U) DESCRIPTION: This project integrates existing developments into a system which will support the command and control of surface amphibious assaults launched from extended over-the-horizon (OTH) off shore ranges. The system adapts the USMC's Position Location Reporting System (PLRS) for naval applications and integrates it with navigation and communications systems. The project is required to effectively use the capabilities provided by deployment of the Landing Craft Air Cushioned (LCAC) vehicles.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Not Applicable.
2. (U) FY 1990 PROGRAM:

a. (U) Develop project management, system engineering, and test and evaluation plans.

b. (U) Prepare system specifications, hardware acquisition packages, and and Test and Evaluation Master Plan (TEMP).

3. (U) FY 1991 PLANS:

a. (U) Commence Full Scale Engineering Development (FSED). Acquire prototype equipment, develop computer programs, review and update TEMP, select and survey test platforms, prepare installation documentation, and install prototype equipment.

b. (U) Acquire support equipment and services.

c. (U) Develop maintenance, training and logistics plans, validate subsystem design and equipment interfaces, modify prototypes as required, perform integrated system test.

4. (U) PROGRAM TO COMPLETION:

a. (U) Perform DT-II/OT-II, conduct Milestone III review. Projected program completion is 9/93.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington D.C.

E. (U) RELATED ACTIVITIES: PE 0206626M Position Location Reporting System (PLRS); PE 0604777N Global Positioning System (GPS) User Equipment; PE 0204163N Single Channel Ground and Airborne Radio System - (SINCGARS).

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT OPN	0	0	0	47,100	47,100

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204571N Budget Activity 4
Program Element Title: SPECIAL PROJECTS

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0431	Tactical Aircrew Combat Training System (TACTS)	3,998	6,692	2,903	Cont.	Cont.
X1823	Enhanced Naval Warfare Gaming System (ENWGS)	2,056	0	2,161	Cont.	Cont.
Total		6,054	6,692	5,064	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops instrumentation systems to support fleet proficiency training and tactics assessment. It develops the Tactical Aircrew Combat Training System (TACTS) capabilities which support the Naval Strike Warfare Center (NSWC) at NAS Fallon, Nevada and the Strike Warfare Initiatives program by extending the current training capability in air-to-air combat to other phases of air warfare; e.g., air-to-surface and defense suppression. This program also funds the improvement of the TACTS training capability by providing comprehensive interfaces with additional tactical aircraft/weapons, and by improving the control of and the debrief from realistic electronic warfare environments. ENWGS is a distributed tactical training system located at Tactical Training Group Atlantic (TTGL), Tactical Training Group Pacific (TTGP), Naval War College, CINCPACFLT, CINCLANTFLT, NAVPGSCOL and CINCUSNAVEUR. The ENWGS provides pre-deployment Battle Group-level training for senior Naval Officers and their staffs, and supports the Tactical Warfare Training Curriculum at the Tactical Training Groups. This system optimizes Battle Group/Battle Force training and supports Fleet training objectives independent of Force Structure. These capabilities are not available in any other system.

PROGRAM ELEMENT: 0204571N Budget Activity: 4
PROGRAM ELEMENT TITLE: Special Projects
PROJECT NUMBER: W0431 PROJECT TITLE: Tactical Aircrew Combat Training System (TACTS)

C. (U) DESCRIPTION: This project develops TACTS capabilities which includes full strike training including war-at-sea; F/A-18 aircraft interface and future aircraft weapon system data buses interfaces; computer generated electronic warfare threats; and aircrew performance evaluation.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued development of encryption capability.
   b. (U) Commenced development and updating of weapons and EW simulations.

2. (U) FY 1990 Plans:
   a. (U) Complete encryption and war-at-sea developments.
   b. (U) Continue AGM-88A (HARM) and AIM-54 (PHOENIX) developments.
   c. (U) Initiate common pod development.

3. (U) FY 1991 Plans:
   a. (U) Complete the AIM-54 (PHOENIX) and laser training capability.
   b. (U) Continue the AGM-88A development.
   c. (U) Initiate an AGM-88A (HARPOON) training capability.
   d. (U) Continue the common pod development.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NWC, China Lake, CA; NADC, Warminster, PA; Fleet Analysis Center, Corona, CA; NATC, Patuxent River, MD. CONTRACTORS: Cubic Corporation, San Diego, CA; Ford Aerospace, Sunnyvale, CA.

F. (U) RELATED ACTIVITIES: P.E. 0604208N, Range Instrumentation Development. This is a dual service program with the USAF as defined by the Memorandum of Agreement (MOA) for the Joint Development and Acquisition of Compatible Systems for TACTS/ACMI.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) APPN/P-1					
APN#69	8,796	7,270	6,734	Cont.	Cont.
OPN#206	0	13,986	7,301	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

PROGRAM ELEMENT: 0204571N Budget Activity: 4
PROGRAM ELEMENT TITLE: Special Projects
PROJECT NUMBER: X1823 PROJECT TITLE: Enhanced Naval Warfare Gaming System (ENWGS)

C. (U) DESCRIPTION: The ENWGS will provide realistic Battle Group-level training for senior Naval Officers and their staffs, and support the Tactical Warfare Training Curriculum at the Tactical Training Groups. As an operational and educational tool, the ENWGS will focus on strategy and tactical development, operational planning, wargaming and decision making, tactics evaluation, and post-exercise analysis. This system will optimize Battle Group/Battle Force training and combat readiness during anticipated fiscal austerity and reduced operational tempo. These capabilities are not available in any other system. This program enhanced the Naval Warfare Gaming System to support the needs and objectives of the CNO, Fleet Commanders (FLTCINCS), Naval War College, Tactical Training Groups (Atlantic and Pacific) and the Naval Postgraduate School. ENWGS will require re-hosting and conversion to Defense Standard Language Ada in the early FY 90's.

D. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Commenced Ada-ENWGS 4.0 technical studies.
   b. (U) Developed Release 3.0 enhancements.
2. (U) FY 1990 PLANS: Not applicable.
3. (U) FY 1991 PLANS:
   a. (U) Initiate Ada ENWGS acquisition package.
   b. (U) Commencement of Ada software development and testing.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Incorporation of Ada and other emerging wargaming technology into target system.
   b. (U) Satisfy joint tactical training interoperability requirements.

E. (U) WORK PERFORMED BY: IN HOUSE: NAVALEXACT, Portsmouth, VA. CONTRACTOR: Computer Sciences Corporation, Moorestown, N.J.

F. (U) RELATED ACTIVITIES: None.

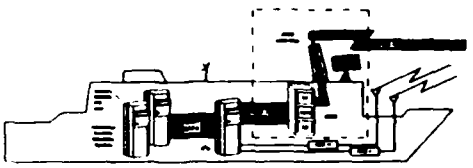
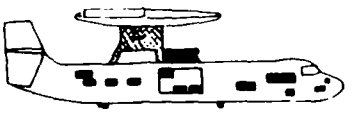
G. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

FY-1989 Actual	FY-1990 Estimate	FY-1991 Estimate	To Complete	Total Program
0	0	0	0	0

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Information System
PROJECT NUMBER: X1977 PROJECT TITLE: Joint Tactical Information Distribution System (JTIDS)

POPULAR NAME: Link-16 - Joint Tactical Information Distribution System (JTIDS)

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	DAB IIIA		NPDM FOR IIIA OPTION	IOC
Engineering Milestones	F-14D/E-2C Installation	Fly F-14D/ E-2C	Comp F-14D Integ	Comp E-2C/ Ship Integ
T&E Milestones	DT-IIA DT-IIB	DT-IIC	OT-IIA OT-IIB	TECHEVAL OPEVAL
Contract Milestones	FSD Terminal Award Blk II		LRIP CONTRACT AWARD	FULL-RATE CONT AWARD

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contact	70,706	49,651	37,646	Continuing
Support Contact	3,465	3,200	2,244	Continuing
In-House Support	4,731	4,407	3,338	Continuing
GFE/ Other	34,833	34,345	32,771	Continuing
Total	113,735	91,603	75,999	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Information System
PROJECT NUMBER: X1977 PROJECT TITLE: Joint Tactical Information Distribution System (JTIDS)

B. (U) DESCRIPTION:

(U) Combat experience gained during the Southeast Asia conflict, Middle East incidents and Grenada exposed several deficiencies in United States tactical communication, navigation, and identification systems. Extensive analyses of these combat situations indicate that a joint service, high capacity, secure and jam resistant communications link would increase force effectiveness and substantially reduce losses due to hostile action and friend on friend engagements. These capabilities are critical in the high speed, long range, and electronically hostile environment envisioned in any substantial modern day conflict. This includes any engagement with Soviet Block nations and, due to the proliferation of high technology weaponry, many other minor or third world powers.

(U) Link 16 is an integration of the Time Division Multiple Access (TDMA) family of Joint Tactical Information Distribution System (JTIDS) terminals and the Tactical Digital Information Link J (TADIL J) Message Standard. It will provide selected U.S. Navy tactical air, U.S. Navy ships and Marine Corps ground units crypto-secure, jam resistant, low-probability-of-exploitation communication of tactical data and voice at a high data rate. It will have the additional capabilities of common-grid navigation and the use of automatic relay capabilities inherent in the equipment that enable long range communication and provide jam resistance. The system will be interoperable among all Services and NATO/Allied users equipped with JTIDS or the European version, NATO Multifunctional Information Distribution System (MIDS) (Germany, Italy, France, Spain, and eventually Canada).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued TADIL J/TDMA conversion of the System Integration Facility (SIF).
b. (U) Continued integration of F-14D and E-2C aircraft with IU terminals.
c. (U) Continued shipboard integration.

2. (U) FY 1990 PROGRAM:

a. (U) Deliver shipboard antennas for test program.
b. (U) Continue F-14D, E-2C and ship integration.
c. (U) Conduct first flights of JTIDS terminals installed in F-14D and E-2C aircraft.
d. (U) Deliver first JTIDS Network Library.
e. (U) Begin multi-platform testing on F-14D, E-2C, and ships.
f. (U) Complete TADIL J/TDMA conversion of SIF.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Information System
PROJECT NUMBER: X1977 PROJECT TITLE: Joint Tactical Information Distribution System (JTIDS)

3. (U) FY 1991 PLANS:

a. (U) Continue E-2C and ship integration and multi-platform testing.
b. (U) Conduct operational testing to support limited production of ship and aircraft terminals.
c. (U) Award LRIP contract.
d. (U) Complete F-14D integration.
e. (U) Deliver second JTIDS Network Library.

4. (U) PROGRAM TO COMPLETION:

a. (U) Complete E-2C and ship integration.
b. (U) Conduct TECHEVAL.
c. (U) Conduct OPEVAL.
d. (U) Commence full rate production.
e. (U) Initial Operational Capability (IOC).
f. (U) Complete production and delivery to the Fleet.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NAVAIRTESTCEN, Patuxent River, MD; FLTCOMBATDIRSSACT, San Diego, CA; FLTCOMBATDIRSSACT, Dam Neck, Virginia Beach, VA; NAVAIRDEVCEN, Warminster, PA; NAVELEXCEN, Vallejo, CA. CONTRACTORS: Plessey Electronics Systems Division, Wayne, NJ; Grumman Aerospace Corp., Bethpage, Long Island, NY; The Boeing Corporation, Seattle, WA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: Department Reduction of $3,765K rephases funds to reflect incremental funding policy.

F. (U) PROGRAM DOCUMENTATION:

1 (U) SDDM (JTIDS Milestone II), 1/81
2. (U) MJCS 194-89 (MROC for JTIDS)
3. (U) Joint JTIDS Navy TEMP Annex, 5/88
4. (U) ADM (JTIDS Milestone IIIA), 10/89

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Information System
PROJECT NUMBER: X1977 PROJECT TITLE: Joint Tactical Information Distribution System (JTIDS)

G. (U) RELATED ACTIVITIES:

(U) Program Element 0603717N, Command and Control (C^2) Systems (Adv). The Command and Control Processor (C^2P) is required for Link 16 implementation.
(U) Program Element 0205667N, F-14 Upgrade. Aircraft upgrades include integration with JTIDS.
(U) Program Element 0204152N, Early Warning Aircraft Squadrons Upgrade. Aircraft upgrades include integration with JTIDS.
(U) Program Element 0604771D, Common JTIDS. Funding develops and procures the Navy's Full Scale Development terminals through the Joint Program Office.

H. (U) OTHER APPROPRIATION FUNDS: (Quantity/Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT					
APN (BA1) #10, 11, 24, 25	0/ 0	0/ 0	22/ 23,107	415/ 290,508	437/ 313,615
APN (BA5) #55, 140	0	0	7/ 5,728	108/ 148,438	115/ 154,166
APN (BA6) #167	0	0	4,000	28,694	32,694
OPN (BA2) #96	0	0	9/ 24,180	85/ 172,291	94/ 196,471
OPN (BA8) #303	0	0	4,274	72,074	76,348
SCN				16/ 36,085	16/ 36,085

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: None.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare System Integration
PROJECT NUMBER: S0896 PROJECT TITLE: Anti-Submarine Warfare System Integration

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0896	ASW CSI	13,991	14,866	19,253	CONT.	CONT.

B. (U) DESCRIPTION: Introduction of the AN/SQQ-89(V), Surface Ship Anti-Submarine Warfare Combat System (composed of the Underwater Fire Control System (UFCS) MK 116 Mod 5/6/7/8/9, AN/SQR-19 Tactical Towed Array Sonar, AN/UYQ-25 sonar In-Situ Mode Assessment System, AN/SQS-53B/C hull-mounted sonars, and the Light Airborne Multi-Purpose System (LAMPS) MK III signal processor) in surface ships will generate large numbers of passive and active surface and subsurface sonar contacts. An integrated ASW control system is required to effectively correlate, classify, track, etc. contacts from initial detection to effective and expeditious threat engagement. This program element develops sensor integration and display sharing software applicable to FFG 7, DD 963, and CG 47 Class ships. The MK 116 Mod 5/6/7/8/9 ASW Control System is essential to ensure the effective utilization of new sensor systems. Without such an automated system, experience has shown that only one target can be effectively manually correlated and tracked.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued development efforts to implement OBT in MOD 8/9 computer programs.

b. (U) Continued efforts to modify MOD 7 for DD 963 Class ships.

c. (U) Implemented partial OPSPEC 411.2 changes to ASWCS on DD 963 Class ships.

d. (U) Completed planned ASWCS Upgrades to support new AN/SQQ-89 sensor capabilities.

e. (U) Completed safety efforts in support of VLS/VLA and obtained OTS certification from WESRB.

2. (U) FY 1990 Program:

a. (U) Implement OPTEVFOR deficiency corrections in UFCS MK 116 MOD 8/9 computer programs.

b. (U) Implement ASWCS/SIMAS (Desktop) interface for all MODs.

c. (U) Initiate development efforts to implement MK 50 torpedo capability.

d. (U) Continue development of full OPSPEC 411.2 interface with C&D and CDS.

e. (U) Deliver MOD 8/9 computer programs to DD 977 and DD 974, respectively.

f. (U) Deliver UFCS MK 116 MOD 7 (DD 978) to Production Test Site (PTS) and ICSTF for certification.

g. (U) Continue safety efforts.

PROGRAM ELEMENT: 0205620N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare System Integration
PROJECT NUMBER: S0896 PROJECT TITLE: Anti-Submarine Warfare System Integration

3. (U) FY 1991 Plans:
   a. (U) Complete development and delivery of ASWCS MOD 8/9 computer programs with full OPSPEC 411.2.
   b. (U) Continue development and test of upgrades to ASWCS.
   c. (U) Continue MK 50 development.
   d. (U) Initiate incorporation of OBT in MOD 7 for DD 963 Class.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSEA, Washington, DC; NUSC, New London, CT; NOSC, San Diego, CA (Lead Laboratory); NSWC, White Oak, MD; Naval Sea Combat Systems Engineering Station, Norfolk, VA. CONTRACTORS: EG&G Washington Analytical Services Center, Inc., Rockville, MD; MATRIX Corporation, Vienna, VA; Tracor, Inc., Rockville, MD; Hughes Aircraft Company, Fullerton, CA; General Electric Co., Syracuse, NY; Sciences Application Incorporated, San Diego, CA; Sperry-Univac, Minn., MN and Integrated Systems Analysts, Inc., Arlington, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENTS BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: NDCP S0896-AS 5/81

G. (U) RELATED ACTIVITIES: PE 0604212N, Project W1707 (Light Airborne Multi-Purpose System MK III): development of an anti-submarine warfare helicopter for deployment with surface ships. PE 0604713N, Project S1916 (ASW Systems Improvement): develops upgrades to the sensors to counter recently identified threat improvements, including reductions in radiated noise.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)
1. (U) Other appropriation funds are identified at the AN/SQQ-89 system level and can not be identified at the subsystem (ASWCS) level.
2. (U) MILCON: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0205633N Budget Activity: 4
Program Element Title: AIRCRAFT EQUIPMENT R&M IMPROVEMENT PROGRAM (AERMIP)
Project Number: W1041 Project Title: AERMIP

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1041	AERMIP	0	977	1,445	Cont.	Cont.

B. (U) DESCRIPTION: AERMIP is specifically dedicated to correct R&M deficiencies for inservice, out-of-production aircraft equipment. It provides the cost-effective solution to parts obsolescence problems which are encountered as the APN appropriation is diminished and new system introductions are delayed. The development effort uses proven technology to improve readiness and reduce operating and support costs. Return on Investment regularly exceeds 500%. AERMIP facilitates the Operational, Safety and Improvement Program (OSIP) by applying proven solutions to current fleet problems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplish: N/A

2. (U) FY 1990 Program:
   a. (U) Complete ANC Interface improvement task.
   b. (U) Complete AAU-19 altimeter improvement.
   c. (U) Continue Helicopter/Ship Dynamic Interface testing & analysis.
   d. (U) Initiate standard electronic aircraft clock improvement.

3. (U) FY 1991 Plans:
   a. (U) Continue previous task(s).
   b. (U) Continue common avionic R&M tasks for Fleet requirements.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Avionics Center, Indianapolis, IN; CONTRACTORS: Clifton Precision, Davenport, IA; others.

E. (U) RELATED ACTIVITIES: P.E. 0604203N standard avionics.

F. (U) OTHER APPROPRIATION FUNDS: Aircraft procurement funds (APN) to procure and install the improvements developed under this program are included within the budgets of the affected aircraft programs.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0205658N Budget Activity: 4

Program Element Title: Laboratory Fleet Support
Project Number: X0834 Project Title: Laboratory Fleet Support

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY1989 Actual	FY 1990 Estimate	FY1991 Estimate	To Complete	Total Program
X0834	Laboratory Fleet Support	5,451	5,373	6,796	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program provides direct assistance to the Fleet by on-site support from Navy laboratories facilitating technical improvement of inservice systems. These efforts increase effectiveness of operational systems and ensure commmunications between the technology producer (RDT&E community) and the technology user (Navy/Marine Corps operating forces). In FY 1989, the program supported 25 scientists and engineers at major Navy/Marine Corps operational commands as principal technical advisors.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. Demonstrated rule-based navigation selector.
b. Demonstrated filter against geomagnetic noise.
c. Evaluated theater-wide communication linkage table.
d. Established tactical sensor-to-battle group connectivity.
e. Demonstrated reduction in radar intercept vulnerability.
f. Demonstrated improved submarine bearing accuracy.
g. Adapted Army MK-19 trainer to COMIDEASTFOR use.
h. Demonstrated substantial radar clutter reduction.
i. Support for 25 scientists and engineers in field team.

2. (U) FY 1990 Program: Technical problem solution will continue on a quick reaction basis. Also, a field team of similar size is expected to be deployed.

3. (U) FY 1991 Plans: Technical problem solution will continue on a quick reaction basis. Also, a field team of similar size is expected to be deployed.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: Navy R&D Laboratories and Centers; Naval Oceanographic Office. Contractors: Applied Research Laboratory ARL, Penn State, State College, PA; ARL, U. of Texas, Austin, TX; ARL U. of Washington, Seattle, WA; APL, Johns Hopkins, University, Laurel, MD.

E. (U) RELATED ACTIVITIES: PE 0602936N, Navy Lab Indep. Expl, Devel.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0205667N Budget Activity: 4
Program Element Title: F-14 Upgrade
Project Number: W1408 Project Title: F-14 Upgrade

POPULAR NAME: F-14D TOMCAT

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars In Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	IIIA 10/88	IIIA-2 01/90	IIIB 10/90	
Engineering Milestones				
T&E Milestones	DT/OT IIB	DT/OT IIC		
Contract Milestones				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	54,500	27,400	56,300	Continuing
Support Contract				
In-House Support	33,679	33,289	17,511	Continuing
GFE/ Other	64,459	57,137	47,617	Continuing
Total	152,638	117,826	121,428	Continuing* Continuing

* Reflects emerging technologies.

Program Element: 0205667N Budget Activity: 4
Program Element Title: F-14 Upgrade
Project Number: W1408 Project Title: F-14 Upgrade

B. (U) BRIEF DESCRIPTION: This program element provides for operational improvement of Navy F-14 squadrons in order to counter the projected threat through the year 2000 and beyond. The F-14D will have increased capability in three major areas: new engine, new digital avionics and an upgraded radar. The new engine will increase tactical flexibility against advanced threat aircraft and correct significant safety problems associated with the present engine. New digitized avionics will enable operational compatibility with other fleet units and incorporation of DOD directed programs thereby increasing aircrew effectiveness. These changes will yield significant improvements in capability and per-formance as well as reliability and maintainability, and will facilitate the total integration and exploitation of related programs i.e., Air Force Common Joint Tactical Information Distribution System (JTIDS), Airborne Self-Protection Jammer (ASPJ) and Infrared Search and Track System (IRSTS), which is a forward hemisphere, passive, target detection, tracking and ranging sensor. The up- graded radar will ensure a multi-target, multi-shot capability in the more severe electronic countermeasures environment now projected. A predeployment (primarily software) update (PDU) which includes HARM, AMRAAM, fighter-to-fighter data link, Multi-Sensor Mechanization, and radar/ECCM improvements is planned for incorporation prior to the first deployment. Production incorporation of the upgraded engine in F-14 aircraft (designated the F-14A(PLUS)) began in FY 1986 (first delivery November 1987). Pilot production of the F-14D began in FY 1988 with deliveries commencing in March 1990.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted NPDM IIIA for limited production decision for 12 F-14D aircraft.
   b. (U) Continued avionics and radar hardware/software integration and development.
   c. (U) Integrated Grumman software tape updates with increased capabilities.
   d. (U) Continued flight testing to demonstrate: ECCM improvements, mixed missile launch, fault isolation, TCS/ALR-67/ASPJ operation, full radar modes/live weapons firing (East Coast).
   e. (U) Conducted DT/OT IIB.
   f. (U) Completed flight test of mid wave IRST systems and commenced flight tests of longwave IRSTS at PMTC.
   g. (U) Commenced PDU full scale development.
   h. (U) Continued trainer development.

2. (U) FY 1990 Plans:
   a. (U) Integrate final Grumman software tapes.
   b. (U) Demonstrate IRSTS/JTIDS on F-14D (DT/OT).
   c. (U) Continue flight testing to complete demonstration of fully integrated engine, avionics, and radar upgrade.
   d. (U) First F-14D production aircraft delivery in March 1990.
   e. (U) Conduct DT-IIC (TECHEVAL) and OT-IIC (OPEVAL).

f. (U) Continue descoped PDU Hardware/Software design, integration and test.

g. (U) Commence preliminary design for data fusion integration.
h. (U) Continue initial trainer development.
i. (U) Conduct NPDM Milestone IIIA for limited production for 20 long wave IRST systems.

3. (U) FY 1991 Plans:
a. (U) Conduct NPDM Milestone IIIB for Full Production decision for the F-14D.
b. (U) Integrate software enhancements resulting from OPEVAL.
c. (U) Continue PDU Hardware/Software integration and testing.
d. (U) Commence PDU flight test.
e. (U) Commence FSD for data fusion integration; commence preliminary design for integration and testing into the F-14D.
f. (U) Complete initial trainer development.
g. (U) Conduct DT-IIC (TECHEVAL) and OT-IIC (OPEVAL) on Longwave IRSTS.

4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Propulsion Center, Lakehurst, NJ; Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Naval Avionics Center Indianapolis, IN; Naval Aviation Engineering Center, Philadelphia, PA; Naval Aviation Logistics Center, Patuxent River, MD; Naval Aviation Depot, Norfolk, VA; Naval Aviation Depot, North Island, CA; Naval Training Engineering Center, Orlando, FL. CONTRACTORS: Grumman Aerospace Corporation, Long Island, NY; General Electric, Evandale, OH; General Electric, Utica, NY; and Hughes Aircraft Company, El Segundo, CA.

E. (U) COMPARISON WITH AMENDED FY 1990/1991 PRESIDENT'S BUDGET

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: Departmental increase of $1,691K applied to PDU.

F. (U) PROGRAM DOCUMENTATION: OR 11/83; NDCP Updated 10/88; TEMP Updated 12/88.

G. (U) RELATED ACTIVITIES: P.E. 0205604N and 0604771D, Development of Air Force Common Joint Tactical Information Distribution System (JTIDS); P.E. 0604226N, Airborne Self-Protection Jammer (ASPJ); P.E. 0604314N, AMRAAM; P.E. 0204134N, A-6 Squadrons (initial trainer commonality).

Program Element: 0205667N Budget Activity: 4
Program Element Title: F-14 Upgrade
Project Number: W1408 Project Title: F-14 Upgrade

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APN F-14 Procurement cost APPN/P1				
APN/#9, 10, 39	952,010	1,509,527	997,236	17,016,369
MILCON	0	0	3,200	4,900

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205670N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Intelligence Processing Support
PROJECT NUMBER: X0521 PROJECT TITLE: Shipboard Tactical Intel. Processing

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0521	SHPBD TAC INTEL PROCESSOR					
W0521		2,118	4,198	4,895	Cont.	Cont.

B. (U) DESCRIPTION: This program improves the Naval Intelligence Processing System (NIPS) which provides the commanders with an organic capability to process, analyze, and disseminate tactical intelligence aboard aircraft carriers, amphibious command and amphibious assault ships. These systems are being made compatible with the Tactical Aircraft Mission Planning System (TAMPS), Tactical EA-6B Mission Planning System (TEAMS), Tactical Electronic Reconnaissance Processing Evaluation System (TERPES), Stand-off Land Attack Missile System (SLAM) and the Navy Command and Control System Afloat (NCCS-A). NIPS will begin interface development with the Joint Services Imagery Processing System (JSIPS) in FY 1990.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Began AN/SYQ-9 (NIPS V4) full scale engineering development. Began development of a database transfer system using the Tactical DOD Intelligence Information System (DODIIS).

b. (U) Began developing the NIPS V4 interface with NCCS-A, TAMPS, TEAMS, TERPES and SLAM.

c. (U) Began engineering development of improved communications interface between Fleet Imagery Support Terminal (FIST) and Imagery Processing Intelligence Exchange (IPIX).

2. (U) FY 1990 PROGRAM:

a. (U) Continue NIPS V4 Upgrade and DODIIS connectivity development.

b. (U) Begin NIPS V4 interface development for Tomahawk cruise missile Afloat Planning System (APS), Digital Imagery Workstation (DIWS) and JSIPS.

c. (U) Continue interface development with NCCS-A, TAMPS, TEAMS, TERPES, SLAM and IPIX.

3. (U) FY 1991 PLANS:

a. (U) Continue APS, DIWS, interface development; complete JSIPS/NIPS interface.

b. (U) Perform DT/OT on interface developments with TEAMS, TAMPS, NCCS-A, TERPES, SLAM and IPIX.

c. (U) Complete NIPS V4 Operational Testing and achieve production.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVELEXACT, St. Inigoes, MD; NAVELEXCENDET Philadelphia, PA. CONTRACTORS: Planning Research Corp., McLean, VA.

E. (U) RELATED ACTIVITIES: TFCC PE 0604231N.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN BA-2 #89	5,961	5,533	11,705	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205675N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Operational Reactor Development
PROJECT NUMBER: S1303 PROJECT TITLE: Operational Reactor Development

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1303	Operational Reactor Development	37,258	45,512	56,614	CONT.	CONT.

B. (U) DESCRIPTION: The objective is to increase the useful lives of operating reactor plants. Accordingly, designs, developments, tests and evaluations are pursued to improve system and component reliability, develop equipment and methods needed for servicing, inspections and evaluations, and develop means to emulate and assess plant performance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Designed, developed, tested and evaluated reactor servicing and refueling equipment, methods, and techniques.

b. (U) Developed and tested improved methods and techniques to efforts will help avoid premature component replacements, minimize maintenance costs and increase operating time.

c. (U) Tested propulsion plant systems and components in prototypical environment to identify potential design deficiencies and resolve problems before they affect the fleet.

d. (U) Continued thermal, hydraulic, and mechanical analyses to confirm operating procedures and limits. Efforts included qualifying structural integrity of various operating plant material alloys. Investigated and developed ways to support operation of plant systems and components beyond the original design lives.

e. (U) Evaluated diagnostic test results to determine plant noise performance, and develop design changes to improve quieting.

2. (U) FY 1990 Program:

a. (U) Continue to design, develop, test and evaluate reactor servicing and refueling methods and equipment. Qualify containers for shipping radioactive components.

PROGRAM ELEMENT: 0205675N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Operational Reactor Development
PROJECT NUMBER: S1303 PROJECT TITLE: Operational Reactor Development

b. (U) Test operating plant materials for corrosion resistance; evaluate material erosion to better characterize corrosion damage.

c. (U) Assess
continue to evaluate the effects of

d. (U) Develop inspection equipment to improve steam generator inspection ability and reduce personnel radiation exposure.

e. (U) Continue to identify deficiencies and prove new designs in prototype tests; replace components needed to continue this testing. Improve designs in response to fleet feedback.

f. (U) Develop better core thermal and hydraulic analysis methods to confirm reactor plant operating procedures and limits. Analyze core mechanical and structural test results to confirm designs are adequate. Investigate and develop ways to extend plant and systems component lives.

g. (U) Develop examination methods to inspect in-service nuclear plant components; develop cutting and seal welding techniques.

h. (U) Develop and prove ways to identify and resolve component problems. Continue to develop evaluation methods;

i. (U) Develop methods and capabilities to backfit equipment into operating plants; develop systems to model plant operations.

3. (U) FY 1991 Plans:

a. (U) Continue to test corrosion resistance of materials in operating plants; develop models to characterize corrosion; evaluate rates of corrosion in various plant configurations.

b. (U) Continue to design, develop, test and evaluate reactor servicing and refueling methods and equipment for:

(1) (U) First TRIDENT refuelings;

(2) (U) First defueling of power units in CVN 65;

(3) (U) First NIMITZ class refueling; will include capability to disassemble and reuse NIMITZ core components;

(4) (U) First defueling of D1G reactor plants and

(5) (U) Shipment of nuclear fuel and irradiated core components.

(U) Assess
capabilities.

d. (U) Continue to develop inspection equipment to improve capability

e. (U) Continue prototypic testing of improved component designs; improve designs based on fleet feedback.

f. (U) Continue thermal, hydraulic, mechanical and structural analyses to establish reactor operating limits and resolve performance

PROGRAM ELEMENT: 0205675N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Operational Reactor Development
PROJECT NUMBER: S1303 PROJECT TITLE: Operational Reactor Development

concerns. Investigate and develop ways to operate plant systems and components beyond their original design lives.

g. (U) Continue to develop examination methods for in-service inspection of nuclear plant components; continue work on welding and cutting techniques.

h. (U) Continue to develop evaluation methods; evaluate noise data to identify problems; develop and prove ways to resolve component noise problems.

i. (U) Continue to develop methods and capabilities to backfit equipment into operating plants; develop systems to model plant operations.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: Contractors: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA; General Electric Company, Knolls Atomic Power Laboratory and Machinery Apparatus Operation, Schenectady, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: This project is related to PE 0602324N, Nuclear Propulsion Technology, and PE 0603570N, Advanced Nuclear Power Systems. No duplication of effort occurs.

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Telecommunications

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0048	Communications Terminal Improvements	1,738	2,010	1,708	Continue	Continue
C1931	Communications Ancillary Equipment	975	1,206	835	Continue	Continue
C1975	Tactical Communications Center	5,053	2,758	2,942	Continue	Continue
	TOTAL	**7,766**	**5,974**	**5,485**	**Continue**	**Continue**

B. (U) DESCRIPTION: This program provides for the development and improvement of Marine Corps ground telecommunications items not being developed within the chartered responsibilities of the Joint Tactical Communications Agency. Equipments developed within this program support the mission area of command and control and are those equipments upon which command and control is totally dependent.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Telecommunications
PROJECT NUMBER: C0048 PROJECT TITLE: Communications Terminal Improvements

C. (U) DESCRIPTION: This project develops improvements to HF/VHF/UHF radios and multi-channel transmission systems, and items of communications terminal equipment to support record and data traffic for all tactical users.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Fielded temp loaned, non-ICOM SINCGARS radios to LAI BN. Developed timing and training frequency cables for HAVE QUICK radios. Began development of Data Transfer Device (DTD) software to support SINCGARS and HAVE QUICK radios. Began Antenna study or Near Verticle Incident Systems (NVIS) for mobile and transportable radio systems.

2. (U) FY 1990 PROGRAM: Field interim timing system for HAVE QUICK. Participate in OT of SINCGARS ICOM radio (ITT version). Participate in joint SINCGARS test. Participate in OT on the MD-1230 and conduct milestone III. Conduct milestone III on AN/TSC-120.

3. (U) FY 1991 PLANS: Conduct SINCGARS Marine Corps Program Decision Meeting III/IPR. Field ICOM SINCGARS to all LAI Bns. Complete development to DTD software. Conduct milestone III on "Down the Hill" radio system.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCTSSA, Camp Pendleton, CA; NESEA, Saint Indigoes, MD; NAC, Indianapolis, IN. CONTRACTORS: Hughes Aircraft, Fullerton, CA; ITT Ft. Wayne, IN; GTE San Diego, CA; Magnavox, Ft Wayne, IN.

F. (U) RELATED ACTIVITIES: Navy Program Element 0303401N, Communication Security. The USMC participates with other Services and the National Security Agency in developing secure voice equipment and the Data Transfer Device.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
	Communications Terminal Improvements					
66	Digital Comm Term	0	3,600	9,600	TBD	TBD
74	Sht-Term Anti-Jam	0	5,100	7,800	10,500	21,900

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Telecommunications
PROJECT NUMBER: C1931 PROJECT TITLE: Communications Ancillary Equipment

C. (U) DESCRIPTION: Monitor development of tactical UHF/SHF/EHF satellite communication (SATCOM) terminals. Develop Modifications to the AN/TSC-96 to maintain interoperability with Navy SATCOM network. Develop improvements to multichannel radio systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Installed prototype and tested Demand Assigned Multiple Access (DAMA) Secure Voice into AN/TSC-96. Completed operations tests of Digital Wideband transmission System(DWTS), Line-of-Sight Radio System (LRS) (AN/MRC-139). Conducted and developed Marine Corps network analysis for concept of employment.

2. (U) FY 1990 PROGRAM: DWTS, LRS (AN/MRC-139) Milestone III decision. Participate with Army on upgrade of AN/PSC-3 UHF Manpack SATCOM Radio. Monitor Army development of SCOTT. Initiate AN/TSC-96 interface with AN/MCS-63 Communications Central. Evaluate antenna towers for multichannel radio systems.

3. (U) FY 1991 PLANS: Continue participation with Army on AN/PSC-3 upgrade. Monitor Army development of SCOTT and Advanced Manpack EHF terminal (AMET). Review/update AN/TSC-96 PIP drawing package for installation of Navy/Marine Corps Common User Digital Information Exchange (NAVMCAS/CUDIX) DAMA modifications.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NESEC, Vallejo, CA, SPAWAR, Washington, DC; SATCOM, Ft Monmouth, NJ; ESD Hanscom AFB, MA; MCRDAC, Quantico, VA. CONTRACTORS: LORAL, San Diego, CA; Canadian Marconi Corp., Montreal, Canada.

F. (U) RELATED ACTIVITIES: Various other service efforts.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
63	DWTS, LRS	0	9,600	20,200	47,600	77,900
	AN/TRC-170	0	32,800	33,000	47,100	112,000
	AN/TSC-96 PIP	0	514	0	0	955

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Telecommunications
PROJECT NUMBER: C1975 PROJECT TITLE: Tactical Communications Center (TCC)

C. (U) DESCRIPTION: This is a software modification/development of a modified non-developmental item intelligence system AN/MSC-63A, Special Security Communications Central (SSCC), for general service record message traffic. The Tactical Communications Center will replace the AN/TYC-5A and AN/TGC-37.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Marine Corps Combat Development Command (MCCDC) validated and prioritized TCC Block Upgrades; continued TCC software development; continued Operator/Maintainer training material development; sought production authority to procure remaining twenty-one TCCs after completion of SSCC user acceptance test.

2. (U) FY 1990 PROGRAM: Initiate block upgrades; conduct further Developmental Tests.

3. (U) FY 1991 PLANS: Conduct Operational Testing of TCC software; continue block upgrades.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCTSSA, Camp Pendleton, CA; NOSC, San Diego, CA; NESEC, Vallejo, CA. CONTRACTORS: SAIC, San Diego, CA; Calculon, Dumfries, VA.

F. (U) RELATED ACTIVITIES: Program Element CC27GO, (Radio Battalion Modifications) SSCC developed by NOSC and funded by National Security Agency.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
65	Tactical Communications Center	900	7,700	7,400	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0010	SMAW	2,242	1,148	1,533	0	6,618
C0018	FSSI	5,368	2,322	1,541	Continue	Continue
C0021	AAV7A1 Pip	12,058	10,767	9,817	Continue	Continue
C1120	ADMS	4,949	9,349	6,669	Continue	Continue
C1555	LAV Pip	3,174	2,918	1,532	Continue	Continue
C1763	AAS Pip	1,734	798	1,351	Continue	Continue
C1901	Grnd Wpry Pip	8,323	3,731	3,263	Continue	Continue
C1960	LAV-AD*	(19,928)	19,666	18,019	Continue	Continue
C2086	SOL/MAR ENH	**	11,678	0	0	11,678
	TOTAL	37,848	62,377	43,725	Continue	Continue

* Funded in Program Element 0604656M, Marine Corps Assault Vehicles (Engineering).

** Congressionally mandated program. (RDDS not provided)

B. (U) DESCRIPTION: This program element provides modifications to Marine Corps Expeditionary Ground Force weapons systems to increase lethality, range, survivability, and operational effectiveness.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C0010 PROJECT TITLE: Shoulder-Launched Multipurpose Assault Weapons (SMAW)

C. (U) DESCRIPTION: The SMAW is a lightweight, portable assault weapon with a dual-mode round capable of defeating field and urban fortifications. The follow-on High Explosive Anti-Armor (HEAA) round will give the SMAW an anti-armor capability.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Continued with preplanned product improvements to the SMAW launcher and alternative explosive testing to meet insensitive munitions requirements for the HEAA.

2. (U) FY 1990 PROGRAM: Continue SMAW launcher tube hardening, laser protection for sight and improve bindings between launcher tube and spotting rifle. Continue insensitive munitions (ISM) testing for the HEAA. ISM will be completed and programmed for the FY 1991 HEAA production buy.

3. (U) FY 1991 PLANS: Continue SMAW launcher tube, sight and binding improvements and risk reduction plan.

4. (U) PROGRAM TO COMPLETION: Complete SMAW launcher product improvement and risk reduction plan.

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA. CONTRACTORS: McDonnell Douglas Astronautics Company, Titusville, FL; Physics International, CA.

F. (U) RELATED ACTIVITIES: Joint Anti-Armor Weapons Systems and Short Range Anti-Tank Weapon (SRAW) are related to Anti-Tank Warhead.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
28	SMAW HEAA	18,000	28,400	29,300	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The SMAW has been approved to selected countries for FMS.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C0018 PROJECT TITLE: Fire Support Systems Product Improvements (FSSI)

C. (U) DESCRIPTION: This project provides the artillery commander cost effective, survivable and supportable equipment/systems which will allow him to engage and neutralize/destroy enemy targets with minimal expenditures of rounds and survive enemy targeting.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Enhance artillery weapon systems, fire control, survey, meteorological, target acquisition, and C2 equipment/ systems. Participate in multi-service Advanced Field Artillery Tactical Data System (AFATDS) to satisfy Marine Corps requirements.

1. (U) FY 1989 ACCOMPLISHMENTS: Conducted a technical demonstration of the Israeli Tactical Display Information Systems (TACDIS).

2. (U) FY 1990 PROGRAM: Field a baseline capability in the FMF and continue evaluation/development of the required C2 capabilities. Evaluate existing LASER filters for possible application to the Modular Universal Laser Equipment (MULE), thereby increasing operator survivability. Participate in multi-service AFATDS program.

3. (U) FY 1991 PLANS: Complete development of a baseline capability for fire support automation/C2. Continue the evaluation and monitoring of equipment/systems for survivability, performance, and cost effectiveness which will enhance the Marine Corps fire support capability.

4. (U) PROGRAM TO COMPLETION: Continue participation in related "Other Service" programs when considered to be in the best interest of the government and Marine Corps.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC/MCCDC, Quantico, VA; US Army CECOM, Fort Monmouth, NJ; USA Fire Support Center, Ft. Sill, OK; NSWC, Dahlgren, VA; NWSC, Crane IN. CONTRACTORS: Magnavox Electronic Systems, Litton Data Systems, Others TBD.

F. (U) RELATED ACTIVITIES: Other service fire support and target acquisition program.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C0021 PROJECT TITLE: Assault Amphibious Vehicle 7A1 Product Improvement Program (AAV7A1)

C. (U) DESCRIPTION: This project sustains the Marine Corps capability to conduct surface-borne amphibious assaults by improving the present amphibious vehicle such that its battlefield effectiveness is extended until the successor vehicle is fully fielded in the year 2004.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Completed testing of enhanced applique armor, improved track, improved transmission, and infantry weapons mount kit. Continued development of collective NBC protection system, composite hull technology, advanced propulsion system and improved suspension components.

2. (U) FY 1990 PROGRAM: Continue development and testing of improved propulsion system, improved suspension system and composite hull.

3. (U) FY 1991 PLANS: Continue testing of improved propulsion system and improved suspension system.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; DTRC, Bethesda, MD. CONTRACTORS: Martin Marietta, Baltimore, MD; Rafael (Haifa, Israel); SW Research Inc. Sah Antonio, TX; Cadillac Gage, Warren, MI; AAI, Cockeyville, MD; Westinghouse, Cleveland, OH; MTV, Germany; VSE, Alexandria, VA; CASDE, San Diego, CA.

F. (U) RELATED ACTIVITIES: Existing and developing AAV systems.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
34	AAV7A1 PIP	47,400	12,900	19,000	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C1120 PROJECT TITLE: Air Defense Missile Systems (ADMS)

C. (U) DESCRIPTION: Hardware/software improvements to the HAWK surface-to-air missile system. Joint development with Army of lightweight ADMS.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Evaluated Digital Signal Processor and Reduced Side Lobe Antenna for Light Weight Early Warning Detection Device (LEWDD). Completed Stinger Night Sight (SNS) development. FSED for HAWK Mobility PIP. Completed FSED for Electrical Optical Target Adjumct System Product Improvement Program (EO/TAS PIP); purchased prototype. Developed Low Altitude Air Defense (LAAD) C2 adjuncts to HAWK and expeditious HAWK System Employment. Continued Mobile Surface to Air Missile System/Mobile Surface to Air Weapons Systems (MSAMS/MSAWS) analysis.

2. (U) FY 1990 PROGRAM: Continue FSED with HAWK Mobility PIP, EO/TAS PIP.

3. (U) FY 1991 PLANS: Complete development for HAWK/Mobility PIP, EO/TAS PIP, LAAD C2 System, and software upgrades.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Washington, DC; NSWC, White Oak, MD; NWSC, Crane, IN; U.S. Army MICOM, Huntsville, AL. CONTRACTORS: Raytheon, Bedford, MA; Northrup, Anaheim, CA.

F. (U) RELATED ACTIVITIES: USA HAWK/PMS, USN Sea-Sparrow, USAF AMRAAM.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
47	HAWK Modification	8,000	1,100	5,900	TBD	TBD
68	LEWDD	5,000	2,400	6,600	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Request for price and availability from Honduras. U.S. Army Memorandum of Understanding with the Netherlands on a portion of the HAWK Mobility PIP.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C1555 PROJECT TITLE: Light Armored Vehicle (LAV)

C. (U) DESCRIPTION: The family of LAVs consists of six fielded configurations whose operational capabilities provide a significant enhancement to the mobility and firepower of the Marine Air Ground Task Force (MAGTF). This project provided the funding to maintain the fleet of over 750 vehicles in the most capable condition.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Evaluated a proposal to improve the LAV-Mortar mount system. Concluded that the proposal exceeded resources and necessitated a reevaluation of the requirement. Evaluated potential product improvements at the LAV Test Branch.

2. (U) FY 1990 PROGRAM: Establish a level-of-effort arrangement with the prime contractor by which the test, evaluation and documentation efforts for various product improvements will be accomplished. Among the improvements being considered are the following: bilge pump, voltage regulator, power steering pump, brake warning signal and exhaust manifold.

3. (U) FY 1991 PLANS: Continue to evaluate potential product improvements with the main focus centering on the LAV-Mortar mount.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; PM-LAV, Tank Automotive Command, Warren, MI; Naval Surface Warfare Command, Dahlgren, VA; David Taylor Research Center, Bethesda, MD. CONTRACTORS: Diesel Division of GM, London, Ontario, Canada.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C1763 PROJECT TITLE: Amphibious Armor Systems (AAS) Product Improvement Program

C. (U) DESCRIPTION: This project funds the development of the Deep Water Fording Kit (DWFK), amphibious tie-down, and Position Locating Reporting System (PLRS) for M1A1 Tank.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed development of amphibious ship tiedown/PLRS integration.

2. (U) FY 1990 PROGRAM: Initiate Marine Corps unique RDT&E Forward Air Controller/Forward Observer (FAC/FO) study. Continue product improvement on Tiedown for M1A1.

3. (U) FY 1991 PLANS: Monitor Army's product improvement program for M1A1.

5. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA. CONTRACTORS: General Dynamic Lands Systems.

F. (U) RELATED ACTIVITIES: Army Tank Automotive Command.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
43,44	Amphibious Armor Systems Product Improvement Program M1A1 Tank	140,900	374,300	-	-	1,339,451

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C1901 PROJECT TITLE: Marine Corps Ground Weaponry PIP

C. (U) DESCRIPTION: This project develops joint and USMC unique improvements to infantry weapons, monitor national/international ground weapons.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed .50 caliber Saboted Light Armor Penetrator(SLAP)/Tracer Type classification. Continued development of muzzle-launched ordnance/bullet trap rifle grenade (MLO/BTRG). Procured combat shotguns and began follow-on operational tests.

2. (U) FY 1990 PROGRAM: Continue SLAP Sight Fire Control and improved mount system for Heavy Machine Gun initiatives. Continue joint development with US Army thermal technology to change from air cooled to electronically cooled sights. Begin initial evaluation of light-weight artillery technology and shipboard compatibility evaluation of the Army Multiple Launch Rocket System (MLRS) for application to the Marine Corps Artillery Master Plan.

3. (U) FY 1991 PLANS: Continue improved mount, Sight Fire Control System, for Heavy Machine Guns. Complete advancement of thermal technology. Initiate Marine Corps Lightweight 155 Howitzer program. Continue Marine Corps integration of Army MLRS system. Continue artillery technology and compatibility evaluation of candidate systems.

4. (U) PROGRAM TO COMPLETION: Compete NDI Lightweight howitzer program via competitive shootoff. Integrate Army's MLRS into the Marine Corps artillery structure. This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA; ARDEC, Dover, NJ. NVEOL, Ft Belvoir, VA. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: All ground weapons systems.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
42	Marine Corps Ground Weaponry Product Improvement 5.56mm Squad Auto	1,800	5,400	0	0	7,200
44	MK19 Machine Gun	5,000	17,200	0	0	22,200
49	Mach Gun 50 Cal SLAP	0	4,200	0	0	4,200
78	Thermal Imaging Equip	0	0	3,500	0	3,500

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms System (Operational Systems)
PROJECT NUMBER: C1960 PROJECT TITLE: Light Armored Vehicle - Air Defense (LAV-AD)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1960	LAV-AD*	(19,928)	19,666	18,019	Continue	Continue

* Funded in Program Element 0604656M, Marine Corps Assault Vehicles (Engineering).

B. (U) DESCRIPTION: This project will develop a mobile air defense system on an LAV chassis to provide air defense for rapidly maneuvering ground combat elements in the Marine Air Ground Task Force (MAGTF). The weapons system will consist of a rapid fire 25mm gun, Stinger standard vehicle missile launcher (SVML), and 2.75 inch LAU-68 E/A rocket launcher. The weapons system will integrate a fire control system consisting of a fire control computer, laser range finder, forward looking infrared radar (FLIR), multimode auto-tracker, video display, optical sights, and vehicle navigation system. The system will have fire-on-the-move capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: This effort will conduct full scale development (FSD) of an air defense system integrated onto an LAV chassis.

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under 0604656M) Delivered turret mockups.

2. (U) FY 1990 PROGRAM: Complete prototype build in second quarter FY 1990. Commence DT II April 1990.

3. (U) FY 1991 PLANS: Commence OT II March 1991.

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C1960 PROJECT TITLE: Light Armored Vehicle - Air Defense (LAV-AD)

4. (U) PROGRAM TO COMPLETION:

a. (U) Commence DT IIA during November 1991.

b. (U) Marine Corps Program Decision Memorandum (MCPDM) December 1991.
c. (U) Issue production request for proposal April 1992.

d. (U) Receive proposals August 1992.

e. (U) Production contract award during December 1992.

f. (U) Production deliveries begin during September 1994.

g. (U) Initial operational capability January 1995.

D. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; PM-LAV TACOM, Warren, MI; NSWC, Dahlgren, VA; TECOM, Aberdeen, MD. CONTRACTORS: General Electric, Burlington, VT; FMC, San Jose, CA; Diesel Division of GM, London, Ontario, Canada.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) Temp	July 1988
b. (U) Required Operational Capability	July 1989

G. (U) RELATED ACTIVITIES: Pedestal Mounted Stinger, Program Element 0206623M.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROGRAM ELEMENT: 0206623M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
PROJECT NUMBER: C1960 PROJECT TITLE: Light Armored Vehicle - Air Defense (LAV-AD)

J. (U) MILESTONE SCHEDULE:

		DATE
a.	(U) Prototype Deliveries	February 1990
b.	(U) Contractor Training	March 1990
c.	(U) DT II	April - September 1990
d.	(U) Prototype Refurbishment	October 1990 - February 1991
e.	(U) OT II	March - September 1991
f.	(U) DT IIA	November 1991 - March 1991
g.	(U) MCPDM III	December 1991
h.	(U) Production RFP	April 1992
i.	(U) Receive Proposals	August 1992
j.	(U) Production Contract Award	December 1992
k.	(U) Full Rate Production	cal Years 1994-1996
l.	(U) Production Deliveries Begin	September 1994
m.	(U) Initial Operational Capability	Fiscal Year 1995

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Operational Systems)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0076	Combat Service Support Product Improvement	2,440	919	1,050	Continue	Continue
C0085	Amphibious Raid Equipment	769	1,791	789	Continue	Continue
	TOTAL	**3,209**	**2,710**	**1,839**	**Continue**	**Continue**

* In FY 1988 this project was titled Combat Support.

B. (U) DESCRIPTION: This program element provides funding for Marine Air Ground Task Force requirements for combat service support equipment improvements. It also provides for evaluation of non-developmental items to support Marine Corps amphibious raid reconnaissance and special operations in low intensity conflicts in all climatic environments.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Operational Systems)

PROJECT NUMBER: C0076 PROJECT TITLE: Combat Service Support (CSS) Systems

C. (U) DESCRIPTION: This project evaluates CSS Systems for improvements in operational capability and reductions in Integrated Logistic Support.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed sixcon electric fuel pump and road spray bar. Conducted study of Digital Scanner for Topographical Mapping Set and replaced the Distance Measuring Equipment Topographical Survey Set. Began Helicopter Expeditionary Refueling System (HERS) and Tactical Air Fuel Delivery System (TAFDS) field communications kit evaluation. Procured US Army Standard Integrated Command Post Shelter (SICPS) for evaluation. Completed Hydrographic Survey Set.

2. (U) FY 1990 PROGRAM: Start DT/OT TAFDS field communications kit; Continue DT 50,000 gallon fuel tank; DT aviation fuel test kit. Complete HERS upgrade. Develop reverse osmosis pre-treatment. Improve Topographic, Hydrographic and Geodetic Survey Sets. Evaluate SICPS against other potential technology shelters.

3. (U) FY 1991 PLANS: OT aviation fuel test kits. Complete TAFDS field communication kit. Improve Container, Shelters, Topographic, Hydrographic and Geodetic Survey Sets.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NCEL, Port Hueneme, CA; MCRDAC, Quantico, VA. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
100	Topo Equip	0	0	3,800		3,800
98	Fuel/Water Store	5,700	0	0		5,700

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: (D) None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Operational Systems)
PROJECT NUMBER: C0085 PROJECT TITLE: Amphibious Raid Equipment

C. (U) DESCRIPTION: This project funds research in non-development items for a small, lightweight, automatic position and direction determination for the small unit leader; test and evaluate non-developmental items for unique Marine Corps requirements in reconnaissance, special operations and low intensity conflict (SO/LIC), cold weather operations, and tactical deception operations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Monitored other Service and commercial specialized equipment efforts to meet USMC requirements. Developed specifications for USMC reconnaissance equipment. Observed U.S. Army evaluation of new military free fall parachute. Developed requirements for ground and air tactical deception. Established a USMC billet for Small Unit Navigation Systems.

2. (U) FY 1990 PROGRAM: Continue to monitor specialized equipment to meet reconnaissance. SO/LIC and tactical deception requirements. Complete tactical deception requirements documentation.

3. (U) FY 1991 PLANS: Evaluate commercially available camouflage materials for ground and air vehicles, and personnel. Conduct testing and of navigation receivers, and identify Non-Developmental Item receiver for an interim capability for Marine Expeditionary Units.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA. CONTRACTORS: Atlantic Research Corporation Defense Systems.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
103	Amphibious Raid Equipment	2,500	200	200	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0062	IAS	3,461	4,379	7,865	Continue	Continue
C1296	JSIPS	13,503	11,045	16,049	Continue	Continue
C1297	TRSS	4,451	1,867	1,646	Continue	Continue
C1928	TERPES*	(7,488)	8,454	8,493	Continue	Continue
	TOTAL	**21,415**	**25,745**	**34,053**	**Continue**	**Continue**

* Funding transferred from 0604270N, Navy Consolidated Electronic Warfare Programs beginning in FY 1990 .

B. (U) DESCRIPTION: This program funds the operational systems development of Marine Corps intelligence equipment that will complement current and future sensors, and will provide systems for data evaluations required to support the operating forces into the next century. Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES) provides an Electronic Intelligence (ELINT) fusion capability for the Marine Air Ground Intelligence System (MAGIS).

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)
PROJECT NUMBER: C0062 PROJECT TITLE: Intelligence Analysis System Product Improvement Program (IAS)

C. (U) DESCRIPTION: The IAS program uses an evolutionary acquisition strategy and Non-developmental Items (NDI) hardware (HW) and software (SW) to improve the AN/TYQ-19 Intelligence Analysis Center (IAC), a fielded Marine Expeditionary Force (MEF) asset. The program will fulfill field requirements to provide automated intelligence capabilities to all echelons below the MEF level. It will also provide for an end-of-service life replacement for the existing IAC. The program consists of sequential block upgrades to enable intelligence analysts to rapidly process and disseminate battlefield intelligence to all commanders of the Marine Air Ground Task Force.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Provide IAS block upgrade prototype system for field evaluation. Plan and begin R&D on a replacement mobile shelter with a SCI-capable communication package.

1. (U) FY 1989 ACCOMPLISHMENTS: Conducted in-process reviews and trained FMF users on the prototype system. Shipped prototype system to the FMF for evaluation.

2. (U) FY 1990 PROGRAM: Conduct user group meetings with FMF evaluation teams to verify desired functional characteristics for the production systems. Continue work to interface DoD Data bases and SW, evaluate candidate shelters, and conduct communication analyses.

3. (U) FY 1991 PLANS: Publish a production, Request for Proposal for the echelons below the MEF upgrade. Commence software upgrade for the IAC replacement to include evaluation of mobile shelters and incorporation of tactical, theater, and national level databases.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NWSC, Crane, IN. CONTRACTORS: Calculon Inc., Dumfries, VA - System Eng/Prog Management Support, Columbia Research Corporation, Triangle, VA - Integrated Logistical Support (ILS).

F. (U) RELATED ACTIVITIES: DIA: DODIIS/MIIDS/IDS; PC-IDB. Navy: ISS/AF, 9C-NIPS/NIPS-2000; Marine Corps: FMF-EUCE, TERPES (AN/TSQ-90C), SSC (MSG-63A).

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY.

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)
PROJECT NUMBER: C1296 PROJECT TITLE: Joint Service Imagery Processing System (JSIPS)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1296	JSIPS	13,503	11,045	16,049	Continue	Continue

B. (U) DESCRIPTION: The JSIPS mission is to acquire and exploit multi-sensor digital imagery in near-real time from national, theater, and tactical platforms, in a soft copy format. JSIPS is not designed to counter a specific enemy threat. The JSIPS will eventually rep the current Imagery Interpretation and Imagery Processing Sub-systems of the marine Air Ground Intelligence System which only have the capability of analyzing visible spectrum hard-copy. The soft-copy imagery, linked, digital data, exploitation capability of the JSIPS becomes a critical requirement with the replacement of the RF-4B aircraft with the F/A-18D reconnaissance aircraft in the early 1990's.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Continued development of the JSIPS to down-link tactical, theater, and national imagery in near-real time.

2. (U) FY 1990 PROGRAM: Continue development of the JSIPS to down-link tactical, theater and national imagery in near-real time.

3. (U) FY 1991 PLANS:

a. (U) Conduct testing of the Full Scale Development (FSD) model.

b. (U) Develop the Common Radar Processor and the Mapping, Charting and Geodesy Segments of JSIPS.

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)
PROJECT NUMBER: C1296 PROJECT TITLE: Joint Service Imagery Processing System (JSIPS)

4. (U) PROGRAM TO COMPLETION:

a. (U) Continue development of Pre-Planned Product Improvement items.

b. (U) Begin production/procurement of JSIPS.

c. (U) Initiate production program.

D. (U) WORK PERFORMED BY: IN-HOUSE: ESD, Hanscom AFB, MA. CONTRACTORS: E-Systems, Garland, TX.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Department adjustment of $1,099K provided resources for a higher priority item, the Position Location Reporting System (PLRS). There will be some JSIPS program delay which cannot be determined at this time.

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) Required Operational Capability	Second Quarter FY 1982
b. (U) Letter of Adoption and Procurement (Part I)	Second Quarter FY 1983
c. (U) Letter of Adoption and Procurement (Part ISI)	FY 1988

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)
PROJECT NUMBER: C1296 PROJECT TITLE: Joint Service Imagery Processing System (JSIPS)

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Milestone I	Second Quarter FY 1984
b. (U) Milestone II	Fourth Quarter FY 1985
c. (U) FSD Contract Award	Fourth Quarter FY 1987
d. (U) IOC (FSD EDM)	Fourth Quarter FY 1991
e. (U) Milestone III	First Quarter FY 1992
f. (U) FOC	FY 1999

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)
PROJECT NUMBER: C1297 PROJECT TITLE: Tactical Remote Sensor System (TRSS)

C. (U) DESCRIPTION: This project develops replacement data packages for reprocurement of the year 1972 inventory items. The system is a remote unattended ground sensor set capable of detecting and providing essential intelligence to the Marine Corps Air Ground Intelligence System during tactical pre-assault, assault, and post-assault operations. The equipment consists of hand-emplaced and air delivered sensors, monitors, and radio relays.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Continued ILS documentation. Updated unit price estimates based on expenditures to date. Completed documentation for production sensor monitoring system (SMS). Initiated production of SMS and tested equipment development. Continued air certification on air delivered components.

2. (U) FY 1990 PROGRAM: Conduct factory training for fielding. Complete air certification of air delivered components and test equipment development.

3. (U) FY 1991 PLANS: Continue development of non-real-time airborne components, ILS and development of additional sensor capabilities.

4. (U) PROGRAM TO COMPLETION: This is a continuing program. Complete pre-production, ILS and technical support documentation of the airborne components and additional sensors.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Avionics Center, Indianapolis, IN; Naval Air Development Center, Warminster, PA. CONTRACTORS: Sandia Labs, BDM Corporation and Columbia Research Corporation, Albuquerque, NM.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
69	TRSS	9,700	4,400	4,200	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Operational Systems)
PROJECT NUMBER: C1928 PROJECT TITLE: Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES)

C. (U) DESCRIPTION: This system provides Electronic Intelligence (ELINT) from aviation Reconnaissance Assets to the Command, Control, and Intelligence (C2I) elements of the Marine Air Ground Task Force (MAGTF). The system also provides Order of Battle Intelligence support to the Air Combat Element (ACE). Without this upgrade the system ceases to support the intelligence requirement and EA-6B Aircraft by FY92.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Deployed AN/TSQ-90C initial operation capability. Began AN/TSQ-90C integration with MIIDS, TRE, EA-6B datalink, and Tactical Aircraft Mission Planning System (TAMPS).

2. (U) FY 1990 PROGRAM: Integrate AN/TSQ-90D with Intelligence Analysis System (IAS), Special Security Communication Center (SSCC), and Tactical Communication Center (TCC).

3. (U) FY 1991 PLANS: Complete integration EA-6B datalink, IAS, MIIDS, SSCC, TCC and TRE. Begin Shelter installation.

4. (U) PROGRAM TO COMPLETION: Begin integration of AN/TSQ-90E block upgrade to Advance Tactical Air Control Center (ATACC), EA-6B Advance Capability (ADVCAP), ALQ-149 Communication Jammer, Tactical Department of Defense Integrated Intelligence System (DODIIS) during FY 92-94.

E. (U) WORK PERFORMED BY: IN-HOUSE: PMTC, Point Mugu, CA; NAVAIR, Washington, DC; NWSC, Crane, IN. CONTRACTORS: Grumman Corporation, Long Island, NY.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
70	TERPES	0	3,900	5,100	2,700	8,898

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Operational Systems)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0036	MC C2 Systems	5,242	(Moved to Project C2035)			
C0045	TACSIIP	3,643	4,765	6,657	Continue	Continue
C0103	MACCS OPS	3,915	3,156	3,340	Continue	Continue
C1067	Aviation Radar	4,262	3,745	5,773	Continue	Continue
C1443	Trng Dev/Sim	3,044	1,298	2,841	Continue	Continue
C2035	PLRS/NAVSTAR		8,219	8,407	Continue	Continue
	TOTAL	**20,106**	**21,183**	**27,018**	**Continue**	**Continue**

B. (U) DESCRIPTION: This Program Element provides funds for the further development of operational Marine command, control, and communications systems. Efforts will be directed toward achieving inter/intraoperability and total integration of tactical command, control, and communications systems and related subsystems. Individual system modification and enhancements are initiated as part of this element.

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Operational Systems)
PROJECT NUMBER: C0036 PROJECT TITLE: Marine Corps Command and Control Systems (MC C2 Systems)

C. (U) DESCRIPTION: This project included the Marine Integrated Fire and Air Support System (MIFASS), the Tactical Combat Operations (TCO) System, the Position Location Reporting System (PLRS) and NAVSTAR Global Positioning System (NAVSTAR GPS). The MIFASS project was terminated by Congressional reduction. PLRS is an active system which maintains electronic tracks on manpack, vehicle and aircraft PLRS user units. NAVSTAR GPS is a passive electronic system used to locate reference points utilized by PLRS.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) PLRS - Awarded contract for follow-on buy; fielded 7th PLRS and spares; developed test program sets; demonstrated communications enhancements.

b. (U) GPS - participated in multi-service operational test and evaluation, USMC conducted field demonstrations to refine employment concepts; prepared for Marine Corps Program Decision Meeting (MCPDM) III B decision to begin procurement of NAVSTAR GPS manpack.

2. (U) FY 1990 PROGRAM: Funding contained in C2035, PLRS/NAVSTAR GPS in this program element.

3. (U) FY 1991 PLANS: Funding contained in C2035.

4. (U) PROGRAM TO COMPLETION: Funding contained in C2035.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Operational Systems)
PROJECT NUMBER: C0045 PROJECT TITLE: Tactical Systems Inter/Intra-operability Program (TACSIIP)

C. (U) DESCRIPTION: This project funds development of inter/intraoperability of tactical Command Control Communications, Computers, and Intelligence Systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed development of the Interoperability Database (IDB). Continued revision/update of Technical Interface Concept (TIC) and Technical Interface Design Plan (TIDP). Established Interoperability Testbed at MCTSSA. Publish Marine Corps Tactical Communications Architecture (MCTCA). Conducted TIDP Interoperability, Test, and certification of new C4I systems. Monitored future systems engineering for Marine Tactical Systems aboard amphibious ships.

2. (U) FY 1990 PROGRAM: Maintain IDB. Continue revision/update of TIC, TIDP, and MCTCA. Conduct Interoperability Testing and certification of new C4I systems.

3. (U) FY 1991 PLANS: Maintain IDB. Continue revision/update of TIC, TIDP, and MCTCA. Conduct Interoperability Testing and certification of new C4I systems.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC/MCCDC, Quantico, VA; USA CECOM, Fort Monmouth, NJ; ATCCS Experimentation Site, Fort Lewis, WA; Pacific Northwest Lab, Department of Energy. CONTRACTORS: Eagle Technology Corporation, Arlington, VA and ATAC Corporation, Mountain View, CA.

F. (U) RELATED ACTIVITIES: US Army Maneuver Control C2 programs

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Operational Systems)
PROJECT NUMBER: C0103 PROJECT TITLE: Marine Air Command and Control Systems Operational Development (MACCS OPS)

C. (U) DESCRIPTION: This project supports the MACCS for Marine Corps and Joint/Allied interoperability and compatibility.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Evaluated and selected components to comprise the Portable Heliport Lighting Set (PHLS). Continued upgrading and testing each system's software and hardware to maintain interoperability with Joint/Allied commands. Tested and evaluated Marine Air Traffic Control System (MATCS) upgrades.

2. (U) FY 1990 PROGRAM: Test and evaluate the PHLS configuration to meet an urgent safety related Fleet Marine Force deficiency. Continue upgrading, testing, evaluating and implementing current systems software and hardware to ensure compatibility and interoperability with Joint/Allied tactical command and control agencies.

3. (U) FY 1991 PLANS: Begin operational testing of the PHLS. Continue MACCS upgrades and arrive at a more cost-effective means to maintain compatibility/interoperability with Joint/Allied tactical command and control agencies.

4. (U) PROGRAM TO COMPLETION: Continue block upgrades to fielded systems to maintain Joint/Allied interoperability.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; MCTSSA, Camp Pendleton, CA; NAVELEX, Vallejo, CA. CONTRACTORS: Advanced Computer Systems, Inc., Fairfax, VA; Litton, Van Nuys, CA.

F. (U) RELATED ACTIVITIES: US Air Force Modular Control Equipment and New Mobile Radar Approach Control.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
66	TAOM	67,389	54,339	47,400	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems Operational Systems)

PROJECT NUMBER: C1067 PROJECT TITLE: Aviation Radar Product Improvement Program (Aviation Radar Pip)

C. (U) DESCRIPTION: This project funds modifications in response to field-identified discrepancies for existing radars. The modifications include Electronic counter-countermeasures (ECCM) and anti-antiradiation missile capability for existing radars.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed hardware for the AN/TPS-32 Improved Radar Display Console (IRDC). Began AN/TPS-59 Low Radar Cross-Section (RCS) Target Detection Studies. Began Multi-Spectral Sensor Suite (MSSS) studies. Investigated radar quality deficiency reports (QDRs).

2. (U) FY 1990 PROGRAM: Begin development of AN/TPS-59 Electronic Counter Measures (ECM) Analyzer, Low RCS target modification, Energy Management/Track While Scan Study, AN/TPS-63 Solid State Transmitter (SSTX), and Mark XV IFF Interface. Begin development of MSSS sensors and AN/TPS-63 Decoys. Investigate radar QDRs.

3. (U) FY 1991 PLANS: Continue AN/TPS-59 ECCM analyzer, Low RCS target modification, Engineering Development Model (EDM) AN/TPS-59 Energy Management Track While Scan, EDM AN/TPS-63 Decoy, SSTX and Mark SV Interfaces. Continue MSSS studies. Investigate radar QDRs.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC and NRL Washington, DC. CONTRACTORS: GE, Syracuse, NY; Westinghouse, Baltimore, MD; ITT Gilfillan, Van Nuys, CA; SENSIS Corporation, Syracuse, NY.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
82	Mod Kit	0	8,700	2,500	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems Operational Systems)

PROJECT NUMBER: C1443 PROJECT TITLE: Training Devices/Simulators Program

C. (U) DESCRIPTION: This project develops tactical engagement/command and control, training devices/simulators in support of operational weapon systems, tactical equipment, and tactical command and control systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Reoriented Marine Air Ground Task Force Tactical Warfare Simulator (MTWS) (formerly TWSEAS) into commercial computer use from tactical computers; and initiated software development in ADA programming language. Completed development of Manual Wargames (MWG) and PGTS.

2. (U) FY 1990 PROGRAM: Continue development of MTWS software design.

3. (U) FY 1991 PLANS: Continue design/coding, development of MTWS system.

4. (U) PROGRAM TO COMPLETION: Product improve MTWS display system.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, NOSC, NTSC, NADC. CONTRACTORS: University of Central Florida, Fairchild-Weston Systems Exploration Inc., Computer Science Corporation, Eagle Technology, UNISYS.

F. (U) RELATED ACTIVITIES: Battalion/Brigade Automade Battle Simulation, ARTBASS, MILES, Amphibious Warfare Tactical Trainer, Engineer Wargamming System, Electronic Warfare Simulation.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
114-5	Training Devices/Simulators Program	6,000	5,000	3,700	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Operational Systems)
PROJECT NUMBER: C2035 PROJECT TITLE: Position Location Reporting System/ NAVSTAR Global Positioning System (PLRS/NAVSTAR GPS)

C. (U) DESCRIPTION: PLRS is an active system which maintains electronic tracks as well as communications capability on manpack, vehicle, and aircraft user units. GPS, a space based radio navigation system, will be used to anchor PLRS, serve as initial survey for radars and artillery, and provide position and navigation capability to users outside of, or prior to the establishment of the PLRS network.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Awarded PLRS contract for follow-on buy; fielded 7th PLRS and spares; developed sets; demo communications. GPS participated in multi-service operational test and evealuation, USMC field demonstration and development of employment concepts.

2. (U) FY 1990 PROGRAM: Initiate downsized PLRS Master Station/Communications Enhancements. Initiate PLRS/GPS Interface Unit development. Conduct GPS test and evaluation. Purchase remaining PLRS installation kits and ancillary hardware. Complete the PLRS Test Program Set development.

3. (U) FY 1991 PLANS: Continue the downsizing of the PLRS Master Station/Communications Enhancements and the PLRS/GPS Interface Unit development and continue to conduct GPS test and evaluation.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Washington, DC.
F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
65	P L R S	27,600	23,600	0	TBD	

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0208010M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Tactical Communications Program

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0049	ULS	1,869	112	1,094	Continue	Continue
C0065	JTCCCA	1,836	464	916	Continue	Continue
	TOTAL	3,705	576	2,010	Continue	Continue

B. (U) DESCRIPTION: This program element provides for development of the TRITAC Unit Level Switches (ULS) and supporting equipments. Equipments developed within this program element support the mission area of command and control and specifically support the switching requirements of the various subsystems within the Landing Force Integrated Communications System. The Assistant Secretary of Defense (ASD) for Command, Control, Communications and Intelligence has designated the Marine Corps as the developing service for ULS and the ASD provides funding for Marine Corps testing of Joint Tactical Command, Control and Communications Program equipments. The ULS project consists of product improvements to the Unit Level Circuit Switch (ULCS), Unit Level Tactical Data Switch (ULTDS), and their peripherals. The COMMCON project contains the JTCP network planning (SPEED), control (SYSCON) and restoration (TECHCON) systems that are required to deploy and operate the digital communications JTCP network. It also contains funds to support Marine Corps JTCP Testing.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0208010M BUDGET ACTIVITY: 4
PROGRAM ELEMENT Title: Joint Tactical Communications Program
PROJECT NUMBER: C0049 PROJECT TITLE: Unit Level Switches Product Improvement (ULS)

C. (U) DESCRIPTION: The ULCS and ULTDS will provide the backbone of the TRITAC communications architecture within the Marine Corps. This project will incorporate product improvements recommended by the FMF through operational testing.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: ULCS deliveries and suitability testing began. ULTDS underwent user evaluations by selected FMF units.

2. (U) FY 1990 PROGRAM: Field and evaluate ULCS. Evaluate FMF recommendations for ULTDS improvements.

3. (U) FY 1991 PLANS: Incorporate ULCS improvements. Incorporate ULTDS improvements.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: SPAWAR, Washington, DC. CONTRACTORS: Atlantic Research Corporation, Rockville, MD; ITT Defense Communications Division, Nutley, NJ.

F. (U) RELATED ACTIVITIES: This effort is related to Program Element 0208010A, Tri-Service Joint Tactical Communications Program, Army; Program Element 0208010F, Tri-Service Joint Tactical Communications Program, Air Force; and Program Element 0208020N, Tri Service Joint Tactical Communications Program, Navy. The National Security Agency is developing Communications Security Equipment for the Unit Level Switch Programs.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
54	Unit Level S	75,700	48,000	32,900	16,879	233,129

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRRAM ELEMENT: 0208010M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Tactical Communications Program
PROJECT NUMBER: C0065 PROJECT TITLE: Marine Corps Unilateral Test and Evaluation for JTCP

C. (U) DESCRIPTION: This project consists of three programs; (1) System Planning, Engineering and Evaluation Device (SPEED), (2) Operational Systems Control Center (SYSCON), and (3) Technical Control Facility (TECHCON). These systems are required to deploy, operate, and restore the digital JTCP communications networks. This project also supports JTCP testing.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed "rehosting" of prototyped SPEED software onto ruggedized microcomputer and conducted Development Test. Completed fabrication and fielded prototype, portable, TECHCONS.

2. (U) FY 1990 PROGRAM: Operational Test for baseline SPEED and conduct MCPDM III. Begin SPEED software Preplanned Product Improvement (P3I) Program. Evaluate prototype TECHCON. SYSCON prototype development.

3. (U) FY 1991 PLANS: SPEED software P3I Program. MCPDM III for TECHCON. Evaluate SYSCON prototype.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: ECAC, Annapolis, MD and Tobyhanna Army Depot, PA. CONTRACTORS: Atlantic Research Corporation, Rockville, MD.

F. (U) RELATED ACTIVITIES: This effort is related to Program Element 0208010A, Tri-Service Joint Tactical Communications Program, Army; Program Element 0208010F, Tri-Service Joint Tactical Communications Program, Air Force.

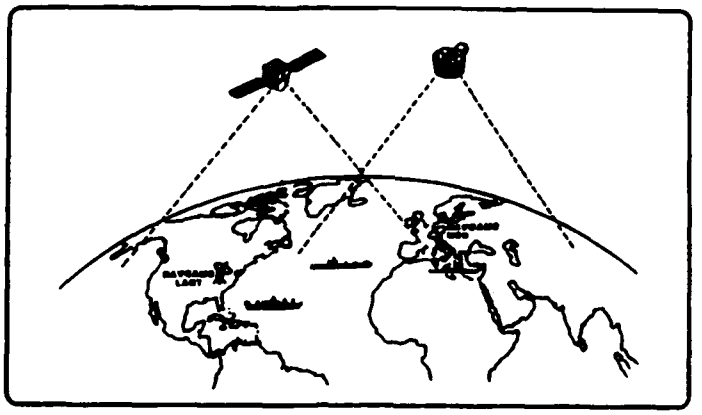
G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: SATELLITE COMMUNICATIONS
PROJECT NUMBER: X0731 PROJECT TITLE: FLEET SATELLITE COMMUNICATIONS



POPULAR NAME: SATCOM

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	MS II 2/89	TADIXS Phase IV IOC 8/90		Mini-DAMA MS III 2Q/94
ENGINEERING MILESTONES		Mini-DAMA PDR 2Q/90	Mini-DAMA CDR 3Q/91	
T&E MILESTONES				Mini-DAMA DT/OT FY93
CONTRACT MILESTONES	Mini-DAMA Award 7/89			

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
Major Contract	11,432	11,827	10,684	Continuing
Support Contract	1,916	1,203	902	Continuing
In-House Support	3,057	2,846	2,137	Continuing
GFE/ Other	0	0	0	
Total	16,405	15,876	13,723	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: SATELLITE COMMUNICATIONS
PROJECT NUMBER: X0731 PROJECT TITLE: FLEET SATELLITE COMMUNICATIONS

B. (U) DESCRIPTION: Fleet Satellite Communications provides worldwide satellite communications. The project develops shipboard and shore based equipment operating throughout three communication satellite systems: Fleet Satellite (FLTSAT) Communications, Leased Satellite (LEASAT) Communications, and Defense Satellite Communication System (DSCS). One mission is to provide global, continuous, secure communications among Naval Forces. A second mission is to provide secure and anti-jam communication between command centers and fleet commanders using DSCS satellites. Specifically, efforts develop Ultra High Frequency (UHF) Terminals, network controllers, time division multiplexers, and provide tactical support for super high frequency terminals. FLTSAT provides fleet broadcast service to all Navy ships, Over-the-Horizon Targeting data for TOMAHAWK and Flag configured ships, submarine communications, intelligence data, and various other battle group satellite communications circuits while the Super High Frequency (SHF) terminals operate within the Defense Satellite Communication System. This project consists of several individual but related elements for satellite communications to different tactical users. Within any one satellite system, several subsystems are being developed to solve unique problems for different users. Tactical Data Information Exchange Subsystem (TADIXS) serves as the primary shore-to-ship communication line for providing over-the-horizon targeting data to TOMAHAWK missile equipped ships. The Miniature Demand Assigned Multiple Access (Mini-DAMA) system will provide the same satellite channel utilization efficiencies for aircraft and submarines that are now enjoyed by surface ships and shore stations equipped with the larger version TD-1271 DAMA multiplexer. Officer in Tactical Command Information Exchange Subsystem (OTCIXS) phase II software will be developed to provide OTCIXS Battle Group command and control data on a DAMA channel on the satellite. Sending OTCIXS data on DAMA allows increased communications capability on existing satellites.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Started Mini-DAMA Full Scale Development.
   b. (U) Continued TADIXS Phase IV development.
2. (U) FY 1990 PROGRAM:
   a. (U) Continue Mini-DAMA Full Scale Development.
   b. (U) TADIXS Phase IV IOC.
3. (U) FY 1991 PLANS:
   a. (U) Continue Mini-DAMA Full Scale Development.
   b. (U) Conduct Mini-DAMA DT and refine integration specifications.
   c. (U) Continue conversion of OTCIXS to DAMA capability.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Complete development of Mini-DAMA, conduct DT/OT FY93
   b. (U) Achieve MS III for Mini-DAMA (3Q/FY94)

D. (U) WORK PERFORMED BY: CONTRACTORS: Advanced Digital Systems, Inc, San Diego, CA; MA/COM, San Diego, CA; Computer Science Corporation, Falls Church, VA; Advanced Communication Systems, Inc., Arlington, VA; IN-HOUSE. NAVOCEANSYSCEN, San Diego, CA; NAVELEXSYSENGACT, St. Inigoes, MD; NAVELEXSYSENGCEN, Vallejo, CA; NAVELEXSYSENGCEN, Charleston, SC; NUSC, New London, CT.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: SATELLITE COMMUNICATIONS
PROJECT NUMBER: X0731 PROJECT TITLE: FLEET SATELLITE COMMUNICATIONS

E. (U) COMPARISON WITH REVISED FY 1990/91 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

(U) JOR H-C123-75 (DAMA)	12/75
(U) DCP 99R5	3/77
(U) OR 174-094-87 (MINI-DAMA)	8/87
(U) TEMP 252-10 (MINI-DAMA)	1/89

G. (U) RELATED ACTIVITIES. None.

H. (U) OTHER APPROPRIATION FUNDS:

PROCUREMENT	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TOTAL PROGRAM
OPN #140 (Excluding NN107)	10,205	15,852	20,214	Cont.
OPN #141 (Excluding NP109)	0	4,993	3,402	Cont.
QUANTITIES (VARIOUS)				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY-1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303131N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Minimum Essential Emergency Communication Network
PROJECT NUMBER: X0795 PROJECT TITLE: MEECN

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0795	MEECN	1,034	1,305	1,559	CONT.	CONT.

B. (U) DESCRIPTION: This project develops the Minimum Essential Emergency Communications Network Message Processing Mode and other processing advancements which are an integral part of Fleet Ballistic Missile Submarine Command and Control System communications. These advancements improve delivery of emergency action messages via the Navy and Air Force Low Frequency/Very Low Frequency system. MEECN Message Processing Mode encodes the specialized emergency action messages transmitted from the National Command Authority to Fleet Ballistic Missile submarines, bombers and launch control centers over the Low Frequency/Very Low Frequency communication system. The program provides system architecture upgrades, configuration control management and additional MEECN interoperability testing as new software programs are evolving to meet applicable threats. It will also provide interoperability assessments in line with the planned deployment posture of the MEECN in coordination with the Joint Chiefs of Staff, Air Force, and Defense Communications Agency.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Tested MEECN HIDAR modes.
   b. (U) Supported testing Compact Very Low Frequency (CVLF) receiver.
   c. (U) Analyzed MEECN system architectures.
2. (U) FY 1990 Programs:
   a. Implement Non-Linear Adaptive Processor (NONAP).
   b. Continue system architecture upgrades and configuration control management.
   c. Continue MEECN interoperability testing as new software programs are evolving to meet applicable threats.
3. (U) FY 1991 Plans:
   a. Continue systems architecture upgrades and configuration control management.
   b. Continue MEECN interoperability testing as new software programs are evolving to meet applicable threats.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Lead Laboratory is NAVOCEANSYSCEN, San Diego, CA. CONTRACTORS: GTE, Government Systems Corporation, Needham Heights, MA and Technology Services Corporation, Santa Monica, CA.

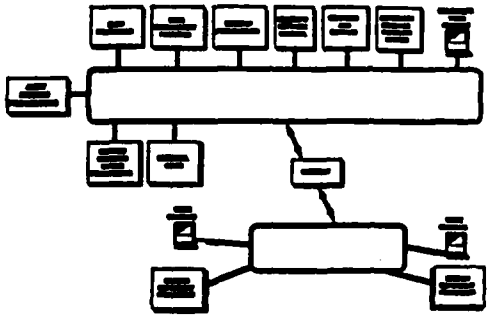
E. (U) RELATED ACTIVITIES: PE 0101402N, Navy Strategic Communications (Shore-to-ship Communications Project X1083) contains the LF/VLF systems into which the MEECN Message Processing Mode will be incorporated.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303152N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: WWMCCS ADP Modernization (WAM)
PROJECT NUMBER: X1798 PROJECT TITLE: Navy WAM



POPULAR NAME: WWMCCS ADP MODERNIZATION (WAM)

A. (U) SCHEDULED/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		WAM DAB MS-II 1QTR		Continuing
Engineering Milestones		Comp. NWSUS Inc. I	NWSUS Inc.I Install	Continuing
T&E Milestones			NWSUS DT/OT	Continuing
Contract Milestones			Del. NWSUS Inc. I	Continuing

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	2,800	4,506	2,980	Continuing
SUPPORT CONTRACT	1,290	1,320	791	Continuing
IN-HOUSE SUPPORT	489	200	325	Continuing
GFE/ OTHER	0	0	0	Continuing
TOTAL	4,579	6,026	3,996	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303152N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: WWMCCS ADP Modernization (WAM)
PROJECT NUMBER: X1798 PROJECT TITLE: Navy WAM

B. (U) DESCRIPTION: This joint modernization program provides for the phased redesign and replacement of the current WWMCCS Automated Data Processing (ADP) hardware/software system. The WWMCCS ADP Modernization program will develop a modern ADP system to provide C^3 information for the National Command Authority (NCA); support strategic and conventional planning and command of forces; provide an effective crisis action management system; support joint operations execution planning and monitoring; and provide supportability and sustainability of information for command and support of forces. The Navy is responsible for major WWMCCS sites supporting USCINCPAC, CINCPACFLT, USCINCLANT, CINCLANTFLT, CINCUSNAVEUR, COMUSKOREA, COMUSJAPAN and CNO.

(U) This development modernizes the existing Navy WAM Site Unique Software NWSUS COBOL software into ADA language providing the ability to re-host most applications on WWMCCS ADP workstations and provide the interface between Joint Mission Applications Software (JMAS) and Joint Operations Planning and Execution Software (JOPES).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Provided technical support for the WAM program.
   b. (U) Continued technical review of JOPES software design specifications.
   c. (U) Prepared site unique software Test and Evaluation Master Plan (TEMP).
   d. (U) Continued NWSUS software modernization. Completed Increment I System Requirements Review (SRR), System Design Review (SDR), System Software Review (SSR) and Preliminary Design Review (PDR).
2. (U) FY 1990 PROGRAM:
   a. (U) Continue technical review for JOPES versions software design and test specifications.
   b. (U) Complete design of NWSUS Increment I software at USCINCPAC, USCINCLANT, and USFK.
   c. (U) Begin development, test and installation of NWSUS Increment I software at USCINCPAC, USFK, and USCINCLANT.
   d. (U) Begin design of NWSUS Increment II software for USCINCPAC, USFK and USFJ.
   e. (U) Complete site unique software TEMP and Test Plans.
3. (U) FY 1991 PLANS:
   a. (U) Continue technical review of JOPES versions software design specifications.
   b. (U) Complete installation and operational testing of NWSUS Increment I at USCINCPAC and USFK.
   c. (U) Complete installation of NWSUS Increment I at USCINCLANT.
   d. (U) Continue design of NWSUS Increment II software.
   e. (U) Begin design of NWSUS Increment III software for USCINCPAC and USCINCLANT.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Complete development of NWSUS Increments II and III.
   b. (U) Complete DT and OT of Increments II and III.

PROGRAM ELEMENT: 0303152N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: WWMCCS ADP Modernization (WAM)
PROJECT NUMBER: X1798 PROJECT TITLE: Navy WAM

c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY:
IN HOUSE: Naval Ocean Systems Center (NOSC), San Diego.
CONTRACTORS: Andrulis Research Corporation, Bethesda, MD; Advanced Technology Inc., Reston, VA; Booz-Allen-Hamilton, Bethesda, MD; Planning Research Corp., McLean, VA.

E. (U) COMPARISON WITH REVISED FY 1991 PRESIDENT'S BUDGET:
1. (U) ENGINEERING CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGE: None.

F. (U) PROGRAM DOCUMENTATION:
- o JMENS, 6/82
- o WAM DCP (Draft) 11/89
- o WAM TEMP (Draft) 12/89
- o ILSP, 9/89
- o NWSUS TEMP (Draft) 9/89

G. (U) RELATED ACTIVITIES:
- o PE 0303152F WWMCCS ADP Modernization (WAM), funds the Joint Program Management Office (JPMO).
- o PE 0303152K (WAM), PE 0303151H (WWMCCS ADP), and PE 0902498M (Management Headquarters (ADMIN)) fund Joint WAM procurement for Defense Communications Agency, Defense Nuclear Agency, and the US Marine Corps, respectively.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT					
OPN 147	1,036	288	0	Cont.	Cont.
OPN(BA7) 3382100	300	4,475	0	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303401N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Communications Security

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0734	COMSEC R&D	-		-	Cont.	Cont.
X1237	TEMPEST OP	223	300	307	Cont.	Cont.
	TOTAL			-	Cont.	Cont.

B. (U) DESCRIPTION: The goal of the Navy Communications Security (COMSEC) program is to ensure the continued protection of Navy and Joint communications systems from hostile exploitation. The program accomplishes this by: analyzing and evaluating currently deployed and developmental C3I and EW systems to identify vulnerabilities; developing and testing new cryptographic equipments, systems and techniques; and developing equipment and techniques for testing operational and developmental equipment in order to protect against compromising emissions. The current emphasis is on achieving an interoperable, more secure key distribution capability among Army, Navy and Air Force.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303401N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Communications Security
PROJECT NUMBER: X0734 PROJECT TITLE: Communications Security R&D

A. (U) RESOURCES: (Dollars in Thousands)

POPULAR NAME	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
COMSEC R&D	-	-	-	Cont.	Cont.

B. (U) DESCRIPTION: The Communications Security (COMSEC) Project analyzes existing COMSEC equipments and develops improved, interoperable communications security equipment and methods to protect classified communications from adversary exploitation. The project is a continuing effort to modernize obsolete cryptographic equipment and ancillaries with state-of-the-art replacements in order to meet the evolving threat. Projects under COMSEC R&D development include: state-of-the-art secure voice communications equipment; the Navy Key Distribution System (NKDS) to secure Navy key variables; the Navy Single Point Keying System to centralize and automate distribution of cryptographic key material; the Modular Security Device (MSD); and integrating KG-66/KGR-66/KGV-68.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Started NKDS full scale development.
   b. (U) Completed STU-III test and evaluation.
   c. (U) Continued to procure the [redacted] for application to Navy missiles, aircraft and associated subsystems and system integration to support Navy weapon system R&D tests.
   d. (U) Developed MSD system specifications.
2. (U) FY 1990 PROGRAM:
   a. (U) Continue to procure [redacted] for application to Navy missiles, aircraft and associated subsystems and system integration to support Navy weapon system R&D tests.
   b. (U) Conduct NKDS Preliminary Design Review.
   c. (U) Complete design of MSD implementation architecture.
3. (U) FY 1991 PLANS:
   a. (U) Continue to procure the [redacted] for application to Navy missiles, aircraft and associated subsystems and system integration to support Navy weapon system R&D tests.
   b. (U) Continue NKDS development. Conduct Critical Design Review.
   c. (U) Continue MSD development.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Continue to procure the [redacted] for application to Navy missiles, aircraft and associated subsystems and system integration to support Navy weapon system R&D tests.
   b. (U) Complete development of the NKDS.
   c. (U) This is a continuing program.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303401N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Communications Security
PROJECT NUMBER: X0734 PROJECT TITLE: Communications Security R&D

D. (U) WORK PERFORMED BY: In-house: Naval Research Laboratory, Washington, DC; Naval Electronic Systems Security Engineering Center, Washington, DC; Naval Ocean Systems Center, San Diego, CA; and Naval Electronics Systems Engineering Center, Portsmouth, VA. Contractors: ITT, Nutley, NJ; GTE, Needham Heights, Mass; Booz, Allen & Hamilton, Bethesda, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET: The Department adjustment of -$2,564K was offset by equivalent savings during contract award for NKDS.

F. (U) PROGRAM DOCUMENTATION:

OR #03309487 Operational Requirement for STU III	1/86
COMSEC RESOURCES PROGRAM (CRP)	5/88
OR #14409486 FOR NKDS	3/87
AP FOR NKDS	8/89
TEMP #1163-01 FOR NKDS	8/89

G. (U) RELATED ACTIVITIES: Program element 0303401G, equipments.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
OPN #154 (NR009)				Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

MAJOR MILESTONES	M/S II	M/S III	IOC
STU-III	3/Q FY85	2/Q FY88	4/Q FY88
KG-84C	N/A	4/Q FY88	1/Q FY89
Navy Key Dist System	4/Q FY89	2/Q FY93	4/Q FY93

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303401N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Communications Security
PROJECT NUMBER: X1237 PROJECT TITLE: TEMPEST OP Development

C. (U) DESCRIPTION: The TEMPEST OP Development project develops and employs specialized test equipment to investigate the TEMPEST characteristics of operational and developmental Navy Systems. The test equipments employ signal storage and presentation capability, spectrum analysis and signal strength measurement devices to support testing of Navy systems across the electromagnetic and electro-optic spectra and recommend solutions to identified TEMPEST problems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Developed test objectives, instrumentation, and countermeasures for operational and developmental systems with TEMPEST problems.
   b. (U) Completed NAVAUTEMP II development.
2. (u) FY 1990 PROGRAM:
   a. (u) Started development of the applique for the
   b. (U) Develop tailored analysis and test instrumentation and techniques for controlling compromising electro-magnetic emanations in Navy systems.
3. (u) FY 1991 PLANS:
   a. (u) Define the TEMPEST hazards associated with systems.
   b. (U) Complete development of the applique for the
4. (u) PROGRAM TO COMPLETION:
   a. (U) Continue development of tailored instrumentation and techniques to identify TEMPEST problems in Navy systems and recommend solutions.
   b. (U) Continue development of TEMPEST instrumentation.
   c. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NAVELEXSECCEN, Washington, DC.

F. (U) RELATED ACTIVITIES: PE 0303401G.
system equipment and techniques will be used in the Navy's TEMPEST Program.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1989 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303603N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Milstar Satellite Communication System
PROJECT NUMBER: X1880 PROJECT TITLE: Joint Terminal Program Office (JTPO)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1880	Joint Terminal Program Office	4,397	5,001	4,591	Cont.	Cont.

B. (U) DESCRIPTION: Milstar is a global, strategic-and-tactical, satellite communications system designed to provide essential and survivable communications to Unified/Specified Commanders-in-Chief and the National Command Authority. The Milstar Joint Terminal Program Office (JTPO) is tasked with directing and coordinating the development of Army, Navy and Air Force Milstar Terminals. Navy funds the JTPO in accordance with DOD direction.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Conducted tri-service terminal interoperability testing.
   b. (U) Continued development of interoperable terminal protocols.
   c. (U) Modified Advanced Narrow-Band Digital Voice Terminal to enhance nuclear environment performance.
   d. (U) Developed EHF specification for Milstar/UHF Follow-On Satellite (UFO) terminal compatibility.
2. (U) FY 1990 PROGRAM:
   a. (U) Continue terminal protocol development and interoperability T&E.
   b. (U) Identify/test/resolve interoperability/compatibility issues.
   c. (U) Complete development of Milstar/UFO interoperability specifications.
   d. (U) Continue joint-service ILS planning and documentation.
3. (U) FY 1991 PLANS:
   a. (U) Audit production designs of tri-service terminals.
   b. (U) Continue protocol development and interoperability T&E.
   c. (U) Support tri-service transition to production.
   d. (U) Provide technical support to OJCS, OSD, OPNAV, CINCS and users.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Identify and resolve system engineering issues, conduct system interoperability T&E, support physical and functional configuration audits, and transition JTPO functions to Milstar System Operators.
   b. (U) Provide technical support to users.
   c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC. CONTRACTORS: Booz, Allen & Hamilton, Bethesda, MD.

E. (U) RELATED ACTIVITIES: Program Element 0303603F, Air Force Satellite Communications; Program Element 0303601F, Milstar Terminals; Program Element 0303142A, EHF Communication Terminals; Program Element 0604577N, Navy EHF Satellite Communications Terminals.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305111N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Weather Service
PROJECT NUMBER: X0523 PROJECT TITLE: SATDAT

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0523	SATDAT	872	995	1,083	CONT.	CONT.

B. (U) DESCRIPTION: The software developed by this program enables satellite data to be used by global, regional and tactical oceanographic/atmospheric analysis and prediction models. It also supports software portability studies and rehosting of prediction models from other sources. Modifications to the Tactical Environmental Support System (TESS(3)) data base managemetn system and man machine interface will increase user support and integrate data input functions with product generation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Meet baseline operational capabilities of ISDB by ingestion of Defense Meteorological Satellite Program (DMSP), Special Sensor Microwave Imager (SSM/I) and FNOC data.

b. (U) Demonstrate baseline for data flow from FNOC to ISDB data base management system.

c. (U) Integrate National Oceanic and Atmospheric Administration (NOAA) Automatic Picture Transmission (APT) data and Tiros, Operational and Vertical Sounder (TOVS) data with display software to enable operation on a desktop computer.

d. (U) Complete shared processing network for ISDB.

2. (U) FY 1990 Program:

a. (U) Link data base management techniques with AN/SMQ-11 and the TESS(3).

b. (U) Design and develop user graphic interface utilities.

c. (U) Adapt NASA software portability routines.

d. (U) Rehost National Hurricane Center tropical cyclone model.

3. (U) FY 1991 Plans:

a. (U) Develop capability for integrating atmospheric sounder and SSM/I data.

b. (U) Integrate scatterometer wind data with SSM/I winds and precipitation.

c. (U) Commence modifications to TESS(3) Data Base Management System and Man Machine Interface to improve user support.

d. (U) Begin integration of operational applications software into TESS(3) data base management system.

e. (U) Begin development of multi-sensor, multi-satellite applications software for TESS(3) and large scale computer.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Monterey, CA. (Previously NEPRF). CONTRACTOR: NASA (Earth Resources Lab), Bay St. Louis, MS.

E. (U) RELATED ACTIVITIES: PE 0603207N, Air/Ocean Tactical Applications

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0524	DMSP-Navy Support	796	1,223	1,295	CONT.	CONT.
X1452	GEOSAT	1,077	1,117	2,907	3,565	66,144
TOTAL		1,873	2,340	4,202	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program funds the development, test, calibration and operation of space based systems and sensors designed to measure atmospheric and oceanographic parameters. The goal of this program is to improve our capability to monitor and predict the operating environment through satellite detection of environmental features. A capability to provide Navy tactical and central sites with atmospheric moisture, surface wind speed, and ice data was added to the Defense Meteorological Satellite Program (DMSP) with the launch of a microwave imager in June 1987. On-orbit command and control and data processing for the Geophysical/Geodetic Satellite (GEOSAT) continues.

PROGRAM ELEMENT: 0305160N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program
PROJECT NUMBER: X0524 PROJECT TITLE: DMSP - Navy Support

C. (U) DESCRIPTION: Defense Metorological Satellite Program (DMSP) provides Navy support to the DMSP under an Air Force/Navy/Army Memorandum of Agreement (MOA). It also funds Navy efforts associated with the special sensors located on the DMSP satellite and other efforts, such as the Remote Atmospheric/ Ionospheric Detection System (RAIDS) experiment, related to providing measurements of atmospheric, oceanographic, and ionospheric parameters to Navy units. Naval space sensed meteorological data requirements are thus meet. Meteorological data provides tactical information required by air, surface and anti-submarine warfare sensors to increase effectiveness.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Completedjoint-service SSM/I Calibration and Validation Plan.
b. (U) Integrate prototype RAIDS onto host satellite.
c. (U) Install improved SSM/I software at Fleet Numerical Oceanography Center (FNOC).
2. (U) FY 1990 Program:
a. (U) Complete installation of improved SSM/I algorithms at FNOC.
b. (U) Launch RAIDS and begin data analysis.
3. (U) FY 1991 Plans:
a. (U) Continue study of space based and data processing methods.
b. (U) Continue RAIDS data analysis
4. (U) Program to Completion: This is a continuing program for study of space based and data processing methods to extract the maximum tactical environmental information and improve prediction capability.

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVSPASYSACT, Los Angeles, CA. CONTRACTOR: Hughes Aircraft Corp., El Segundo, CA; Harris Corp., Melbourne, FL.

F. (U) RELATED ACTIVITIES: PE 0305160F, Air Force Defense Meteorological Satellite; PE 0305111N, Weather Service; PE 0603207N, Air/Ocean Tactical Applications; PE 0603704N, Anti-Submarine Warfare Oceanography; PE 0604218N, Air/Ocean Equipment Engineering. Each of these programs depends on information gathered by DMSP and GEOSAT.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
WPN (#40)	21,575	0	0	0	40,908

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program
PROJECT NUMBER: X1452 PROJECT TITLE: Geodetic/Geophysical Satellite

C. (U) DESCRIPTION: Geodetic/Geophysical Satellite (GEOSAT) operation, provides funds for the operation of a unique development satellite launched in 1985. The primary mission provided the Navy with a complete description of the earth's geoid. Currently operating in an exact repeat mission, GEOSAT is providing ocean topography measurements from which front, eddy and current information is being derived by the Navy's research community to increase the effectiveness of anti-submarine and undersea warfare operations. As a result of increased life expectancy, GEOSAT should provide the Navy with near real-time oceanographic data on wave height, ice edge, ocean currents, fronts and eddies through FY 1992. These developments will provide better prediction and exploitation of sea environmental conditions.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Continued oceanographic on-orbit operations.
   b. (U) Continued exploitation of oceanographic data.
2. (U) FY 1990 Program:
   a. (U) Continue oceanographic on-orbit operations.
   b. (U) Continue exploitation of oceanographic data.
3. (U) FY 1991 Plans:
   a. (U) Continue oceanographic on-orbit operations.
   b. (U) Continue exploitation of oceanographic data.
4. (U) Program to Completion:
   a. (U) Oceanographic on-orbit operations predicted to complete in FY 1992. If satellite life extends beyond that time, this program will continue.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Laboratory, Washington, DC; NAVSWC, Dahlgren, VA. CONTRACTORS: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD.

F. (U) RELATED ACTIVITIES: PE 0305160F, Air Force Defense Meteorological Satellite; PE 0305111N, Weather Service; PE 0603207N, Air/Ocean Tactical Applications; PE 0603704N, Anti-Submarine Warfare Oceanography; PE 0604218N, Air/Ocean Equipment Engineering. Each of these depends on information gathered by DMSP and GEOSAT.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROGRAM ELEMENT: 0601152N BUDGET ACTIVITY: 1-Technology Base
PROGRAM ELEMENT TITLE: In-House Laboratory Independent Research
PROJECT NUMBER: Not Applicable PROJECT TITLE: Not Applicable:

A. (U) RESOURCES: (Dollars in Thousands)

	FY1989 ACTUAL	FY1990 ESTIMATE	FY 1991 ESTIMATE	TOTAL PROGRAM
(U) TITLE:	In-House Independent Laboratory Research			
	23,429	24,346	26,801	Continuing

B. (U) DESCRIPTION: This element provides the primary means for Navy laboratory directors to strengthen in-house capabilities and to initiate high-risk, high-payoff research relevant to their respective missions and to the needs of the Navy. Research is identified in those fields of science most closely related to the Navy's mission and on new concepts relevant to future requirements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: The following is a selected set of over 80 accomplishments reported during this fiscal year:

a. (U) Materials/Mechanics/Chemistry--Explored use of thin film technology and high-temperature superconductors for magnetic gradiometry.

b. (U) Electrooptics/Electromagnetics--Improved performance and long-term stability of electrochromic light-attenuation devices.

c. (U) Hydrodynamics/Aerodynamics--Improved methods for computing steady flow about a ship.

d. (U) Information Sciences--Designed a multiple partitioned m-dimensional computer memory architecture.

e. (U) Physical/Environmental Acoustics--Developed relationships that quantify impact of sensor position and sound speed mismatch on detection performance.

2. (U) FY 1990 PROGRAM: Program includes the following topics:

a. (U) Materials/Mechanics/Chemistry--properties of high temperature ceramic superconductors; transient crack growth in structural steels.

b. (U) Electrooptics/Electromechanics--tunable solid state laser materials for countermeasures devices; radar scattering and target discrimination.

PROGRAM ELEMENT: 0601152N BUDGET ACTIVITY: 1-Technology Base
PROGRAM ELEMENT TITLE: In-House Laboratory Independent Research
PROJECT NUMBER: Not Applicable PROJECT TITLE: Not Applicable

c. (U) Information Science--development of a unified theory for data fusion.

d. (U) Physical/Environmental Acoustics--signal processing for target discrimination in sonar clutter; matched field processing for Arctic acoustic detection.

e. (U) General Physics--use of the scanning tunneling microscope for evaluation of semiconductors; interactions of electron beams and radiation with matter, for damage assessment.

3. (U) FY 1991 PLANS: Programs will include the following topics:

a. (U) Materials/Mechanics/Chemistry--robust methods for tactical missile computations; electrochemistry of batteries; diamond semiconductor film material deposition.

b. (U) Electrooptics/Electromechanics--amplification of trace atmospheric elements in detection; science of superlattices of narrow band-gap semiconductors.

c. (U) Information Sciences--development of a unified theory for data fusion.

d. (U) Physical Environmental Acoustics--sound propagation modeling; interactions of acoustic, electromagnetic, and elastic waves with materials.

e. (U) General Physics--high power millimeter wave tube technology (for communications, radar, tracking); radiation, space charge, and field effects in charged particle beams; energy storage research for pulsed power.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: NOSC, San Diego, CA; NUSC, Newport, RI; NSWC, Dahlgren, VA; NWC, China Lake, CA; DTRC, Bethesda, MD; NCEL, Port Hueneme, CA; NADC, Warminster, PA; NCSC, Panama City, FL; NMRDC, Bethesda, MD; NPRDC, San Diego, CA; and NTSC, Orlando, FL. CONTRACTORS: Not applicable.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

PROGRAM ELEMENT: 0601152N BUDGET ACTIVITY: 1-Technology Base
PROGRAM ELEMENT TITLE: In-House Laboratory Independent Research
PROJECT NUMBER: Not Applicable PROJECT TITLE: Not Applicable

F. (U) PROGRAM DOCUMENTATION: Not applicable

G. (U) RELATED ACTIVITIES: Program Element 0601153N, Defense Research Science; Program Element 0602111N, AAW/ASUW Technology; Program Element 0602234N, System Support Technology; Program Element 0602314N, Antisubmarine Warfare; Program Element 0602936N Independent Exploratory Development; Program Element 0601101A, In-House Laboratory Independent Research; and 0601101F, In-House Laboratory Independent Research. This research effort is coordinated in a variety of ways reflecting the nature and level of activities and interests of different agencies. The overall independent research program is reviewed annually by Deputy Director of Defense Research and Engineering for Research and Advanced Technology. Medical research is coordinated through the Armed Services Biomedical Research Evaluation and Management Committee. Joint symposia are held with other military services and government agencies. Coordination is also accomplished through the usual means of professional scientific communication. Relationships are maintained with industrial research and development to insure transition from successful in-house research results to industrial development and to accommodate industrial request for use of special in-house facilities for tests and evaluation of components and instruments. This is done in accordance with the official Department of Defense policy on technology transfer.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601153N BUDGET ACTIVITY: 1-Technology Base
PROGRAM ELEMENT TITLE: Defense Research Sciences
PROJECT NUMBER: Not Applicable PROJECT TITLE: Not Applicable

A. (U) RESOURCES: (Dollars in Thousands)

S.E. NO.	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMP.	TOTAL PROG.
TOTAL FOR PROGRAM ELEMENT		328,964	341,584	374,357	Cont.	Cont.
11	General Physics	36,129	37,188	40,099	"	"
12	Radiation Sciences	1,990	2,627	3,052	"	"
13	Chemistry	22,909	25,075	25,526	"	"
14	Mathematics	13,592	13,563	15,966	"	"
15	Computer Sciences	15,266	15,385	16,091	"	"
21	Electronics	27,196	30,714	37,159	"	"
22	Materials	28,004	31,204	35,514	"	"
23	Mechanics	19,504	20,280	23,417	"	"
24	Energy Conversion	9,524	9,940	9,111	"	"
31	Ocean Sciences	50,856	52,022	59,203	"	"
32	Ocean Geophysics	36,924	36,058	39,309	"	"
33	Atmospheric Sciences	14,221	15,471	14,501	"	"
34	Astronomy & Astrophys.	4,101	4,353	5,260	"	"
41	Bio & Med Sciences	24,165	24,431	24,947	"	"
42	Cognitive & Neural Sci	11,608	12,525	13,723	"	"
52	Multidisciplinary Spt	12,975	10,748	11,479	"	"

B. (U) DESCRIPTION: The purpose of this element is to sustain U.S. Naval scientific and technological superiority for the maintenance of naval power and national security. The program includes theoretical and experimental research in selected areas of the physical, mathematical, engineering, environmental, behavioral and life sciences.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Mathematical and Physical Sciences--A demonstration of much improved optical phase conjugation techniques relevant to improved battle theater intelligence remote sensing and data transmission; lithography technique (.25 micron resolution) for producing higher density/capacity computer chips licensed to computer industry; new optical interferometer produces four orders of magnitude improvement in star angular resolution to contribute to improved navigation precision.

b. (U) Environmental Sciences--Acoustic signal processing based on Unified Wave Field Theory incorporating anisotropics of ocean environment; improved global ocean

prediction system with fronts and eddies; Barents Sea Polar Ice Prediction System; and Array Heading Rose to minimize sonar azimuthal ambient noise effects, employed to provide operational fleet tactical forecasts.

c. (U) Engineering Sciences--Dynamic fracture resistance of composite intermetallic materials increased twenty-fold through fibrous intermetallics applicable to future lighter, stronger ship and aircraft structures; calculated chaos parameters based on spin-wave chaotic trajectories in yttrium iron garnet spheres supporting new materials advances; new gas turbine surge and rotating stall mitigation procedures for increased jet engine reliability and operating envelope transitioned to industry; first test flight of the Low Altitude Unmanned Research Aircraft as a basis for theater level intelligence remote sensing and EW countermeasures.

d. (U) Life Sciences--synthesis of enzyme and insertion of unnatural amino acids in biological systems as precursors in development of biotechnology materials; neural network techniques mimic performance of mammalian retinas representative of non scanning visible light and infrared fleet sensors.

e. (U) Special Programs--continued to support the ONR Graduate Fellowship Program, the Summer Faculty Program, the ONR High School Apprenticeship Program and the Historically Black Colleges/Universities Program and other programs designed to increase scientific manpower trained in areas critical to naval research.

2. (U) FY 1990 PLANS:

a. (U) Mathematical and Physical Sciences--investigation of semi-conductor properties of matched thin film-substrate crystal lattices; characterization of thin-film magnetic materials for high-frequency electronics uses.

b. (U) Environmental Sciences--atmospheric studies of the transition from marine stratus (100% cloud cover) to cumulus (10% cloud cover) for its effects on communications and radar; ocean studies of mixed-layer physical and surface forcing (e.g., winds) for predictive ocean models for ASW; and a study of the dynamics of ice generation and other phenomena in the strategic Arctic Basin.

c. (U) Engineering Sciences--evaluation of non-linear ship motions, to improve naval combatant seakeeping; research on the synthesis and processing of polymers for improved electronic and optical materials; and the processing science of non-oxide ceramics, useful as infrared windows/missile domes.

d. (U) Life Sciences--exploitation of recent advances in biotechnology to sense low levels of metal ions in the marine environment as environmental tracers; study of the underlying mechanisms of non-freezing cold injury.

e. Continue Special Programs.

PROGRAM ELEMENT: 0601153N BUDGET ACTIVITY: 1-Technology Base
PROGRAM ELEMENT TITLE: Defense Research Sciences
PROJECT NUMBER: Not Applicable PROJECT TITLE: Not Applicable

3. (U) FY 1991 PLANS:

a. (U) Mathematical and Physical Sciences--discrete mathematics of pattern recognition for target identification; transient signal processing for ASW; mechanisms of high temperature superconductivity and methods for fabricating practical materials; topics in solid state electronics and systems/communication theory.

b. (U) Environmental Sciences--space-based remote sensing; multi-sensor data correlation; bioluminescence imaging systems for ASW; remote Arctic monitoring.

c. (U) Engineering Sciences--investigation of materials fracture at the atomistic level; dynamics/acoustics of complex/unsteady flows; energetic materials synthesis and reaction dynamics.

d. (U) Life Sciences--innovative approaches for treating combat casualties; evaluation of the interaction of electromagnetic energy with biological systems; structures/functions of macromolecules for possible use as sensors.

e. Continue Special Programs.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: Performers include various university, industry, not-for-profit institutions and Navy laboratories. About 54% of funding goes to universities, 34% to Navy laboratories and 12% to industrial and other sources.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: +12,611K for NIF and inflation adjustments.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Program Element (PE) 0602111N, AAW/ASUW Technology; PE 0602121N, Surface Ship Technology; PE 0602122N, Aircraft Technology; PE 0602234N, System Support Technology; Program Element 0602314N, Antisubmarine Warfare; PE 0603207N, Air/Ocean Tactical Applications; and PE 0603785N, ASW Environmental Acoustic Support. Coordination through reviews by the Assistant Secretary of Defense for Research and Technology, through active Navy and Marine Corps participation in inter-service and interagency committees, and through interaction with the scientific community.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602111N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Anti-Air/Anti-Surface Warfare Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
AAW/ASUW Technology	57,871	61,751	63,105	Continuing	Continuing

B. (U) DESCRIPTION: This program supports future surveillance and weapons systems for surface, air, and space platforms for Navy missions in Anti-Air and Anti-Surface Warfare. AAW requires surveillance/intercept capabilities extending beyond stand-off ranges of the launch platforms. Develops essential innovative short-range defense technology to defeat penetration of the wide area defensive shield. ASUW requires enhanced launch stand-off, precision targeting, survivability, post strike damage assessment and affordable munitions.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (u) Wide Area Surveillance: Conducted at-sea experiment of the surface ship wake detection system; tested super resolution IR focal plane array; Completed High Altitude Remote Platform Surveillance System (HARPSS) to Advanced Technology Demonstration (ATD).

b. (u) Area Surveillance: Conducted flight tests of the auto-correlation processor; initiated processing concepts for airborne targets; conducted experiment to characterize at-the-horizon IR background clutter. Initiated radar program.

c. (u) Multi-Sensor Synthesis and Data Correlation: Interfaced and tested the advanced transmit/receive equipment.

d. (u) Air Superiority Weapons: Fabricated/tested breadboard hardware for e concept.

e. (u) Long Range Fleet Air Defense Weapons: Completed missile application; fabricated integrated targeting.

f. (u) Local Area/Self Defense and Directed Energy Weapons: Conducted characterization testing of laser radar; completed single

requirements based on lethality measurements.

PROGRAM ELEMENT: 0602111N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Anti-Air/Anti-Surface Warfare Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

g. (u) Anti-Surface Ship/Strike Weapons: Began development for concept using real time multi-sensor fusion algorithms; completed fabrication of full-scale lightweight, low-hazard rocket motor case.

2. (U) FY 1990 PROGRAM:

a. (U) Wide Area Surveillance: Analyze surface ship wake data; begin development of Initiate development of plume characterization using microwave and lightning sources (Congress directed).

b. (U) Area Surveillance. Test algorithms for initiate waveform designs to enhance Low Probability of Intercept (LPI) characteristics for future radars; initiate measurement program to investigate polarization content of both IR background and targets. Continue radar program. Initiate development of automatic ship classification for

c. (U) Multi-Sensor Synthesis and Data Correlation. Transition advanced tracker-correlator to Advanced Combat Systems Architectural Test Bed; transition portions of the airborne sensor synthesis processor

d. (U) Air Superiority Weapons. Fabricate and test breadboard for active array; for integrated concept, fabricate/test conceptual designs.

e. (U) Long Range Fleet Air Defense Weapons. Conduct high altitude test of

f. (U) Local Area/Self Defense and Directed Energy Weapons. Develop multi-target tracking system architecture for conduct full scale test to verify lethality gain, based on lethality data, focus

g. (U) Anti-Surface Ship/Strike Weapons. Conduct simulations of multi-sensor algorithms; demonstrate solid fuel-air warhead; test neural network fuze concept; investigate propellant applications of low hazard, high performance, thermoplastic elastomeric explosives; feasibility study of low drag ramjet configuration.

3. (U) FY 1991 PLANS:

a. (U) Wide Area Surveillance. Transition HARPSS radar to ATD; complete lab tests of

b. (U) Area Surveillance. Conduct flight test of advanced AEW radar; initiate tests of range resolution radar; complete laboratory tests of UHF 3-D Continue development of automatic ship classification for

PROGRAM ELEMENT: 0602111N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Anti-Air/Anti-Surface Warfare Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

c. (U) Multi-Sensor Synthesis and Data Correlation. Continue multi-air-borne sensor synthesis processor development and initiate efforts to optimize hardware packaging and software integration for fleet use.

d. (U) Air Superiority Weapons. Develop active array fire control system architecture; fabricate/test

seeker fuze.

e. (U) Long Range Fleet Air Defense Weapons. Conduct captive flight test of

f. (U) Local Area/Self Defense and Directed Energy Weapons. Conduct field tests of multi-sensor detection/tracking brassboard against multiple air targets; demonstrate low altitude performance of azimuthally adaptive RF fuze; continue development of infrared anti-sensor lasers;

effects; continue compact accelerator development.

g. (U) Continue multi-sensor land attack fire control investigation; begin investigation of

concept; continue low hazard propellant studies; continue low drag ramjet feasibility study.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NOSC, San Diego, CA; NRL, Washington, D.C.; NSWC, Dahlgren, VA; NWC, China Lake, CA. CONTRACTORS: Applied Physics Laboratory, Johns Hopkins University, Silver Spring, MD; Lincoln Laboratories, Massachusetts Institute of Technology, Lexington, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Increase of 2,102 in FY 1991 represents Department budget adjustments for NIF and inflation. Continuation of Plume Characterization work, started as a result of FY 1990 Congressional initiative, is unfunded.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: PE 0603306N, Advanced Aircraft Air-to-Surface Missile; PE 0603609N, Conventional Munitions; PE 0603318N, Air-to-Air/Surface-to-Air Missile; PE 0602302F, Rocket Propulsion; PE 0602601F, Advanced Weapons; PE 0602602F Conventional Munitions; PE 0602203F, Aerospace Propulsion; PE 0602234N, Systems Support Technology; 0603792N, Advanced Technology Transition; PE 0602784A, Atmospheric Investigation; PE 0602211A, Aircraft Avionics Technology; PE 0603006A, Space Technology Integration; PE 0602204F, Aerospace Avionics; PE 0603742F, Combat Identification Technology.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602121N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Surface Ship Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Surface Ship Technology	14,916	13,753	15,982	Continuing	Continuing

B. (U) DESCRIPTION: This element develops hull, machinery and electrical technology to (1) drastically reduce detectability and targetability for all ships, (2) increase ability of ships to absorb combat damage and fight hurt, (3) increase ship volume of operations in all weather conditions and (4) allow more efficient, affordable warships. Project areas presently being pursued include: electromagnetic compatibility, non-acoustic signature, acoustic signature, advanced hull, weapon effects, damage control, advanced propulsion and machinery, and technology assessment. Since the 1970's this element has fostered the development of key technologies associated with the Navy's Integrated Electric Drive program. Critical work is continuing in advanced electrical distribution system concepts, machinery monitoring and control, and advanced current collectors.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Completed communication engineering design system development.

b. (U) Completed for reducing non metallic hull magnetic signature.

c. (U) Conducted sea trials to determine shielding effect of steel hulls on variable moment magnet fields.

d. (U) Completed experiments to obtain quantitative wake wave spectra associated with various propeller operating conditions.

e. (U) Transitioned new bow shape to design community which substantially

f. (U) Transitioned work to Navy design community for use on future ships.

g. (U) Conducted total ship impact assessment of double hull concept.

h. (U) Successfully tested electromagnetic expulsive deicing panels developed by NASA aboard Alaskan State patrol vessel.

i. (U) Conducted

under joint DNA, Canada and UK test trials project.

PROGRAM ELEMENT: 0602121N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Surface Ship Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

j. (U) Initiated effort to refine prediction method for age due to underwater explosions.

k. (U) Completed updates for ship vulnerability analysis model.

l. (U) Initiated lab evaluation of metal oxide semiconductor controlled thyristor (MCT) devices and circuits for potential ship electric drive power distribution systems.

m. (U) Completed low field evaluation of contra-rotating electric motor current collectors for potential ship electric drive application.

2. (U) FY 1990 PROGRAM:

a. (U) Complete development of combined narrow band, wide band and frequency hopping VHF/UHF transmitter models for electromagnetic interference analyses.

b. (U) Complete of steel hulled ship for math model verification.

c. (U) Determine wake characteristics of contra-rotating propellers.

d. (U) Initiate experiments combining to reduce radiated noise signatures.

e. (U) Perform ultimate strength analytical assessment of double hull ship configuration.

f. (U) Initiate development of glass reinforced plastic mast concept.

g. (U) Complete development of ice impact loading model for hull and appendages.

h. (U) Complete topside spray icing prediction model based on and validate with sea trials.

i. (U) Initiate a cooperative effort with other NATO navies to improve dynamic stability of ships in rough seas.

j. (U) Conduct feasibility demonstration of concept.

k. (U) Demonstrate smart power switch block based on MCT module for integrated electric drive power distribution system.

l. (U) For integrated electric drive enhancement, begin construction of model contra-rotating electric propulsor motor.

3. (U) FY 1991 PLANS:

a. (U) Complete electric field integral algorithm for electrically thin magnetic and organic composite material systems.

b. (U) Develop and verify advanced ships.

c. (U) Transition technology to advanced development for Mine Counter Measures (MCM) and Mine Sweeper Hunter (MSH)

PROGRAM ELEMENT: 0602121N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Surface Ship Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

d. (U) Initiate effort to validate [redacted] codes with actual at sea measurements.
e. (U) Transition [redacted] technology to funded advanced technology demonstration program.
f. (U) Conduct at sea testing of first breadboard of autonomous structural data acquisition system aboard T-AGOS-19 ship.
g. (U) Conduct [redacted] of sandwich configuration deckhouse panel under continuing DNA, UK, Canada test series.
h. (U) Initiate development of [redacted] concepts.
i. (U) Initiate algorithm development for integrated electric drive control system.
j. (U) Complete concept design and initial pay off demonstration of composite diesel engine.
k. (U) Utilize full scale advanced development program shipboard test results to validate fire and smoke spread modeling.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.
D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, Md; NOSC, San Diego, CA; NRL, Washington, D.C; NSWC, Dahlgren, VA. CONTRACTORS: Boeing Marine Systems, Seattle, WA; General Electric Company, Schenectady, NY; Massachusetts Institute of Technology, Cambridge, MA; Pennsylvania State University, State College, PA; University of Michigan, Ann Arbor, MH.
E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.
F. (U) PROGRAM DOCUMENTATION: Not Applicable.
G. (U) RELATED ACTIVITIES: PE 0602131M, Marine Corps Landing Force Technology; PE 0602233N, Mission Support Technology; PE 0602234N, System Support Technology; PE 0602315N, Mine and Special Warfare Technology; PE 0602323N, Submarine Technology; and PE 0602936N, Laboratory Independent Exploratory Development; PE 0603502N, Surface Mine Countermeasures; PE 0603508N, Ship Propulsion Systems; PE 0603513N, Shipboard Systems Component Development; PE 0603514N, Shipboard Damage Control; PE 0603553N, Surface Anti-Submarine Warfare; PE 0603564N, Ship Development; PE 0603573N, Electric Drive; PE 0603724N, Navy Energy Program.
H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.
J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602122N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Aircraft Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Aircraft Technology	19,155	21,282	24,403	Continuing	Continuing

B. (U) DESCRIPTION: This program develops technology for naval aviation, with emphasis on the demands imposed by aircraft carrier flight operations and Marine Corps amphibious and field operations. This program exploits the emerging technologies of (a) composite and matrix materials for structures to reduce airframe and propulsion plant weight and the effects of saltwater corrosion; (b) reduced observable aerodynamic designs of Navy-unique aircraft components; (c) advanced gas turbine engine component designs for extended range/endurance; and (d) longer service life to bring about reduced at-sea replacements and spares inventory. Technologies are developed for needed upgrades to shipboard catapult and arresting gear systems, visual landing aids for safer flight operations and aircraft maintenance test equipment for increased weapon system availability. The program provides mission area analysis and concept definition required for the Exploratory Development phase of air vehicle and weapon system programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Transitioned the Electromagnetic Aircraft Launcher to Advanced Development (PE 0603512N).

b. (U) Completed breadboard design/fabrication of an extended range Optical Landing System for use aboard aircraft carriers.

c. (U) Continued Integrated High Performance Turbine Engine Technology (IHPTET) program. Developed an advanced swept aero fan which exhibited a four percent efficiency increase over current engine fans. A COMGLAS construction combustor was incorporated and successfully operated in an IHPTET engine demonstrator.

d. (U) Continued development of second generation composite materials and structures for aircraft. The survivability features of the High Strain Wing design to withstand 30mm HEI

ballistic impact and still sustain load, even though extensively damaged, was demonstrated.

e. (U) Terminated investigation of technologies applicable to High Altitude Long Endurance (HALE) Unmanned Air Vehicles (UAV).

f. (U) Transitioned the advanced integrated armament system to Advanced Development (PE 0603219N).

2. (U) FY 1990 PROGRAM:

a. (U) Fabricate a light weight, high temperature aircraft engine core turbine.

b. (U) Demonstrate advanced technology cockpit design for all weather attack missions.

c. (U) Demonstrate flight control smart actuators.

d. (U) Develop Aviation Test and Evaluation Technology to test advanced aviation systems and equipment for future weapon systems and platforms.

3. (U) FY 1991 PLANS:

a. (U) Complete fabrication of advanced aircraft engine control sensors.

b. (U) Correlate the Capsule Escape System Simulation Model for the Advanced Technology Cockpit.

c. (U) Demonstrate flat panel displays, helmet mounted display presentations, and high brightness color displays.

d. (U) Demonstrate the capability of composite components to endure static and fatigue loads.

e. (U) Continue Test and Evaluation Technology emphasizing sensor, modelling and Simulation Technologies for laboratory and test range improvements for future aircraft.

f. (U) Flight test flight control smart actuators.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; Naval Air Engineering Center, Lakehurst, NJ; David Taylor Research Center, Bethesda, MD; Naval Research Laboratory, Washington, DC; Naval Weapons Center, China Lake, CA; Naval Ordnance Station, Indian Head, MD. CONTRACTORS: General Electric, Lynn, MA; Grumman Aerospace Corporation, Bethpage, NY; McDonnell-Douglas Corporation, St. Louis, MO; Pratt-Whitney Engines, East Hartford, CT; Rockwell International, Columbus, OH.

Program Element: 0602122N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Aircraft Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: PE 0602234N, IHPTET Materials; PE 0602102F, Materials; PE 0602131N, Marine Corps Landing Force Technology; PE 0603210N, Advanced Aircraft Propulsion Systems; PE 0603217N, Advanced Aircraft Subsystems; PE 0602270N, Electronic Warfare Technology; PE 0602201F, Aerospace Flight Dynamics; PE 0602203F, Aerospace Propulsion, PE 0602211/47A, Aeronautical Technology.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602131M BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Marine Corps Landing Force Technology	17,101	16,374	18,132	Continuing	Continuing

B. (U) DESCRIPTION: This is the only DOD program that develops the technologies needed to support unique Marine Corps expeditionary force requirements. Mission needs are derived from specific threat capabilities and the requirement to operate in a variety of climates and tactical scenarios worldwide, including the conduct of amphibious operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) AMPHIBIOUS SURFACE MOBILITY/LOGISTICS TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: Completed fabrication of High Water Speed Technology Demonstrator. Achieved overwater speed in excess of 20 knots.
2. (U) FY 1990 PROGRAM: Complete transition documentation. Evaluate lightweight Roller Chain Track. Complete Electric Drive M113 testing/verify drive train computer control.
3. (U) FY 1991 PLANS: Full Scale Water Piston Propulsor evaluation. Lightweight armor concepts evaluations. Continue ACV Technology in power pack.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) MINE DETECTION TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: AMDAS-the Airborne Imaging Test Bed was completed proving feasibility of the AMDAS concept. Imaging objects underwater with a single laser pulse demonstrated. SMDG- "Smoking hole" detection with acoustic detection demonstrated.
2. (U) FY 1990 Program: Transition AMDAS to ATD. Develop Low Light Level (LLL) high-speed imaging receiver and algorithms for mine detection/classification. Demonstrate major components of near IR laser imaging for AMDAS applications.
3. (U) FY 1991 Plans: Complete AMDAS joint tests at Ft. Knox. Complete SMDG sensors for land mine detection; integrate sensors into test-bed.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) LAND MINE COUNTERMEASURES TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: DEMNS- successful demonstration of Rocket deployment of simulated net. Characterized alternative fuels for FAE.
2. (U) FY 1990 PROGRAM: Conduct underwater array evaluation. Initiate technology survey and model analysis of foam explosives.

PROGRAM ELEMENT: 0602131M BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

3. (U) FY 1991 PLANS: Transition AMDAS to ATD. Integrate and evaluate SMDG test bed. Fabricate and evaluate underwater arrays and foam explosives. Transition fuels technology to CATFAE.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) AMPHIBIOUS LOGISTICS TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: Evaluated advanced material handling alternatives. Started protective fabric structures task. Automated Reading and Marking Concepts validated.
2. (U) FY 1990 PROGRAM: Demonstrate D7G & Tactical Fuel System concepts. Initiate protective fabrics structures task.
3. (U) FY 1991 PLANS: Evaluate automated load acquisition and construction equipment master/slave concepts. Demonstrate survivability concepts on earth moving equipment. Transition Tactical Fuel System.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) CHEMICAL/BIOLOGICAL DEFENSE TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: Advances in voicemitters. Completed second skin/quick doff design and prototypes. Advances in FLIR detection. Completed redesign of prototype aerial standoff detector. Successful aerosol testing.
2. (U) FY 1990 PROGRAM: Test AFFF additives as decon. Conduct sorbent loading. Optimize pilot plant waterproof breathable reactive materials. Evaluate protective clothing and rainwear. Develop a transport model for land/sea interface. Transition voicemitter and quick doff hood/second skin. Investigate diagnostic kit technology for Chem/Bio sampling. Complete integration testing of lightweight aerial detector concept.
3. (U) FY 1991 PLAN: Evaluate materials for sorbtive capacity. Deliver system concept paper on material selection. Technology demonstration of integrated concept for garments. Prototypes of eye/respiratory protection and system concept paper.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) BATTLEFIELD ELECTRONIC SUPPORT TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: Procured components to build a C2 platform for evaluation. Awarded four SBIR contacts in tactical deception.
2. (U) FY 1990 PROGRAM: C2 in the year 2000 task will demonstrate subsystems/concepts in expert systems, sensors, planning aids, and C2I processing. Test MTI, demonstrate F.O. technology.
3. (U) FY 1991 PLANS: Demonstrate prototype system in C2, audio simulation and MTI decoys. Complete battlefield surveillance and prepare for transition.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WEAPONRY TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS: QAZ pressing demonstrated. Data package completed for direct fire rocket. Terminated high

PROGRAM ELEMENT: 0602131M BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

performance seeker work. Developed tech base to support LAV-AD. Fabricated smoke generator to test as multi-mode marker. Completed finite element analysis of mortar base plate. Demonstrated feasibility of 25mm APTS. Progress in advanced laser materials. Successful demonstration of Tround Gun.
2. (U) FY 1990 PROGRAM: Explore Hypergolic alloy as kill mechanism. Test and evaluate 155mm Howitzer. Deliver system concept paper in support of LAV-AD. Test two-stage smoke generator in multi-mode marker; deliver deployment study. Fabricate and test prototype m-60 and base plates.
3. (U) FY 1991 PLAN: Demonstrate Hypergolic alloys and QAZ. In LAV-AD, demonstrate sensor performance, conduct PDR, fabricate and demonstrate system in a lab environment. Initiate strap down low cost seeker project, helicopter self-defense effort, and advanced armor penetration.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
(U) MANPOWER TECHNOLOGY
1. (U) FY 1989 ACCOMPLISHMENTS: Biopsychometric measures strongly correlated with marksmanship improvements. .
2. (U) FY 1990 PROGRAM: Continue effort in biopsychometric predictors to broaden data base. Test of a prototype enlisted retention forecasting model.
3. (U) FY 1991 PLAN: Biopsychometric assessment effort transitions. Complete development of Officer EAS date algorithm. Incorporate EAS analysis into MCORP Forecasting Model.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NCSC, Panama City, FL; NSWC, Dahlgren, VA; NCEL, Port Hueneme, CA; NWC, China Lake, CA; NPRDC, San Diego, CA; NRL, Washington, DC; U.S. Textile Research Center, Natick, MA; DTRC, Carderock, MD; Naval Ordnance Station, Indian Head, MD; Los Alamos National Laboratory, Los Alamos, NM; Lawrence Livermore Laboratory.
E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.
F. (U) PROGRAM DOCUMENTATION: Not Applicable.
G. (U) RELATED ACTIVITIES: PE 0602122N, Aircraft Technology; PE 0602121N, Surface Ship Technology; PE 0602315N, Mine and Special Warfare Technology; PE 0602786A, Logistics Technology.
H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATION AGREEMENTS: None.
J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602232N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Command, Control and Communications (C3) Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C3 Technology	15,296	15,508	18,393	Continuing	Continuing

B. (U) DESCRIPTION: This program provides the technologies needed by the primary warfare areas to meet requirements in secure communications, tactical communications interoperability, timely data fusion, decision aids and accurate navigation. Present emphasis in joint operations requires, as a high priority, Joint Service/NATO tactical C3 systems interoper- ability. Today, combat decisions must often be made and implemented in seconds, while the amount of information needed by a commander to conduct operations, and threats to his communications links, are rapidly increasing. New long-range weapons require more precise navigation while being more reliable and affordable.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) C3 SYSTEM ARCHITECTURE:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Conducted land-based testing of integrated high and ultra-high frequency communications using existing line-of-site equipment to simulate intra-battle group communications.

b. (U) Conducted a prototype experiment to develop method for effective technology transition to advanced systems development program elements.

2. (U) FY 1990 PROGRAM:

a. (U) Conduct at-sea demonstration of intra-battle group communications.

b. (U) Complete transition of Unified Network Technology (UNT) to Advanced Technology Demonstration (ATD).

c. (U) Develop algorithms for dissemination of topology/ connectivity information in a battle group and global environment.

d. (U) Develop algorithms for dynamic network membership to account for generation and elimination of nodes in a dynamic stressed battle environment.

e. (U) Improve network routing algorithms to shorten net cycle time, reduce message delay/overhead; increase throughput.

3. (U) FY 1991 PLANS:

a. (U) Complete simulation of algorithms for dissemination of topology/connectivity information in battle group and global environment.

b. (U) Continue development of point-to-point and conference voice.

c. (U) Improve dynamic network membership algorithms.

PROGRAM ELEMENT: 0602232N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Command, Control and Communications (C3) Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

d. (U) Publish update to the C3 exploratory development technology transition planning document.

e. (U) Develop algorithms to integrate the military version of the Integrated Services Data Network (ISDN) to battle group networks.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) COMMUNICATIONS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Transitioned [redacted] to Submarine Integrated Antenna System program.

b. (U) Transitioned very high speed integrated circuit terminal brassboard to PE 0604577N program.

c. (U) Conducted arctic RF spectrum tests.

2. (U) FY 1990 PROGRAM:

a. (U) Conduct at-sea demonstration of UNT concepts.

b. (U) Design, build, and test prototype of an [redacted]

c. (U) Investigate low cost data and bandwidth compression techniques for sonobuoy communications.

d. (U) Complete investigation into the effects of partial correlation, jamming and fading on the performance of the LPI spread-spectrum waveform.

e. (U) Implement and test the signal time-out protocol on high-frequency adaptive antenna arrays.

3. (U) FY 1991 PLANS:

a. (U) Conduct [redacted] system.

b. (U) Develop real-time [redacted] capability.

c. (U) Develop a breadboard and conduct lab evaluation of the LPI spread-spectrum waveform.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) COMMAND SUPPORT:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Developed a PC-based map-generation capability for use in afloat and ashore command centers.

b. (U) Developed a template-based situation assessment model for all-source data fusion.

c. (U) Transitioned network interface technologies to Navy Desk Top Computer and Flag Data Display System programs.

2. (U) FY 1990 PROGRAM:

a. (U) Transition the decentralized operating system technology to the Unified Networking Technology ATD.

b. (U) Develop and test enhancements to the plan recognition system to enable the handling of more diverse scenarios, greater numbers of surface and air platforms, and more elaborate plan generation and execution modelling.

c. (U) Demonstrate situation assessment and response planning employing Tactical ASW Battle Management System (TABS).

PROGRAM ELEMENT: 0602232N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Command, Control and Communications (C3) Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

3. (U) FY 1991 PLANS:
a. (U) Demonstrate real-time distributed database management functions on the distributed C2 testbed.
b. (U) Conduct demonstration of TABS as a tactical decision aid for the ASW mission.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
(U) NAVIGATION:
1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Flight tested and transitioned tactical missile ring laser gyro technology to advanced development.
b. (U) Conducted lab tests of fiber optic gyro and advanced accelerometer technology.
2. (U) FY 1990 PROGRAM:
a. (U) Conduct lab test of high accuracy ring laser gyro for submarine applications.
b. (U) Complete lab tests of fiber optic gyro and advanced accelerometer technology.
c. (U) Conduct phase I submarine field experiment with the passive navigation system. Prepare test plan for phase II experiment.
d. (U) Develop approaches for improving accuracy of battle force navigation based on navigational performance requirements of battle force C2 operations.
3. (U) FY 1991 PLANS:
a. (U) Complete high accuracy ring laser gyro development for submarines.
b. (U) Develop second-generation fiber optic gyros.
c. (U) Transition advanced accelerometric technology to Navy strapdown navigation systems.
d. (U) Conduct phase II submarine passive navigation experiment in applicable northern latitude areas.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NOSC, San Diego, CA; NRL, Washington, D.C.; NUSC, New London, CT; NWC, China Lake, CA; CONTRACTORS: TRW, Redondo Beach, CA; Westinghouse Electric Corporation, Pittsburgh, PA; Litton Industries, Los Angeles, CA; SRI International, Menlo Park, CA; Carnegie Mellon University, Pittsburgh, PA.
E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.
F. (U) PROGRAM DOCUMENTATION: Not Applicable.
G. (U) RELATED ACTIVITIES: PE 0602234N, Systems Support Technology; PE 0602111N, AAW/ASUW Technology. The miniature ring laser gyro development is conducted jointly with the Air Force under a cooperative memorandum of agreement.
H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.
J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602233N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Mission Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Mission Support Technology	28,068	31,702	34,493	Continuing	Continuing

B. (U) DESCRIPTION: This program provides mission support technologies essential for all naval operations. Personnel and training technologies enhance the Navy's ability to select, assign and train people for highly demanding jobs. Biomedical technologies improve the medical care delivery system and enhance performance capabilities under adverse conditions. Logistics technologies increase operational readiness through effective management and movement of supplies ashore and at-sea; improved fuel procurement specifications; and advanced techniques for more cost effective construction and maintenance of shore and off-shore facilities. Environmental protection technologies address Navy-unique issues in air and water quality and toxic waste. Chemical Biological Radiological (CBR) Defense technologies improve the ability to respond to existing and future CBR threats.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Completed development of measures which predict officer leadership abilities, for use in selecting Naval Academy midshipmen.

b. (U) Completed evaluation of artificial intelligence applications to a maintenance training course for the SH-3H helicopter.

c. (U) Developed prototype decision training aid for shipboard damage control and chemical warfare defense.

d. (U) Initiated evaluation of Rh-positive to Rh-negative converted blood cells as final step in the development of universal blood.

e. (U) Started post-trauma immunological modulation/ enhancement program.

f. (U) Completed computer assisted diagnostic programs for submarine environment.

g. (U) Successfully demonstrated concepts for at-sea rearming of all vertically launched missiles in rough seas.

h. (U) Completed tests of a Metal Oxide Semiconductor device which will provide early warning of an underground fuel leak.

i. (U) Completed development of specifications for a flexible float-sink hose for an amphibious bulk fuel system.

PROGRAM ELEMENT: 0602233N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Mission Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

j. (U) Completed development of a small, economical interior shipboard Chemical Warfare Agent (CW) detector.

k. (U) Complete assessment of the performance of gas filters at high relative humidity.

2. (U) FY 1990 PROGRAM:

a. (U) Complete evaluation of a prototype network to deliver training to Navy personnel geographically remote from instructional facilities.

b. (U) Improve techniques for computer-administered test items used to select and assign applicants for military service.

c. (U) Initiate program to develop and evaluate training techniques aimed at enhancing tactical decision-making under stress.

d. (U) Initiate Chemical Hazards program to assess and document risks of occupational exposures to hazardous chemicals.

e. (U) Complete evaluation of the efficacy of drug therapy during hypothermia to minimize myocardial irritability.

f. (U) Initiate lyophilization of red blood cell and platelets program to enhance blood component availability in the field.

g. (U) Initiate development of design criteria for a high-performance magazine for ammunition storage.

h. (U) Evaluate effectiveness of large samples of conductive concrete to provide shielding against high-altitude electromagnetic pulses.

i. (U) Evaluate detoxification/biodecontamination processes on JP-5 Jet Fuel in different soil matrices.

j. (U) Evaluate the suitability of using high pressure liquid nitrogen as a means to strip paint from naval aircraft and ships.

k. (U) Complete evaluation and transition to advanced development a prototype large-diameter tensioned hose fueling at-sea system.

l. (U) Initiate protein engineering program to design and produce improved CW agent degradating enzymes.

m. (U) Develop prototype multi-element optical waveguide sensor.

n. (U) Complete evaluation of wind-driven aerosol penetration of Navy Chemical Protective Over-Garment.

3. (U) FY 1991 PLANS:

a. (U) Develop improved ASW training capability by means of real-time acoustic simulation techniques to depict range-dependent effects such as those produced by temperature differences and changes in bottom depth.

b. (U) Begin final development of software to optimize personnel assignment.

PROGRAM ELEMENT: 0602233N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Mission Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

c. (U) Evaluate the effectiveness of providing embedded training capability in a shipboard combat direction system.

d. (U) Complete the development of an anitbody assay for endotoxin.

e. (U) Initiate field evaluation of mission-specific performance enhancement interventions developed for the naval special warfare community.

f. (U) Complete exploratory development of synthetic red blood cells.

g. (U) Initiate shipboard evaluation of trash bags manufactured from optimized degradable material.

h. (U) Complete evaluation of techniques for metallurgical rejuvenation of turbine blades.

i. (U) Evaluate performance of bread-board model of a condition-based maintenance system.

j. (U) Complete development of power-line transient protective devices for protection of C3I facilities against HEMP.

k. (U) Complete design criteria for the high-performance magazine.

l. (U) Complete Bearing/Gear analyzer instrumentation for helicopter transmissions and transition to advanced development.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Propulsion Center, Trenton, NJ; NCSC, Panama City, FL; NTSC, Orlando FL; NPRDC, San Diego, CA; Naval Medical Research and Development Command Laboratories, Bethesda, MD; NADC, Warminster, PA; DTRC, Bethesda, MD; NCEL, Port Hueneme, CA; NSWC, Dahlgren, VA; NRL, Washington, DC; NOSC, San Diego, CA. CONTRACTORS: Smithsonian Institution, Washington, D.C; National Bureau of Standards, Gaithersburg, MD; Boston University, Boston, MA; New York Blood Center, New York, NY; Research Triangle Institute, Research Triangle Park, NC.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Increase of 1,095 in FY 1991 due to Department budget adjustments for NIF and inflation.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: PE 0602314N, Anti-Submarine Warfare Technology; PE 0602122N, Aircraft Technology; PE 0602111N, AAW/ASUW Technology; PE 0602232N, Command, Control and Communications Technology.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602234N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Systems Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Systems Support Technology	63,380	62,843	69,152	Continuing	Continuing

B. (U) DESCRIPTION: This element comprises a broad technology base program to provide the Navy with the capability, resources, and expertise to implement advanced weapon system concepts. The materials and electronic devices topics address fundamental limitations in terms of performance, reliability and cost in order to accelerate transition of advanced technology to fleet use. Computer Technology addresses hardware and software development issues and supports advanced concepts in Artificial Intelligence (AI) technology, including Artifical Neural Networks (ANN). The Human Factors topic addresses high-payoff technological opportunities in man/machine interface, decision making and information transfer.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Transitioned high productivity welding consumables to Fleet use in High Strength Low Alloy (HSLA) steel applications.

b. (U) Accelerated development and implementation of OSPREY spray forming process.

c. (U) Transferred the Modulation-doped Field Effect Transistor low noise amplifier to the tri-service MIMIC program.

d. (U) Designed an Artificial Neural Network microchip which was fabricated and commercially released by industry.

e. (U) Initiated evaluation of advanced computer architectures and their application to Navy C2 and ASW systems.

f. (U) Demonstrated tools for an integrated Software Engineering Environment capability using Ada language system facilities.

g. (U) Demonstrated application of AI technology to Fault Diagnosis issues.

h. (U) Completed laboratory evaluation of a decision support system to assist ASW tacticians in integrating information from multiple sources.

PROGRAM ELEMENT: 0602234N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Systems Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

2. (U) FY 1990 PROGRAM:

a. (U) Complete development and evaluation of 700°F Aluminum alloy for IHPTET rotating components for advanced aircraft engines.

b. (U) Complete development of welding consumables for HSLA 100 and HY 130 steels.

c. (U) Develop sensing and control system to automate OSPREY spray forming process.

d. (U) Demonstrate lower cost ($30K vs $60K) staggered ladder Traveling Wave Tube for use in the Navy EHF (44GHz) satellite communications system. (Savings, including replacement tubes are estimated at $100K/year/installation).

e. (U) Evaluate application of advanced high performance computer achitectures for Navy mission-critical systems.

f. (U) Demonstrate integration of advanced software tools into a functional Software Engineering Environment.

g. (U) Complete development of supervisory control techniques for underwater vehicles and manipulators, with application to the ARGO-JASON deep ocean research system.

h. (U) Complete development of prototype decision aid to assist submarine approach officers to develop an accurate understanding of the current 3-D ASW tactical situation.

3. (U) FY 1991 PLANS:

a. (U) Transition HSLA 100 and HY 130 welding consumables to industry and shipyards.

b. (U) Integrate sensing and control system with OSPREY process to fabricate complex shapes.

c. (U) Demonstrate a significantly reduced

--

d. (U) Demonstrate application of Artificial Intelligence technologies to Inverse Synthetic Aperture Radar target classification.

e. (U) Demonstrate a complete, transportable, functional Software Engineering Environment.

f. (U) Evaluate and demonstrate advanced computer architectures for Navy mission-critical applications.

g. (U) Initiate evaluation of an experimental decision support system to improve the quality and speed of tactical decision-making under highly stressful conditions.

h. (U) Conduct laboratory evaluations of advanced display techniques for underssea surveillance applications.

PROGRAM ELEMENT: 0602234N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Systems Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NCEL, Port Hueneme, CA; DTRC, Bethesda, MD; NADC, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; NOSC, San Diego, NRL, Washington, DC; NSWC, Dahlgren, VA; NWC, China Lake, CA; Naval Avionics Center, Indianapolis, IN. CONTRACTORS: Aluminum Co of America, Alcoa Center, PA; Atlantic Research Corp, Alexandria, VA; Fiber Materials Inc., Biddeford, Maine; McDonnell-Douglas Aerospace Corp., St. Louis, MO; Hughes Aircraft, Torrance, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: FY89 ANN microchip was developed two years early, resulting in acceleration of research in related time-domain issues.

3. (U) COST CHANGES: An increase of 2,505 in FY 1991 represents Department budget adjustments for NIF and inflation.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: PE 0602111N, AAW/ASUW Technology; PE 0602270N, Electronic Warfare Technology; PE 0602121N, Surface Ship Technology; PE 0602122N, Aircraft Technology; PE 0602323N, Submarine Technology; PE 0602232N, Command, Control and Communications Technology; PE 0602314N, ASW Technology; PE 0603792N, Advanced Technology Demonstration.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602270N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Electronic Warfare Technology
PROJECT NUMBER: R2030 PROJECT TITLE: EW Technology

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMP.	TOTAL PROG.
EW Technology	14,079*	12,486*	12,872	Cont.	Cont.

Note: * FY 1989 and FY 1990 were funded in PE0603270N.

B. (U) DESCRIPTION: This program cooperatively addresses required electronic warfare (EW) technologies with the other Services; but uniquely, addresses war-at-sea EW requirements. Traditionally, EW threats have resided in the lower microwave frequencies, the electro-optic (EO) and the infrared (IR) spectra; and were countered, almost exclusively, during the terminal phase of an engagement. Validated, projected, or mirrored threats have recently forced investigations into the _ The growing sophistication, redundancy and diversity of these hostile weapons systems have forced renewed interest in countering the threat during the 'phases of the engagements rather than the terminal phase. In order to meet the emerging electromagnetic threats and to apply new technologies to _

the Navy, jointly with the other Services, has refocused our efforts. The program now investigates new technologies for countermeasures (on-board and off-board devices); jammers and false target generators; signal detection and deception; and the related _ signal processors required. The program also addresses countermeasures and off-board _ expendables to defeat anti-ship and anti-aircraft missiles.

Other technological investigations include countermeasures for

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1.(u) FY 1989 ACCOMPLISHMENTS:
a.(u) Completed work on joint AF/NAVY , decoy.
b.(u) Transitioned _ techniques to a 6.3A program. Demo'd enhanced
c.(U) Designed and fabricated

PROGRAM ELEMENT: 0603270N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Electronic Warfare Technology
PROJECT NUMBER: R2030 PROJECT TITLE: EW Technology

d.(U) Commenced work on aircraft as part of a tri-service effort.
e.(U) Continued testing decoy design.
f.(U) Continued risk based expert system C2 integrated decision aid efforts.
g.(U) Awarded the advanced warning receiver development contract.
h.(U)

i.(U) prototyped and lab tested.
2. (U) FY 1990 PROGRAM:
a.(U) Complete tailored noise false target deception device and evaluate against radar.
b.(U) Transition receiver technology to ship and airborne platforms.
c.(U) Complete work on

d.(U) Complete development as a

e.(U) Complete
f.(U) Commence
g.(U) Test and integrate the
h.(U) Implement MIMIC chips in
3. (U) FY 1991 PLANS:
a.(U)

b.(U) Complete development.
c.(U) Transition the warning receiver to a classified airborne program.
d.(U)
e.(U)

f.(U) Transition countermeasure device.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Point Mugu, CA; Naval Surface Warfare Center, White Oak, MD; Naval Weapons Systems Center, Crane, IN; Naval Weapons Center, China Lake, CA; Air Force Wright Patterson Aeronautics Laboratory, Dayton, OH; Army Research, Development & Engineering Center, Picatinny Arsenal, Dover, NJ. CONTRACTORS: Raytheon Corporation, Goleta, CA; Tracor, Inc., Austin, TX; Johns Hopkins Applied Physics Laboratory, Silver Spring, MD; Westinghouse, Baltimore, MD, and Pittsburgh,PA; Rutgers University, New Brunswick, NJ.

PROGRAM ELEMENT: 0603270N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Electronic Warfare Technology
PROJECT NUMBER: R2030 PROJECT TITLE: EW Technology

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: Guidance for this project is derived from the DoD Electronic Combat Master plan, the Navy Electronic Warfare Master Plan, the Joint Director of Laboratories Technology Panel for Electronic Warfare, the Navy Electronic Warfare Advisory Group, Electronic Warfare Needs documents from the Navy Systems Commands, Electronic Warfare Mission Area Strategy and the CNO Tech Base Guidance.

G. (U) RELATED ACTIVITIES: Formal Inter/Intra-Service Coordination: Within the Navy Technology Base, this Program Element is closely associated with Program Element 0602111N, (Anti-Air Warfare/Anti-Surface Warfare Technology); Program Element 0602315N, (Mine and Special Warfare Technology); Program Element 0602234N, (Systems Support Technology); Program Element 0602232N, (Command and Control Technology). AF/Army program in PE 0603270F and 0603270A are coordinated by the Joint Director of Laboratories Technology Panel for Electronic Warfare through service MOUs.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602314N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
ASW Technology	95,938	129,332	114,677	Continuing	Continuing

B. (U) DESCRIPTION: In this element, technologies are developed for detection, tracking, localization, classification, destruction and/or neutralization of undersea targets. The Soviets are developing submarines which are deeper diving, faster, and quieter, which makes these targets

U.S. Forces need: increased gain for platform and surveillance acoustic systems; underwater weapons with higher speed, and improved guidance and control. New sensor systems are being developed for

These sensors are being developed for fixed systems and for air, submarine, and surface platforms. To increase the speed of torpedoes, improved propulsion systems and torpedo bodies with improved hydrodynamics and reduced drag are being developed. More energetic explosive ingredients and formulations for address the warhead needs. Weapon guidance and control developments emphasize

Torpedo quieting programs emphasize

Countermeasures for use against attacking enemy torpedoes include devices to

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
(U) SURVEILLANCE
1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Conducted

b. (U) Completed the ACSAS program with data analysis and reports.
c. (U)

PROGRAM ELEMENT: 0602314N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

d. (U)

e. (U) Completed Exploratory Development of ARGO/JASON.
f. (U) Began fabrication of
g. (U) Initiated broad industry participation in HGI Program.

2. (U) FY 1990 PROGRAM:
a. (U) Conduct

b. (U)

c. (U) Conduct detection experiment.
d. (U) Commence data analysis of the experiment data.
e. (U)
f. (U) Demonstrate computer-aided sonar preclassification screen.
g. (U) Initiate development of advanced sensor.

3. (U) FY 1991 PLANS:
a. (U) Assemble and test a sensors in lab.
b. (U) Begin development of distributed system components/technologies.
c. (U) Conduct test of advanced devices in environment.
d. (U) Characterize and develop cancellation algorithms for noise.
e. (U) Conduct measurements on model.
f. (U) Conduct Experiment.
g. (U) Conduct engineering shake-down tests at sea.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) TORPEDOES AND WARHEADS:

1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Began design and fabrication of plant.
b. (U) Investigated drag reduction effects

c. (U) Completed preparations for phase II test

d. (U) Initiated Advanced Torpedo Technology Thrust (AT3) for torpedo weapons.
e. (U) Evaluated industry proposals and awarded 14 contracts for AT3.

2. (U) FY 1990 PROGRAM:
a. (U) Transition

PROGRAM ELEMENT: 0602314N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

b. (U) Propulsion improvements to be transitioned to MK 50 P3I program.
c. (u) Begin range test of technologies.
d. (u) Select fuze concept and fabricate hardware.
e. (U) Evaluate alternatives and down-select technologies for AT3 development.
f. (u) Conduct tests.
g. (u) Transition technology.
h. (u) Transition xplosive to advanced development.
3. (U) FY 1991 PLANS:
a. (u) Transition weapon to Advanced Development.
b. (u) Begin the plant development testing.
c. (u) Complete fabrication of a power plant.
d. (u) Complete testing of standoff fuze placement.
e. (u) Demonstrate computer modelling of
f. (U) Develop subsystem technologies for AT3 focal concepts.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
D. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Silver Spring, MD; DTRC, Bethesda, MD; NADC, Warminster, PA; NCSC, Panama City, FL; NOSC, San Diego, CA; NUSC, Newport, RI and New London, CT; Naval Undersea Warfare Engineering Station, Keyport, WA; NRL, Washington, D.C. CONTRACTORS: Raytheon, Bedford, MA; McDonnell Douglas, Huntington Beach, CA; General Electric Co., Syracuse, NY; Applied Research Laboratory, Pennsylvania State University, State College, PA; Scripps Institute of Oceanography, University of California, La Jolla, CA.
E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: An increase of in FY 1991 will continue the expanded and accelerated effort which was funded as part of initiative to accelerate and expand ASW development programs.
F. (U) PROGRAM DOCUMENTATION: Not Applicable.
G. (U) RELATED ACTIVITIES: PE 0602435N, Ocean and Atmospheric Support Technology; PE 0101224N, SSBN Security Program.
H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None
J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602315N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Mines and Special Warfare
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Mine/Special Warfare	15,125	15,921	17,926	Continued	Continued

B. (U) DESCRIPTION: This program element provides new technologies for U.S. naval mines, mine countermeasures (MCM), Special Warfare, and Explosive Ordnance Disposal (EOD) equipment including Improvised Nuclear Devices (IND) countermeasures.

(u) Mine Technology. New technologies must be developed to be effective against the rapidly emerging Soviet submarine threat, exemplified by the MIKE, SIERRA, AKULA, and TYPHOON. Future mines must be capable of detecting the

associated with these new targets. Because of delivery platform constraints, increased performance must be attained through technology advances rather than increases in size or quantity. Current technology emphasis is being placed on sensors, mine delivery and advanced minefield concepts.

(u) MCM Technology.

This program's emphasis is on the detection and shallow water mines, as well as on countering close-tethered In addition, work is directed towards improving mine influence sweep capabilities,

(U) Special Warfare Technology. Naval Special Warfare missions are primarily clandestine in character and support naval operations by: reconnaissance and clearing of beaches; underwater attacks against shipping and installations; raids in coastal areas; intelligence collection; and counter-terrorism.

(u) The principal Special Warfare goal is to increase the combat range and mission endurance Weapons improvements focus on underwater efficient, reliable methods

(u) EOD Technology. Provides EOD and IND countermeasures needs of all the U.S. Armed Forces. The present effort concentrates on developing technologies required for locating, examining and rendering safe conventional

PROGRAM ELEMENT: 0602315N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Mines and Special Warfare
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS
(U) MINE WARFARE:
1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Laboratory simulated and tested

b. (U) Completed model tests and analyses

c. (U) Completed

d. (U) Experimentally confirmed

technique.
e. (U) Transitioned to 6.3A.
f. (U) Demonstrated magnetic-acoustic mine detector discrimination against background clutter.
g. (U) Completed development of mine burial prediction techniques.
h. (U) Developed generalized hydrodynamics models for complex mechanical sweep system simulations.
2. (U) FY 1990 PROGRAM:
a. (U) Complete feasibility study of expert system minefield planner.
b. (U) Confirm principle.
c. (U) Transition sea bottom classifier system.
d. (U) Validate bottom-following, mechanical-sweep hydro models.
e. (U) Document viability of low cost side scan sonar concept.
3. (U) FY 1991 PLANS:
a. (U) Transition
b. (U)
prototype
c. (U) Fabricate prototype

d. (U) Characterize environmental influences on very shallow water MCM.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
(U) SPECIAL WARFARE/EXPLOSIVE ORDNANCE DISPOSAL
1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Developed design specifications for prototype for SEAL Delivery Vehicle (SDV) use.
b. (u) Completed compendium for SEAL combat applications.
c. (u) Characterized explosive bomb filler properties

d. (u)

PROGRAM ELEMENT: 0602315N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Mines and Special Warfare
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

e. (u) Completed fabrication of prototype

f. (u) Demonstrated a field system.

g. (u) Transitioned

2. (U) FY 1990 PROGRAM:

a. (U) Fabricate sample variable diver thermal protection material.

b. (u)

c. (u) Demonstrate

d. (u) Demonstrate and transition detector.

3. (U) FY 1991 PLANS:

a. (u) Tank test

b. (u) Complete prototype

c. (u) Transition

d. (U) Transition

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Warfare Center, Dahlgren, VA; Naval Coastal Systems Center, Panama City, FL; Naval Explosive Ordnance Disposal Technology Center, Indian Head, MD; Naval Underwater Systems Center, Newport, RI; Naval Research Laboratory, Washington, DC; David Taylor Research Center, Bethesda, MD; Naval Oceanographic and Atmospheric Research Laboratory Stennis Space Center, MS; CONTRACTORS: EG&G, Las Vegas, NV; Vitro Corp., Silver Spring, MD; Texas Instruments, Dallas, TX; Applied Physics Lab, University of Texas, Austin, TX; Applied Research Lab, Pennsylvania State University, State College, PA.; Woods Hole Oceanographic Institution, Woods Hole, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Program Element 0602314N ASW Technology; Program Element 0602435N, Ocean and Atmospheric Support Technology; Program Element 0602233N, Mission Support Technology.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602323N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Submarine Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Submarine Technology	13,587	15,025	16,701	Continuing	Continuing

B. (U) DESCRIPTION: This program provides new technologies for submarine vehicles needed to achieve significant advances in performance and reduced acquisition and support costs to counter Soviet submarine threat trends.

Program thrusts are: silencing, combat survivability, affordability; technology integration; machinery; and operational performance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Transitioned to Program Element 0603792N, (Advanced Technology Demonstration).
   b. (U) Demonstrated full scale
   c. (U) Assessed low cost illustrative submarine concept.
   d. (U)
   e. (U) Refined
   f. (U) Experimentally evaluated an advanced
   g. (U) Quantified concept.
   h. (U) Initiated Propulsor concept.
   i. (U) Initiated work on high temperature resilient mounts.
   j. (u) Evaluated innovative
   k. (U) Developed add-on damping of machinery structures.
   l. (U) Continued advanced electrical machinery development.
   m. (u) Completed evaluation of

PROGRAM ELEMENT: 0602323N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Submarine Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

2. (U) FY 1990 PROGRAM:
a. (u) Develop hydrophone.
b. (u) Experimental evaluation of quarter scale model structure.
c. (u) Initiate work on concept for launch noise reduction.
d. (u) Assess submarine concept.
e. (u)
f. (u) Develop sonar domes.
g. (u) Characterize
h. (u) Develop advanced hull structure configurations
i (u) Complete evaluation of scale model
j. (u) Experimental evaluation of quarter-scale hulls
k. (u) Model tests of initial
l. (u)
m. (U) Transition improved shaft seal to Program Element 0603561N, (Submarine (Advanced)).

3. (U) FY 1991 PLANS:
a. (U) Transition hydrophone to PE 0603792N (Advanced Technology Demonstration).
b. (U) Conduct test on Large Scale Vehicle (LSV).
c. (U) Design for LSV.
d. (U) Develop treatments.
e. (U) Complete model tests of
f. (U)
g. (U) Develop advanced centrifugal high pressure air compressor.
h. (U) Determine
i. (U) Measure
j. (U) Assess submarine concept.

PROGRAM ELEMENT: 0602323N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Submarine Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: David Taylor Research Center, Bethesda, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: This program is being coordinated with the DARPA Advanced Submarine Program.

- Program Element 0101228N, (TRIDENT Program)
- Program Element 0603561N, (Submarine (Advanced))
- Program Element 0604561N, (Submarine (Engineering))
- Program Element 0603569N, (Attack Submarine Development)

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602324N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Nuclear Propulsion Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Nuclear Propulsion Technology	44,423	14,036	14,575	Continuing	Continuing

B. (U) DESCRIPTION: Nuclear Propulsion Technology provides the foundation of the Naval Nuclear Propulsion Program's highly integrated research and development effort. Key efforts include developing stronger, lighter plant materials, reducing plant and ensuring plant resiliency, reliability and safety. These efforts are necessary to maintain U.S. technological and operational superiority in the face of rapidly developing Soviet Naval threats. Based on Congressional comments, NAVSEA previously had evaluated Nuclear Propulsion Technology and determined that the majority of work had become sufficiently mature to progress to the 6.3 category in FY 1990.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued reactor materials development to provide insight into cladding, and structural material properties. Long and short term tests and analyses of existing and new materials were conducted to ensure their optimal use.

b. (U) Developed graphic display and electrical distribution technology and adapted advanced microprocessor technology to enhance the reliability and safety of plants.

c. (U) Developed an increased understanding of the technology necessary for improved thermal transfer equipment with reduced corrosion rates.

d. (U) Continued development, testing and evaluation of plant components to allow accurate prediction of, and confirmation of, the effects of shock, vibration and high temperature on plant equipment.

e. (U) Developed physics and computational methods to improve advanced plant component and systems capabilities.

f. (U) Developed the process to permit application of advanced technologies.

PROGRAM ELEMENT: 0602324N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Nuclear Propulsion Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

2. (U) FY 1990 PROGRAM:

(U) Continue reactor materials work. Understanding material properties is a base requirement for advanced plants. Major efforts include:

- Developing and qualifying advanced cladding, and structural materials and processes for application to advanced nuclear propulsion plants;
- Conducting irradiation, corrosion and mechanical property testing of new and existing materials to verify material applicability and survivability under extreme reactor conditions and to provide developmental support for irradiation test facilities;
- Examining reactor plant materials to ensure continued plant safety, verify designs and incorporate relevant data into new materials development.

3. (U) FY 1991 PLANS:

(U) Continue reactor materials work to better understand material properties. Major efforts include:

- Continued development and qualification of advanced cladding, and structural materials and processes for application to advanced nuclear propulsion plants;
- Continued irradiation, corrosion, metallurgical, and mechanical property testing of new and existing materials to verify material applicability and survivability under extreme reactor conditions and to provide developmental support for irradiation test facilities;
- Examining reactor plant materials to ensure continued plant safety, verifying designs and incorporating relevant data into new materials development.
- Continued development, testing and analyses of reactor and structural materials to evaluate results of long and short term tests in search of applications for existing and developmental materials.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: CONTRACTORS: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA and General Electric Corporation, Knolls Atomic Power Laboratory and Machinery Apparatus Operation, Schenectady, NY.

PROGRAM ELEMENT: 0602324N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Nuclear Propulsion Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: Program Element 0603570N, Advanced Nuclear Power Systems; Program Element 0205675N, Operational Reactor Development.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602435N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Ocean and Atmospheric Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Ocean and Atmospheric Suport Technology	27,796	29,449	32,099	Continuing	Continuing

B. (U) DESCRIPTION: This element provides exploratory development to support environmental needs for naval weapons and sensor systems in the planning and analysis, design and development, and operational development stages. It develops techniques and prototype equipment to improve the Navy capability to quantitatively measure and predict geophysical parameters on a world-wide basis, and develops the technology required to convert these raw geophysical data into terms of military significance displayed in usable formats and distributed in a timely fashion. As military systems become more sophisticated and complex, the marine environment plays an ever increasing role in the ultimate system performance achievable under operational conditions. Only through quantitative understanding of the environmental effects on modern systems can potential advantages be exploited and serious performance degradations be avoided.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) AAW AND ASUW ENVIRONMENTAL SUPPORT TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Began sensitivity analysis of electro-optical and electromagnetic systems performance.
   b. (U) Developed 94 GHz world-wide progagation statistics.
2. (U) FY 1990 PROGRAM:
   a. (U) Complete sensitivity analysis of electro-optical and electromagnetic systems performance, inlcuding sensitivity to data input.
   b. (U) Revise propagation models to include air-sea coupling.
3. (U) FY 1991 PLANS:
   a. (U) Validate propagation models based on coupled air-sea modeling.
   b. (U) Perform study of benefits gained by using statistical models.

PROGRAM ELEMENT: 0602435N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Ocean and Atmospheric Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) ASW OCEANOGRAPHIC SUPPORT TECHNOLOGY

1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Initiated a program to develop state of the art instrumentation for ocean acoustic research at Woods Hole Oceanographic Institution (WHOI).
b. (u)

c. (u) Conducted
advanced development model tests.
d. (u) Demonstrated effectiveness of

2. (U) FY 1990 PROGRAM:
a. (u)

b. (u)

3. (U) FY 1991 PLANS:
a. (u) Complete simulation studies in preparation for field experiments.
b. (u) Provide comprehensive
to establish the advantage for
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) MULTI-MISSION APPLIED OCEAN AND ATMOSPHERIC SUPPORT

1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Initiated prototype, next generation, integrated model for ocean and atmospheric forecasting.
b. (U) Prepared assimilated data bases for prediction model evaluation.
c. (U) Conducted modeling and simulation studies of measures of effectiveness for environmental impact.
2. (U) FY 1990 PROGRAM: Perform sensitivity tests for data needs of ocean prediction models.
3. (U) FY 1991 PLANS:
a. (U) Determine efficient blend of remote and in-situ data needed to drive the ocean prediction models.
b. (U) Specify the next generation data needs for anticipated coupled air-sea model.

PROGRAM ELEMENT: 0602435N BUDGET ACTIVITY: 1
PROGRAM ELEMENT TITLE: Ocean and Atmospheric Support Technology
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

c. (Determine measures of effectiveness of environmental data and their impact on modeling of weapons systems.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; NADC, Warminster, PA; NOARL Detachment, Monterery, CA; Naval Observatory, Washington, DC; NOARL, Stennis Space Center, MS; NOSC, San Diego, CA; NRL, Washington, DC; NUSC, New London, CT; Institute for Naval Oceanography, Stennis Space Center, MS. CONTRACTORS: PSI, Mclean, VA; Applied Physics Laboratory, University of Washington, Seattle, WA; Applied Research Laboratories, University of Texas, Austin, TX; Marine Physical Laboratory, Scripps Institution of Oceanography, San Diego, CA; Woods Hole Oceanographic Institution, Woods Hole, MA; University of Colorado, Boulder, CO.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Increase of 1,202 for FY 1991 represents Department budget adjustments for NIF and inflation.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Program Element 0602314N, ASW Technology; PE 060378N, Long-Range Propagation; PE 0603207N, Environmental Applications; PE 0603704N, Oceanographic Instrumentation Development. Polar research programs are coordinated throught the Interagency Arctic Research Policy Committee under the National Science Foundation, the Office of the Deputy Director for Research and Advanced Technology (OSD), and the Office of Naval Research.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Some Arctic Environmental work is done with Canada. This effort involves the sharing of scientific data and logistic support. Information Exchange Programs (IEP) ABCANZ II and IEP-C-22 are the agreements under which this is accomplished.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602936N BUDGET ACTIVITY: 1
PROJECT ELEMENT TITLE: Independent Exploratory Development
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

A. (U) RESOURCES: (Dollars in Thousands)

TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
IED	17,040	12,000	13,825	Continuing	Continuing

B. (U) DESCRIPTION: This program provides the Technical Directors of the Navy in-house R&D Centers with a highly flexible means for exploiting new and innovative technology ideas for the solution of Navy and Marine Corps problems. The Navy in-house R&D Centers apply the funds to tasks when the tasks are within the mission of the R&D Center and have been approved by the Technical Director. Task programming is done on an annual basis in response to emergent or meritorious ideas. Ongoing and completed efforts are subject to intense review by the Director, Office of Naval Technology on an after-the-fact basis. This element also provides support for technical laboratory work connected with the Navy Scientific Assistance Program (NSAP) which offers rapid response to fleet requests for technological assistance in resolving problems encountered by selected Navy and Marine Corps Operational commands. Navy scientists from various R&D Centers have been assigned to advise fleet units in the Atlantic, Pacific, and Mediterranean commands. The Office of Naval Technology Postdoctoral Fellowship Program, also funded under this element, provides appointments to recent post-doctoral graduates to work at Navy Centers and Laboratories in research areas of interest to the Navy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) LABORATORY INDEPENDENT EXPLORATORY DEVELOPMENT (IED)

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Fabrication of Celsian ceramics for higher Mach number missile radomes with improved dielectric properties that will eliminate thermal mismatches.

b. (U) Method for processing high-temperature, superconducting flexible wire with a capacity of 200 amps/cm^2 that will provide the plasticity required for many potential applications.

c. (U) Design of analog sonar circuitry utilizing VLSI technology, thereby reducing costs to $400 per channel and increasing the dynamic range of the preamplifier and anti-alias filter.

PROGRAM ELEMENT: 0602936N BUDGET ACTIVITY: 1
PROJECT ELEMENT TITLE: Independent Exploratory Development
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

2. (U) FY 1990 PROGRAM: The FY 1990 Program, currently being executed, is based upon high risk projects carefully reviewed and selected by the Technical Directors of the Navy in-house R&D Centers. The terms of agreement with the Navy R&D Centers call for publication of current year accomplishments during the following year.

3. (U) FY 1991 PLANS: The FY 1991 Program will be planned during FY 1990 based upon review of the FY 1990 accomplishments and proposed projects.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) NAVY SCIENTIFIC ASSISTANCE PROGRAM (NSAP)

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Eighteen science advisors from eleven supporting Navy laboratories/centers continued or initiated 29 projects to provide solutions for immediate fleet requirements.

b. (U) PC tool was developed to assist scheduling offices in assessing impact of ship scheduling and alternatives.

c. (U) Hardware to automatically convert LTN-72 and OMEGA receiver data, for insertion of operator-keyed target DF bearing data to record multiple EW target positions, was developed for COMSIXTHFLT.

2. (U) FY 1990 PROGRAM: The FY 1990 Program,currently being executed, is based on the review of FY 1989 accomplishments and high priority fleet projects for Navy R&D Center scientific advisors assigned to units in the Atlantic, Pacific, and Mediterranean Commands.

3. (U) FY 1991 PLANS: The FY 1991 Program will be planned based on review of FY 1990 accomplishments and proposed projects.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

(U) ONT POSTDOCTORAL FELLOWSHIP PROGRAM

1. (U) FY 1989 ACCOMPLISHMENTS: Selected and appointed approximately forty first-year Fellows for assignments at Navy R&D Centers and Laboratories while another twenty were reappointed by end FY 1989.

2. (U) FY 1990 PROGRAM: The FY 1990 Program, currently being executed, will be based upon quarterly reviews and selections of potential new post-doctorate candidates in response to the nationally disseminated American Society for Engineering Education program announcement circulars and applicant/ laboratory/ONT/grantee interactions.

3. (U) FY 1991 PLANS: This is a continuing program.

PROGRAM ELEMENT: 0602936N BUDGET ACTIVITY: 1
PROJECT ELEMENT TITLE: Independent Exploratory Development
PROJECT NUMBER: N.A. PROJECT TITLE: N.A.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Civil Engineering Laboratory, Port Hueneme, CA; David Taylor Research Center, Bethesda, MD; Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; Naval Ocean Systems Center, San Diego, CA; Navy Personnel Research and Development Center, San Diego, CA; Naval Surface Warfare Center, Dahlgren, VA; Naval Underwater Systems Center, Newport, RI; Naval Weapons Center, China Lake, CA; Naval Training Systems Center, Orlando, FL; GRANTEE: American Society for Engineering Education.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Decrease of 3,464 is due to Department program/budget adjustments.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES:

- Program Element 0601152N, Laboratory Independent Research;
- Program Element 0602121N, Surface Ship Technology;
- Program Element 0602314N, Anti-Submarine Warfare Technology;
- Program Element 0602323N, Submarine Technology;
- Program Element 0602111N, Anti-Air/Anti-Surface Warfare Technology

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603109N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: INTEGRATED AIRCRAFT AVIONICS

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1953	INEWS Adv. Dev.	200	2,663	4,992	Cont.	Cont.
W1954	ICNIA Adv. Dev.	2,022	561	0	0	13,340
Total		2,222	3,224	4,992	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides Navy unique funding for the tri-Services Integrated Electronic Warfare Systems (INEWS) and the Integrated Communications, Navigation, Identification Avionics (ICNIA) effort among the three Services. The INEWS program is managed by a Joint Program Office at Wright-Patterson AFB, OH. The Navy supports the INEWS Joint Program Office with co-located management and engineering personnel. The Air Force, as the lead service, is developing a new family of advanced technology integrated aircraft avionics modules for next generation aircraft. Very High Speed Integrated Circuits (VHSIC) and Microwave, Millimeter Wave Monolithic Integrated Circuits (MIMIC) are extensively utilized in the INEWS/ICNIA development. The Navy will configure jointly funded and developed INEWS and ICNIA modules for use in naval applications. Both hardware and software will be designed in accordance with the specification and standards developed by the Joint Integrated Avionics Working Group (JIAWG) for the Common Avionics Baseline (CAB) and the Advanced Avionics Architecture (A3). The software for both INEWS and ICNIA will be written in the Ada programming language which will significantly reduce the high cost of software maintenance and update. Supportability in all areas will be a key INEWS/ICNIA design consideration. The integration of INEWS and ICNIA into an A3 compatible aircraft will significantly raise aircrew EW situational awareness, improve mission effectiveness, enhance survivability, reduce the aircrew workload, increase force readiness and reduce life cycle cost. INEWS and ICNIA developed modules may also be used to update and enhance other Navy avionics systems through independent technology insertion efforts.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603109N BUDGET ACTIVITY 4
PROGRAM ELEMENT TITLE: INTEGRATED AIRCRAFT AVIONICS
PROJECT NUMBER: W1953 PROJECT TITLE: INTEGRATED ELECTRONIC WARFARE SYSTEMS (INEWS)

C. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: INEWS, a joint program with Air Force designated as lead Service, shall provide a next generation integrated Electronic Warfare (EW) capability for the upgraded version of the Navy Advanced Tactical Aircraft (A-12) and the Air Force Advanced Tactical Fighter.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Continued development of ADM and joint risk reduction projects.

2. (U) FY 1990 PROGRAM:
   a. (U) Complete development of ADMs and conduct Contractor laboratory/flight testing.
   b. (U) Continue to support integration into advanced Navy aircraft.

3. (U) FY 1991 PLANS:
   a. (U) Commence DEM/VAL for Navy unique modules.
   b. (U) Continue to support integration into advanced Navy aircraft.

5. (U) Program to Completion:
   a. (U) Develop Navy tailored EDMs.

E. (U) WORKED PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Weapons Support Center, Crane, IN; Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Ocean System Center, San Diego, CA. CONTRACTORS: TRW, San Diego, CA: Sanders Assoc., Nashua, NH; General Electric, Utica, NY; Westinghouse Electric Co., Baltimore, MD.

F. (U) RELATED ACTIVITIES: PE 0604270N, Consolidated Electronic Warfare. PE 0602234N, Support Systems Technology. PE 0603217N, Advanced Aircraft Subsystems. PE 0603109F, INEWS/ICNIA. PE 0603706D, Microvave, Millimeter Wave Monolithic Integrated Circuits.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1989	FY 1990	FY 1991	TO COMPLETE
APN #2, #4, #5	Not Applicable			(Continuing)

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0513	Air/Ocean Prediction	1,414	1,287	1,571	CONT.	CONT.
X0514	Air/Ocean Shipboard Measurements	1,609	1,989	1,371	CONT.	CONT.
X0948	Precise Time/Time Interval	1,985	2,075	1,430	CONT.	CONT.
X2008	Tactical Ocean Data Assim and Pred.	2,609	2,519	2,924	CONT.	CONT.
TOTAL		7,617	7,870	7,296	CONT.	CONT.

B. (U) DESCRIPTION: This program comprises Navy efforts to provide a shipboard environmental support capability to optimize weapon, sensor and platform performance as a function of the changing ocean and atmosphere. These projects support the infrastructure needed to provide Force Commanders with timely environmental data which will allow them to make tactical decisions to avoid, mitigate or exploit environmental effects. Present shipboard environmental systems are outdated, slow, and incapable of meeting the atmospheric and oceanographic data requirements of modern Naval weapon systems and tactics. The Air/Ocean Prediction project develops computer-based oceanic and atmospheric analysis and prediction models which emphasize the air/ocean interface, an area critical for Naval operations. The Air/Ocean Shipboard Measurements project provides for the advanced development of sensors, communication interfaces, processing and display systems to measure, distribute and display oceanographic and atmospheric parameters. The Precise Time and Time Interval project upgrades the Department of Defense time reference standard and improves dissemination methods critical to strategic missile system accuracy requirements. Strategic Defense Initiative, satellite navigation improvements and jam-proof, secure communications requirements are also included. The Tactical Ocean Data Assimilation and Prediction project maximizes the effectiveness and availability of remotely sensed and conventional oceanographic data needed to enhance warfighting capabilities of the Fleet in such areas as Anti-Submarine Warfare, Anti-Air Warfare, Strike Warfare, and Amphibious Warfare.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications
PROJECT NUMBER: X0513 PROJECT TITLE: Air/Ocean Prediction

C. (U) DESCRIPTION: This project develops Computer based numerical oceanic and atmospheric models to provide environmental data analyses and forecasts necessary to support naval operations. The prediction system emphasizes the air/ocean interface, an area used exclusively for naval operations. Included are global, regional and local scale forecasting, sea ice forecasting, ocean thermal structure analysis and forecasting, ocean circulation prediction and data assimilation for tactical application. The project also supports development of tactical decision aids derived from the numerical analyses and forecasts.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. Began development of on-scene tactical scale Ocean Thermal structure prediction system.
   b. Evaluated and verified the Advanced Tropical Cyclone Model.
   c. Implemented upgrades to the Naval Operational Global and Regional Atmospheric Prediction Systems (NOGAPS).
2. (U) FY 1990 Program:
   a. Complete tactical routing and surf forecast Tactical Decision Aids (TDAs).
   b. Complete strike warfare prototype TDAs and continue tropical cyclone forecast aids.
   c. Complete development of ocean thermal structure prediction system (TOPS 3.0).
3. (U) FY 1991 Plans:
   a. Initiate NOGAPS 4.0 model development.
   b. Continue tropical cyclone forecast aids.
   c. Continue development of Global Circulation Forecast Model.
4. (U) Program to Completion:
   a. Complete NOGAPS 4.0 in FY 94.
   b. This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Monterey, CA; NOARL, Bay St. Louis, MS; and NRL, Washington, DC. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications
PROJECT NUMBER: X0514 PROJECT TITLE: Air/Ocean Shipboard Measurements

C. (U) DESCRIPTION: This project provides for the advanced development of sensors, communication interfaces, processing and display systems to measure, distribute and display atmospheric and oceanographic parameters essential to the optimum employment of naval warfare systems. With these systems, the on-scene Commanders can continuously and automatically monitor the changing atmospheric and oceanographic environment allowing them to optimize performance of their weapons, sensors and platforms.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 Accomplishments:

a. (U) Continued Shipboard Meterological and Oceanographic Observing System (SMOOS) sensor technology development.

b. (U) Continued exploration of Raman Laser atmospheric temperature profiling techniques for the LIDAR Atmospheric Profiler (LAP).

c. (U) Began development of communication interfaces for environmental support systems.

2. (U) FY 1990 Program:

a. (U) Continue development of communication interfaces for environmental support systems.

b. (U) Begin development of shipboard interfaces and data compaction technology to allow extension of Tactical Environmental Support System (TESS)/SMOOS products to other combatants.

c. (U) Complete SMOOS sensor technology development.

3. (U) FY 1991 Plans:

a. (U) Continue development of communication interfaces for environmental support systems.

b. (U) Continue development of shipboard interface and data compaction techniques to allow extension of TESS/SMOOS products to other combatants.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL Det, Monterey, CA (Previously NEPRF); NOSC, San Diego, CA; NRL, Washington, DC; NAVELEXCEN, Vallejo, CA. CONTRACTOR: Lockheed, Austin, TX.

F. (U) RELATED ACTIVITIES: PE 0604218N, Air/Ocean Equipment Engineering; PE 0604230N, Warfare Support System.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications
PROJECT NUMBER: X0948 PROJECT TITLE: Precise Time/Time Interval

C. (U) DESCRIPTION: Upgrade the accuracy of the Naval Observatory's Master Clock System (MCS) for DOD surface, subsurface, air and shore communications, navigation and time dissemination systems. Develop advanced detectors and a optical inter-ferometer to study radio and optical sources used for precise star determination. Develop a laser station for determination of earth rotation and polar motion.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Continued upgrade of the Master Clock System (MCS).
b. (U) Continued the Advanced Light Detector Development (ALDD) program.
c. (U) Continued optical interferometry program.
d. (U) Continued the Very Long Baseline Interferometry (VLBI) required for precise time measurements used in secure communication and navigation.
2. (U) FY 1990 Program:
a. (U) Continue upgrade of the MCS.
b. (U) Continue ALDD program.
c. (U) Continue optical interferometry program.
3. (U) FY 1991 Plans:
a. (U) Continue upgrade of the MCS.
b. (U) Continue ALDD program.
c. (U) Continue optical interferometry program.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORKED PERFORMED BY: Naval Observatory, Washington, DC; Naval Research Laboratory, Washington, DC. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
1,970	2,932	2,793	CONTINUED	CONTINUED

(U) PROCUREMENT: SCN VARIOUS,- OPN SHIP ITEMS UNDER 2M - OPN SUB COMM
(U) MILCON - None

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTION SUMMARY

PROGRAM ELEMENT: 0603207N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications
PROJECT NUMBER: X2008 PROJECT TITLE: Tactical Ocean Data Assimilation

C. (U) Tactical Ocean Data Assimilation (TODAP) develops tactical dynamic ocean models, new means of environmental data collection, including conventional and remotely sensed data, and assimilation techniques to incorporate these data into Navy operational tactical analysis and forecast models. The goal is to provide software enhancements which will promote local ASW and tactical scale atmospheric data.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Performed operational test of GULFCAST ocean prediction model.
b. (U) Completed Defense Meteorological Satellite Program (DMSP) Block-6 Concept Studies.
c. (U) Continued development of Alaska Synthetic Aperture Radar Facility.
d. (U) Continued verification of Pacific ocean model (NEPAC).
e. (U) Began validation of algorithms for foreign satellites.
2. (U) FY 1990 Program:
a. (U) Continue Navy Environmental Operational Novcast (NEONS) development.
b. (U) Perform operational tests of selected ocean models.
c. (U) Begin development of expert system data assimilation techniques.
d. (U) Begin development of range dependent EM/EO performance models.
3. (U) FY 1991 Plans:
a. (U) Continue development of ocean models.
b. (U) Continue expert system and range dependent EM/EO development.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Bay St. Louis, MS; NRL, Washington, D.C., NOARL (formerly NEVENVPREDRSCHFAC) Monterey CA; NOSC, San Diego, CA. CONTRACTOR: Harvard University, Boston MA.

F. (U) RELATED ACTIVITIES: PE 0305111N, Weather Service (Satellite Data Bases); PE 0604218N, Air/Ocean Equipment Engineering.

G. (U) OTHER APPROPRIATION FUNDS: This is not an acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603208N Budget Activity: 4
Program Element Title: T-45 Training System (TS)
Project Nunber: W1142 Project Title: T45TS

POPULAR NAME: GOSHAWK

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		DAB Review 11/89	MS IIIA 11/90 IOC 6/91	MS IIIA 11/91 MS IIIB 11/92
Engineering Milestones		Acft Baseline Estab	OFT Baseline Estab	
T&E Milestones	DT-IIA 11/88 OT-IIA 12/88	DT-IIB 8/90 OT-IIB 8/90	DT-IIC 4/91 OT-IIC 5/91	TECH/OPEVAL DT-IIG 1/92 OT-IID 4/92
Contract Milestones	Del Sim #1 2/89 (FSED)		Del Acft #12 for IOC	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	83,600	22,425	7,633	Cont.
Support Contract	469	0	435	Cont.
In-house Support	7,165	0	6,848	Cont.
GFE/ Other				Cont.
Total	91,234	22,425	14,916	Cont.

Program Element: 0603208N Budget Activity: 4
Program Element Title: T-45 Training System (TS)
Project Nunber: W1142 Project Title: T-45TS

B. (U) DESCRIPTION: 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 in the 1990's and beyond. Projected T-2 and TA-4 aircraft shortages due to attrition and service life expiration, as well as increasing operating and support costs, require development of a cost effective replacement. T45TS is a total training system concept which includes aircraft, simulators, academics and contractor logistics support.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Evaluated and identified corrections for initial DT/OT deficiencies.
   b. (U) Continued T&E of aircraft and ground training systems.

2. (U) FY 1990 Program:
   a. (U) Continue T&E of aircraft and ground training systems.
   b. (U) Demonstrate corrections for initial DT/OT IIA deficiencies.
   c. (U) Commence carrier suitability testing of aircraft.
   d. (U) Accept first pilot production aircraft.

3. (U) FY 1991 Plans:
   a. (U) Continue T&E of aircraft and ground training system including high angle of attack (HAOA).
   b. (U) Conduct Sea Trials.

4. (U) Program To Completion:
   a. (U) Conduct TECHEVAL and system OPEVAL.
   b. (U) Complete HAOA evaluation for fleet spin trainer.
   c. (U) Continue T&E of aircraft and ground training system and final correction of DT/OT deficiencies.
   d. (U) Conduct detailed system evaluation (OT III).
   e. (U) Extend clearances for ordnance and baggage container.
   f. (U) Evaluation of Navy common avionics (MMR/GPS etc.), and lover life cycle cost components.
   g. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Training Support Center, Orlando, FL; Naval Air Propulsion Center, Trenton, NJ; Naval Air Test Center, Patuxent River, MD; Naval Air Engineering Center, Lakehurst, NJ. CONTRACTORS: Douglas Aircraft Company, Long Beach,CA.

Program Element: 0603208N Budget Activity: 4
Program Element Title: T-45 Training System (TS)
Project Nunber: W1142 Project Title: T45TS

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Correction of deficiencies discovered during DT/OT-IIA for the T-45A resulted in delays to the program. In December 1989, a DAB review approved a rebaselined program which moves M/S IIIA(1) to FY91, M/S IIIA(2) to FY92, M/S IIIB to FY92, and IOC to June FY91.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

Mission Element Need Statement	6/79
Acquisition Plan	6/87 (update in process)
Navy Training Plan	6/87 (1990 revision in process)
TEMP	6/89 (Revision 4 in process)
DCP	12/89 (under review)

G. (U) RELATED ACTIVITIES: P.E. 0603216N, Navy Common Ejection System (NACES); P.E. 0604203N, Standard Attitude and Heading Reference System (SAHRS) ; and P.E. 0604264N, Onboard Oxygen Generating System (OBOGS).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APPN/P-1					
QTY	(24)	(0)	(12)		
APN-3	414.0	108.3	305.9		
#25/26					
APN-6 #65	Not applicable			Cont.	Cont.
MILCON				Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Project Element: 0603210N Budget Activity: 2
Program Element Title: AIRCRAFT PROPULSION
Project Number: W2014 Project Title: Integrated High Performance Turbine Engine (IHPTET)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W2014	Integrated High Perf. Turbine Eng. Tech. (IHPTET)	6,028	7,162	10,134	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Integrated High Performance Turbine Engine Technology (IHPTET) program pursues exploratory development efforts in materials and propulsion, and allows for a fully coordinated technology demonstrator effort with the Army, Air Force, DARPA and NASA, and engine industry. Navy participation ensures IHPTET advanced technology payoffs meet Navy needs. IHPTET demonstration categories are: (1) fighter/attack; (2) turboprop/turboshaft and (3) missile and expendable engines.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Fabricated and assemble GE33 and PW699 engines and complete fan testing.
   b. (U) Completed GE23A dry engine demonstration.
   c. (U) Completed performance baseline for small expendable engine.

2. (U) FY 1990 Program:
   a. (U) Continue GE33 and PW699 build 1.
   b. (U) Award Joint Turboshaft Advanced Gas Generator (JTAGG) GEN 5 engine contracts.

3. (U) FY 1991 Plans:
   a. (U) Complete GE33 and PW699 build 1 test and start test.
   b. (U) Start GEN 6 Fighter/Attack engine effort.
   c. (U) Complete JTAGG Final Design and initiate core testing.
   d. (U) Start small expendable engine.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAPC, Trenton, NJ; NADC, Warminster, PA; and DT RC, Bethesda, MD. CONTRACTORS: General Electric Company, Evendale, OH and Lynn, MA; and Pratt and Whitney Aircraft, West Palm Beach, FL.; AVCO/Textron, Stratford, CT; AGTO, Indianapolis, IN.

E. (U) RELATED ACTIVITIES: Joint service MOU with USAF, Army, and NASA; Navy - P. E. 0602122N, Aircraft Technology; 0602234N, System Support Technology; Air Force - P.E. 0603216F, Advanced Turbine Engine Gas Generator; 0603202F, Aircraft Propulsion Subsystem Integration; Army - P.E. 0603003A, Aviation Advanced Technology.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603216N Budget Activity: 4
Program Element Title: AIRCREW SYSTEMS TECHNOLOGY

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0584	Aircrew Systems Tech.	5,285	9,382	6,795	Cont.	Cont.
M0097	Aircrew Impact Injury Prevention	2,273	2,797	3,021	Cont.	Cont.
	Total	7,558	12,179	9,816	Cont.	Cont.

B. (U) DESCRIPTION: Aircrew Systems Technology is a tri-service coordinated advanced development program. It consists of two complementary projects: Project M0097, Aircrew Impact Injury Prevention (AIIP) and Project W0584, Aircrew Systems Technology (AST). Project M0097 develops human dynamic and injury response models (IRM) to impact acceleration and determines the correlation of these dynamic responses with the physiological effects and injuries. Project W0584 uses these models to develop and functionally integrate systems and equipment to ensure 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 the aircraft.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603216N Budget Activity: 4
Program Element Title: AIRCREW SYSTEMS TECHNOLOGY
Project Number: W0584 Project Title: AIRCREW SYSTEMS TECHNOLOGY

C. (U) DESCRIPTION: Develops technology for functionally integrated aircrew Life Support Systems. The FY90 Congressional increase of $3.738 million for the integration of Combat Edge (CE) technology and development of a new crew station for the F/A-18 and other Navy fighters will be applied to initiate joint development with Canada of an F/A-18 compatible Navy CE System and start early development of systems defined by the Advanced Technology Crew Station (ATCS) program to enhance combat capability of current aircraft.

D. (U) PROGRAM ACCOMPLISHMENTS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continue AILSS and 21st CHPP.
   b. (U) Initiate ATCS Program, Laser Visor Eye Protection (LVEP) and Medium Energy Laser Eye Protection (MELEP) Programs.
2. (U) FY 1990 Programs:
   a. (U) Continue AILSS, 21st CHPP, ATCS, LVEP and MELEP Programs.
   b. (U) Initiate Crashworthiness, Advanced Oxygen Delivery (AODS) System and CE Systems Programs.
3. (U) FY 1991 Plans:
   a. (U) Transition AILSS, ATCS and CE Programs.
   b. (U) Continue 21st CHPP, ATCS, LVEP, MELEP, Crashworthiness, and AODS Programs.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA; Naval Ordnance Station, Indian Head, MD; CONTRACTORS: American Optical, Southbridge, MA.; Boeing Advanced Systems Division, Seattle, WA; Gentex Inc., Carbondale, PA; Northrop Aircraft, Los Angeles, CA. OTHERS: USAF Wright Aeronautical Laboratories (AFWAL), Dayton, OH.

F. (U) RELATED ACTIVITIES: All Aviation Life Support System projects are controlled to eliminate duplication and ensure commonality by the Tri-Service Life Support Equipment Steering Committee and the Joint Environmental Working Group (Flight); P. E. 0602201F: Aerospace Flight Dynamics; P.E. 0602233N: Mission Support Technology; P.E. 0604264N: Aircrew Systems Development; and P.E. 0604706F: Life Support Equipment all perform coordinated/related projects.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acqisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603216N Budget Activity: 4
Program Element Title: AIRCREW SYSTEMS TECHNOLOGY
Project Number: M0097 Project Title: AIRCREW IMPACT INJURY PREVENTION

C. (U) DESCRIPTION: This project develops human dynamic and injury response models of impact acceleration and determines the correlation of these dynamic responses with physiological effects and injuries. These models will be used to evaluate human protective systems designed to prevent impact type injuries.

D. (U) PROGRAM ACCOMPLISHMENTS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed vertical accelerator man-rating certification.
   b. (U) Began human data collection on vertical accelerator.
   c. (U) Collect +Gz injury model data.
   d. (U) Publish updated impact guidelines (+ Gz)
2. (U) FY 1990 Programs:
   a. (U) Collect human response to vertical +Gz impact with/without head mounted devices.
   b. (U) Determine Rhesus -Gx cadaveric impact response.
   c. (U) Collect +Gz injury model data.
   d. (U) Develop preliminary human +Gz IM.
3. (U) FY 1991 Plans:
   a. (U) Collect human response to off-axis +Gz and -Gz impact with and without head mounted devices.
   b. (U) Complete IM for on-axis and +Gz and -Gz human impact response.
   c. (U) Collect +Gz (with head mounted device) IM data.
   d. (U) Complete updated injury-impact guidelines.
4. (U) Program to completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Biodynamics Laboratory, New Orleans, LA; Naval Air Development Center, Warminster, PA; Naval Medical Research Institute, Bethesda, MD.; Naval Aerospace Medical Research Laboratory, Pensacola, FL. CONTRACTORS: Maryland Medical Laboratory, Baltimore, MD; Ochsner Medical Clinic, New Orleans, LA; GSA Technical Services, Ft. Worth, TX. OTHERS: USAF Armstrong Aeromedical Research Laboratory, Dayton, OH; USA Aeromedical Research Laboratory, Ft. Rucker, AL; NASA, Johnson Space Center, Houston, TX.; Department of Transportation, Washington, DC; Veterans Administration Medical College of Wisconsin.

F. (U) RELATED ACTIVITIES: All ALSS projects are controlled to eliminate duplication and ensure commonality by the Tri-Service Life Support Equipment RDT&E Steering Committee, the Joint Environmental Working Group (Flight), the Tri-service Aerospace Medical Research Panel and Technical Working Groups in biodynamics and vibrations/acoustics.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N Budget Activity: 2
PROGRAM ELEMENT TITLE: Advanced Aircraft Subsystems
PROJECT NUMBER: W0446 PROJECT TITLE: Advanced Avionics Subsystems and Technology (AS&T)

A. RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0446	AS&T	12,277	5,744	5,966	Cont.	Cont.

B. DESCRIPTION: Develops/demonstrates surveillance sensors, avionics packaging/data bus/architecture, situation awareness/visionics; evaluates subsystems developed by other Services. Goals include improved surveillance, detection and classification of threats/targets; demonstration of avionic systems' architectural concepts; insertion of emerging technologies such as Very High Speed Integrated Circuit (VHSIC), Microwave/Millimeter-wave Monolithic Integrated Circuit (MIMIC), etc.; increased tri-service avionics commonality; lighter, more reliable, more affordable and more effective systems/subsystems.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1989 ACCOMPLISHMENTS:
   a. Initiated Navy/Air Force special airborne antenna system demo.
   b. Completed the specification for JIAWG baseline architecture.
   c. Continued development of advanced situational awareness/visionics.
   d. Completed high speed (100Mbit) fiber optic passive star coupler.
   e. Began dual 32-bit PI-bus (Parallel) chip set development.
2. FY 1990 PLANS:
   a. Continue PI-bus chip set development.
   b. Continue situational awareness/visionics development.
   c. Initiate demonstration of a standard optical backplane architecture.
   d. Continue JIAWG development, coordination and specification efforts; including light weight packaging demonstration.
   e. Continue airborne antenna system demostration with USAF.
3. FY 1991 PLANS:
   a. Continue design of standard optical backplane architecture.
   (u)b
   c. Complete initial situational awareness/visionics assessment.
   d. Complete dual PI-bus interface chip development.
   e. Complete concept phase of the airborne antenna system.
   f. Continue JIAWG coordination and development.
4. Program to Completion: This is a continuing program.

D. WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NAC, Indianapolis, IN; NRL, Washington, DC. CONTRACTORS: IBM, Owego, NY; Cambridge Research Associates, Vienna, VA; GE, Cherry Hill, NJ; Rockwell, Anaheim, CA; MAKCO, Edinboro, PA; G&H Tech., Santa Monica, CA; Westinghouse, Baltimore, MD; Unisys, Minneapolis, MN.

E. RELATED ACTIVITIES: PE#0604203N (Standard Avionics Development); PE#0603109N (Integrated Avionic Systems); PE#0603109F (Pave Pillar/Pace).

F. OTHER APPROPRIATION FUNDS: This is a Non-acquisition program.

G. INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603220N Budget Activity: 4
Program Element Title: ADVANCED TACTICAL SURVEILLANCE (ATS)
Project Number: W1689 Project Title: ADVANCED TACTICAL SURVEILLANCE (ATS)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1689	ATS	0	0	1,510	Cont.	Cont.

B. (U) DESCRIPTION: Advanced Tactical Surveillance (ATS) is a total system concept that may be comprised of land and/or carrier based manned and/or unmanned air vehicles, which through a robust communication network and data fusion, will provide Battle Management for long-range surveillance, AAW, ASW, EW (active and passive) and Mine Warfare. ATS is targeted to replace the E-2C, S-3B, EA-6B, and ES-3A aircraft/missions in order to meet the threat of the 21st Century.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not applicable.

2. (U) FY 1990 Program: Not applicable.

3. (U) FY 1991 Plans:
   a. (U) Conduct Source Selection.
   b. (U) Award two or more competitive contracts for ATS CE; Perform CE "in process" reviews; Develop model to evaluate CE concepts.
   c. (U) PPC, develop SOW/PR and update TLPR for DEM/VAL.
   d. (U) Establish Critical Path Management.
   e. (U) Perform in-house site survey.
   f. (U) Monitor IR&D "Special" avionics programs for ATS application.
   g. (U) Update threat; update all plans.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN HOUSE: CNA, NAVAIR, SPAWARS, OPNAV, NADC, NATC, PMTCF, NAC, NAMO, NWC. CONTRACTORS: TBD.

E. (U) RELATED ACTIVITIES: P.E. 0603217N, Advanced Aircraft Subsystems; P.E. 0602122N, Aircraft Technology; P.E. 0604252N, Advanced Tactical Aircraft; P.E. 0305141D, Joint Remotely Piloted Vehicles Program; P.E. 0603303N Infrared Search and Track.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603228N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CV ASW Module
PROJECT NUMBER: S0517 PROJECT TITLE: CV ASW Module

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0517	CV-ASW Module	3,442	3,411	3,625	CONT.	CONT.

B. (U) DESCRIPTION: This continuing program develops software and equipment improvements required to upgrade the Aircraft Carrier Antisubmarine Warfare Module (CV-ASWM). An integral part of the carrier Advanced Combat Direction System (ACDS), CV-ASWM provides mission support for embarked S-3 aircraft and CV helicopters; ASW sensor data processing/analysis; and primary command, control and communications connectivity between air ASW weapon systems, ACDS, the ASW Commander and other battle force ASW components. Critical program needs are ongoing tactical interoperability with evolving combat direction systems and the continued capability to support both new and upgraded ASW aircraft software programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Continued Model 4.2 computer program development to support fleet introduction of S-3B (WSIP) aircraft. Conducted Model 4.2 IOT&E.
2. (U) FY 1990 Program: Complete Model 4.2 S-3B revision. Implement Model 5.1 upgrade to support ACDS BLOCK I. Conduct Model 4.2 TECHEVAL/OPEVAL.
3. (U) FY 1991 Plans: Complete testing of Model 5.1 program including TECHEVAL/OPEVAL. Commence development of interface with Tactical Environmental Support System (TESS) and Navy Modular Automated Communications System (NAVMACS).
4. Program to Completion: This is a continuing program.

D. WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA. CONTRACTORS: Intermetrics, Inc., Warminster, PA; Pacer Systems Inc., Horsham, PA.

E. RELATED ACTIVITIES: PE 0604518N, Combat Information Center Conversion (provides ASW information to ACDS); PE 0604711N, Anti-Submarine Warfare Operations Center (interoperability with MPA mission support).

F. OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OP,N (P-1 # 76)	4,857	4,119	13,343	CONT.	CONT.

G. INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

Program Element: 0603231N Budget Activity: 4
Program Element Title: NAVY ADVANCED TACTICAL FIGHTER
Project Number: W2051 Project Title: NAVY ATF

NO PICTURE AVAILABLE

POPULAR NAME: NATF

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestone			MSII USAF/ USN Source selection	
Engineering Milestones	DEM/VAL Trade Studies			
T&E Milestones				
Contract Milestones	4/90	2nd/QTR	2nd/QTR	Continuing

Budget ($K)	FY 1989	FY 1990	FY 1991	Prog Total To Complete
Major Contracts	59,649	54,366	48,960	Continuing
Support Contract	--	--	--	Continuing
In-House Support	3,888	6,040	16,525	Continuing
GFE/ Other	185	180	200	Continuing
Total	63,722	60,586	65,685	Continuing

Program Element: 0603231N Budget Activity: 4
Program Element Title: NAVY ADVANCED TACTICAL FIGHTER
Project Number: W2051 Project Title: NAVY ATF

B. (u) DESCRIPTION: The Navy Advanced Tactical Fighter (NATF) program will develop the next generation fighter for to counter the emergence of large numbers of advanced Soviet fighters and long range threat platforms. The NATF is being designed to maintain fleet air superiority against these platforms. Program emphasis from the outset has been balanced on affordability, reliability, maintainability, performance, and survivability. The NATF TOR specified a variant of the Air Force Advanced Tactical Fighter to replace the F-14. In June 1988, Navy modified the mission of NATF to reflect a strike-fighter role and satisfy AAW and STK/ASUW warfighting requirements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 Accomplishments:

a. (U) Phase II contractor awards were made for continuing DEM/VAL to increase the level of effort for the Navy variant design.

b. (U) Carrier suitability design, wind tunnel testing, structural and materials testing for marine environments, effectiveness, avionics integration, susceptibility, integrated logistics support, reliability, maintainability and supportability studies commenced.

2. (u) FY 1990 Program:

a. (U) Results of the studies conducted in 1988,1989, and 1990 will be evaluated and incorporated into source selection criteria and the design specification for a source selection.

b. (U) Carrier suitability analyses will be conducted: includes structures and aerodynamic analyses and capability with CV launch and recovery systems.

c. (U) Marinization of USAF/ATF engines will be accomplished.

d. (u) Investigate use of

e. (U) Wind tunnel testing for Navy variant will continue at NASA Langley Research Center, NASA Ames Research Center and Contractor Facilities.

f. (U) Materials testing for composite structures in Navy variant will be conducted.

g. (U) Source Selection will begin in 2nd QTR FY91 and will be completed in 3rd QTR FY 91.

Program Element: 0603231N Budget Activity: 4
Program Element Title: NAVY ADVANCED TACTICAL FIGHTER
Project Number: W2051 Project Title: NAVY ATF

3. (U) FY 1991 Plans: Enter a three-year DEM/VAL period in preparation for a Milestone IIA decision in FY-94. This includes USN field station engineering support for the following:

a. (U) Monitor the development of USAF ATF airframe, avionics and propulsion during FSD.

b. (U) Monitor USAF ground and flight tests.

c. (U) Additional refinement of USN requirements for FSD will be conducted.

d. (U) Develop Type Spec for the NAVY variant of ATF design and performance criteria.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Systems Command, Washington, DC; Aeronautical Systems Division, Wright-Patterson AFB, Dayton, OH. CONTRACTORS: Northrop Corporation, Aircraft Division, Hawthorn, CA, Lockheed California Co.,Burbank, CA; United Technologies/Pratt and Whitney, West Palm Beach Fl: General Electric Co., Aircraft Engine Division, Evandale, OH.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: TOR July 89

G. (U) RELATED ACTIVITIES: USAF Advanced Tactical Fighter (ATF) P.E. 0603230F.

H. (U) OTHER APPROPRIATION FUNDS: Production is planned for the outyears.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Adv)
PROJECT NUMBER: W1292 PROJECT TITLE: Air Anti-submarine Warfare

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1292	Adv ASW Sensors & Proc.	12,345	10,689	11,319	CONT.	CONT.

B. (u) DESCRIPTION: This program provides improved air ASW warfare platform effectiveness through development of advanced hardware and software associated with airborne acoustic systems, including sensors, processing, post-processing, data recording and display capabilities to meet the deeper diving, faster and quieter Soviet submarine threat of the 1990's. Key objectives are platform accommodations of advanced active and passive sensors, improved detection, classification, localization, tracking, and increased capacity and flexibility to handle multi-sensor data loads.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) - Completed DOP. Commenced demonstration/validation DEM/VAL) testing. Continued systems engineering and detection algorithm development.

b. (U) Air Deployed Active Receiver (ADAR) - Initiated systems studies. Initiated DEM/VAL testing of alternative array configurations.

c. (U) Advanced Active Sonobuoy (AAS) - Initiated systems concept studies to support DOP.

d. (U) Tactical Arctic Sonobuoy (TAS) - Completed DOP analysis. Conducted geobuoy testing.

e. (U) Enhanced Tactical Surveillance System (ETSS) - Completed trade off studies to identify system design.

2. (U) FY 1990 Program:

a. (U) ETSS - Conduct DEM/VAL tests for transition to FSED in FY91. Initiate functional design for software and hardware.

b. (U) ADAR - Complete systems studies.

c. (U) - Complete systems engineering, detection algorithm development, and DEM/VAL tests. Transition selected option to FSED.

d. (U) AAS - Complete DOP analysis. Award ADM contract.

e. (U) Advanced Active Adjunct (AAA) - Initiate system concept studies.

3. (U) FY 1991 Plans:

a. (U) ETSS - Transition to FSED.

b. (U) ADAR - Transition to FSED.

c. (U) AAS - Conduct DEM/VAL tests.

PROGRAM ELEMENT: 0603254N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Adv)
PROJECT NUMBER: W1292 PROJECT TITLE: Air Anti-submarine Warfare

d. (U) AAA - Complete DOP analysis. Initiate advanced development model procurement for selected candidate.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NWSC, Crane, IN.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology Changes: None.
2. (U) Schedule Changes: None.
3. (U) Cost Changes: None.

F. (U) PROGRAM DOCUMENTATION:

ETSS	OR	2/86	ADAR	OR	11/85
AIS	TOR	8/85	TAS	TOR	7/85
AAA	TOR	4/87			
AAS	TOR	5/86	ADAR	PCAD	2/89

G. (U) RELATED ACTIVITIES: PE 0602711N, Undersea Target Surveillance Tech., PE 0604261N, Acoustic Search Sensors.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None

J. (U) MILESTONE SCHEDULE:

	MS II	IOC
ETSS	2Q91	
AIS	3Q90	
AAA	1Q94	
AAS	3Q93	
ADAR	3Q91	

FY 1991 RDT&E,NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603260N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0528	Advanced Airborne Mine Countermeasures	5,627	3,081	2,164	0	105,000
W0529	Airborne Minehunting System	6,275	9,596	14,766	CONT.	CONT.
TOTAL		11,902	12,677	16,930	CONT.	CONT.

B. (U) DESCRIPTION: This program develops airborne mine countermeasures systems that are required to counter known and projected mine threats. Provides a [redacted] minesweeping capability against [redacted] mines, a [redacted] mechanical minesweeping capability against moored mines, and a capability to locate and neutralize [redacted] mines, at greater area coverage rates and by more [redacted] means than by surface mine countermeasures platforms.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603260N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: W0528 PROJECT TITLE: Advanced Airborne Mine Countermeasures Equipment

C. (U) DESCRIPTION: The rapid speed of forward deployment and effectiveness of helicopter minesweeping has been proven in Haiphong, Suez,and the Red Sea. This led to a requirement to expand helicopter mine countermeasures that encompasses a deeper and more effective capability tc

Systems developed include: AN/ALQ-166 Magnetic Sweep to sweep magnetic mines and the A/N37U-1 Controlled Depth Moored Sweep

and reduce streaming time.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) AN/ALQ-166 - Incorporated MH-53E tow capability and initiated contractor demo.
   b. (U) A/N37U-1 - Conducted technical evaluation.
2. (U) FY 1990 Program:
   a. (U) AN/ALQ-166 - Complete contractor demo and technical evaluation. Initiate operational evaluation.
   b. (U) A/N37U-1 - Conduct operational testing and obtain ALRIP.
3. (U) FY 1991 Plans:
   a. (U) AN/ALQ-166 - Complete operational evaluation and obtain AFRP.
   b. (U) A/N37U-1 - Initiate limited production.
4. (U) Program to Completion: A/N37U-1 - Conduct technical and operational evaluations and obtain AFRP.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVCOASTSYSCEN, Panama City, FL, and DTRCEN, Bethesda, MD. CONTRACTORS: EDO Government Products Division, College Point, NY.

F. (U) RELATED ACTIVITIES: Cable fairing and towed body technologies developed under PE 0602315N, Mine and Special Warfare; PE 060350N, Surface Mine Countermeasures, Project S0260, Advanced Minehunting Systems, Neutralization Project S1404.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY1989 ESTIMATE	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN #204 (BA 3)	Not Applicable			CONTINUING	CONTINUING

Source: Exhibit D-1, 29 Dec 89, Page N-35

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E,NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603260N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: W0529 PROJECT TITLE: Airborne Mine Hunting System

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0529	Airborne Mine Hunting System	6,275	9,596	14,766	CONT.	CONT.

B. (u) DESCRIPTION: This project includes sonars for mine detection and classification, and systems for mine neutralization by explosive charge, with equipment designed to provide

nduct rapid minefield reconnaissance
Systems being developed: Acoustic Tracking Device and Neutralization System

and AN/AQS-20 Sonar Mine Detecting Set

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Neutralization - Conducted environmental and safety tests.
2. (U) FY 1990 Program:
a. (U) Neutralization - Conduct contractor demonstration and initiate technical evaluation.
b. (U) AN/AQS-20 - Conduct critical component tests.
3. (U) FY 1991 Plans:
a. (U) Neutralization - Complete technical and operational evaluations.
b. (U) AN/AQS-20 - Conduct developmental and operational testing and obtain Milestone II.
4. (U) Program to Completion:
a. (U) Neutralization - Obtain AFRP.
b. (U) AN/AQS-20 - Conduct environmental and contractor demonstration tests, complete technical and operational evaluations and obtain AFRP.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVCOASTSYSTEN, Panama City, FL; DTRCEN, Bethesda, MD; and NAVSWC DET, Silver Spring, MD. CONTRACTORS: EDO Electro-Acoustic Division, Salt Lake City, UT.

PROGRAM ELEMENT: 0603260N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: W0529 PROJECT TITLE: Airborne Mine Hunting System

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION:
1. (U) NEUTRALIZATION
NDCP 4/80
TEMP #053-2 (IN-PROGRESS)
PCAD 6/86
2. (U) AN/AQS-20
Program Definition Document 4/86
TEMP #053-3 (IN-PROGRESS)

G. (U) RELATED ACTIVITIES: Computer-aided detection/classification, cable fairing, and towed body technologies developed under PE 0602315N, Mine and Special Warfare Sonar Technology; PE 0603502N, Surface Mine Countermeasures; Advanced Minehunting Systems, Project S0260; and Neutralization, Project S1404.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN #204 (BA 3)				CONTINUING	CONTINUING

Source: Exhibit D-1, 29 Dec 89, Page N-35

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE:
1. (U) NEUTRALIZATION
a. (U) Complete DT/OTII 3Q91
b. (U) Complete FSED 4Q91
c. (U) AFRP Milestone III 1Q92
2. (U) AN/AQS-20
a. (U) Complete DT/OT I 4Q91
b. (U) Complete ADV/DEV Milestone II 4Q91
c. (U) Complete DT/OT II 3Q94
d. (U) Complete FSED 4Q94
e. (U) AFRP Milestone III 1Q95

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603261N Budget Activity: 4
Program Element Title: Tactical Air Reconnaissance
Project Number: W0534 Project Title: Tactical Reconnaissance System

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0534	F/A-18C/D Recce Capable (RC) with SAR and ATARS EO/IR Sensors	12,008	21,525	30,950	Cont.	Cont.

B. (U) DESCRIPTION: The Tactical Air Reconnaissance Program provides timely and highly credible 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 (EO), Infrared (IR) 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 F/A-18D(RC) for the Marine Corps and the F/A-18C(RC) for the Navy will be compatible aircraft. The USMC F/A-18D (RC) will phase out USMC RF-4B's commencing in 1990. A Navy Follow-on Tactical Recce (FOTR) capable aircraft (F-18C(RC)) will replace the interim Navy F-14 Tactical Air Reconnaissance Pod System (TARPS). A shipboard readout capability compatible with the Joint Service Imagery Processing System (JSIPS) will be used for data reduction.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Initiated flight test of reconnaissance nose shape for flight control data.

b. (U) Continued aircraft provisions design.

c. (U) Initiated software development for F/A-18D(RC).

d. (U) Coordinated with USAF the development of EO/IR sensors and standoff sensors and design for installation in the F/A-18D(RC). Fund MIPR to USAF for Navy options.

e. (U) Developed test plans.

f. (U) Commenced design planning for provisions for interface of APG-65 radar SAR mode with ATARS and data link.

g. (U) Continued logistic, facility planning for F/A-18D(RC).

h. (U) Participated with USAF in planning Joint T&E of the ATARS system.

i. (U) Initiated planning for USN F/A-18C.

j. (U) Initiated planning for a shipboard Joint Service Imagery Processing System (JSIPS-N).

2. (U) FY 1990 Program:

a. (U) Continue funding of ATARS USN options.

b. (U) Continue software development for F/A-18C/D(RC).

c. (U) Continue production installation of aircraft provisions.

d. (U) Conduct flying qualities flight test of reconnaissance nose.

e. (U) Continue design of provisions for interface of APG-65 radar SAR mode with ATARS and data link.

f. (U) Continue design effort for incorporation of clear air standoff EO.

g. (U) Commence T&E planning for the USN F/A-18C(RC).

Program Element: 0603261N Budget Activity: 4
Program Element Title: Tactical Air Reconnaissance
Project Number: W0534 Project Title: Tactical Reconnaissance System

h. (U) Begin design effort and development to ensure commonality of USN JSIPS with other shipboard intelligence/mission planning systems.

i. (U) Monitor JSIPS development. Commence design planning for the shipboard JSIPS system.

3. (U) FY 1991 Plans:

a. (U) Continue funding of ATARS USN options.

b. (U) Initiate development flight test of ATARS EO/IR nose sensors.

c. (U) Initiate interface design of ATARS to accept SAR imagery data from APG-65 Radar upgrade.

d. (U) Initiate acquisition and integration of clear air "standoff" EO sensor into F/A-18D configuration for T&E.

e. (U) Initiate Low Rate Initial Production (LRIP) of ATARS sensors.

f. (U) Initiate logistic, facility planning and T&E for the USN F/A-18C(RC).

g. (U) Complete design effort and continue development of the shipboard JSIPS capability.

h. (U) Begin funding USN options in joint JSIPS contract.

i. (U) Coordinate Test and Evaluation (T&E) planning for the shipboard JSIPS capability.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORKED PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD; NWC, China Lake, CA. CONTRACTORS: Prime for F/A-18C/D(RC) aircraft; McDonnell Aircraft Co., St. Louis, MO; Prime for EO/IR sensors; Control Data Corp., Minneapolis, MN; prime for JSIPS-N; General Dynamics Electronics Division, San Diego, CA and E-Systems, Garland, TX.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: The Department adjustment of -1,528 in FY 1991 may delay initiation of a P3I for the EO-Long Range Oblique Photography System.

F. (U) PROGRAM DOCUMENTATION: OR 6/84; Operational Requirement (OR) for Tactical Air Reconnaissance System (F/A-18(R)) #022-05-83 of 25 June 1984(C). PMP 9/88; F/A-18 Recce/ATARS "D" Aircraft program Serial 88-1 approved 9/16/88. TEMP in coordination.

G. (U) RELATED ACTIVITIES: PE0204136N. F/A-18 Squadrons: adds reconnaissance capability to multi-mission aircraft; adds SAR imagery mode provisions to radar upgrade; PE 0206625M, Joint Service Imagery Processing Systems: receives EO/IR/SAR imagery. PE 0604710F, Tactical Reconnaissance: develops common EO/IR sensor suite.

Program Element: 0603261N Budget Activity: 4
Program Element Title: Tactical Air Reconnaissance
Project Number: W0534 Project Title: Tactical Reconnaissance System

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APPN/P-1 APPN-1 #10, 11 APN-6 #65	Not applicable			Continuing	Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Kuwaiti F/A-18 buy includes Reconnaissance Capable (RC) configuration.

J. (U) MILESTONE SCHEDULE:

Basic Ordering Agreement (BOA) Contract	Sep 87
BOA Definitization	Mar 88
ATARS EO/IR Sensor Contract	May 88
Engineering Change Proposal (ECP) A (Part II)	May 89
ECP DIWS contract	Jan 90
ECP B (Part III & EO)	Jan 90
ATARS Full Scale Development (FSD) Delivery	Jan 91
ECP JSIPS contract	Feb 91
Initiate EO/IR Flt Test	Jun 91
USN MS IIIA	Aug 91
Hardware Development Test (DT) complete	Dec 91
Operational Evaluation	Apr 92
Software Fleet Release	Oct 92
Complete integration of JSIPS TIS and APS DIWS	Feb 93
Production system	Mar 93
JSIPS-N MS IIIA	Sep 93
Follow-on Test & Evaluation (FOT&E) complete	Feb 94
JSIPS-N MS IIIB	Sep 95

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: ACFT SURVIVABILITY AND VULNERABILITY

A. (U) RESOURCES: (Dollars in Thousands)

Project Number		FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Compt	Total Prog
W0591	Acft Surv & Vulner	6,071	1,745	2,531	0	164,702
W0592	Acft & Ord. Safety	2,913	3,930	3,112	Cont.	Cont.
W1277	FAANTAEL	922	1,222	1,688	Cont.	Cont.
W1819	CV Acft Fire Suppression Sys	759	1,948	2,054	Cont.	Cont.
	Total	10,665	8,845	9,385	Cont.	Cont.

B. (U) DESCRIPTION: This program addresses both the reductions in aircraft susceptibility to enemy and non-combat threats and in aircraft vulnerabilities to conventional, nuclear, chemical, biological, radiological, directed energy, and fire threats. This program expands the survivability technology base and develops prototype hardware which is required to improve the survivability and fire safety of Naval aircraft. Additionally, this program addresses ordnance safety.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: ACFT SURVIVABILITY AND VULNERABILITY
Project Number: W0591 Project Title: SURVIVABILITY AND VULNERABILITY

C. (U) DESCRIPTION: Program expands the survivability technology base and develops prototype hardware to improve the survivability of Navy aircraft. This project addresses the likelihood of an aircraft being hit (susceptibility) and the probability of kill if the aircraft is hit (vulnerability). This program has developed prototype hardware for the reduction of vulnerability of Navy aircraft which has been or will be incorporated in production.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Phase II initiated for the Outlaw Zeus program.
   b. (U) JRA program completed.
   c. (U) Development of techniques to protect EO sensors from laser irradiation continued.
   d. (U) Outlaw Knight Phase I program is being completed.
2. (U) FY 1990 Programs:
   a. (U) Continue Phase II of the Outlaw Zeus Program.
   b. (U) Complete development of an On-Board Inert Gas Generating System (OBIGGS) System for TACAIR.
3. (U) FY 1991 Plans: Complete Phase II of the Outlaw Zeus Program.
4. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVWPNCEN, China Lake, CA; NAVAIRDEVCEN, Warminster, PA; NRL, Washington, DC; PMTC, Pt. Mugu, CA. CONTRACTORS: Grumman Aerospace, Bethpage, NY; McDonnell Aircraft Company, St. Louis, MO.

F. (U) RELATED ACTIVITIES: P.E. 0605132D, Joint Technical Coordinating Group on Aircraft Survivability, supports joint combat survivability development, test and evaluation programs, activities and ensures no duplication of effort between the Services with respect to survivability programs.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: ACFT SURVIVABILITY AND VULNERABILITY
Project Number: W0592 Project Title: AIRCRAFT AND ORDNANCE SAFETY

C. (U) DESCRIPTION: This project transitions technology to comply with CNO direction that all munitions carried aboard Navy ships be insensitive to fast cook-off (FCO), slow cook-off (SCO), bullet and Fragment Impact (FI), sympathetic detonation (SD).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Initiate GPBF booster evaluation.
   b. (U) Investigate, retrofitable protection for GATOR.
   c. (U) Continue strip laminate motor case for HARM.
   d. (U) Conduct baseline, FCO, SCO, SD and FI tests on MK 78 rocket motor.
   e. (U) Study use of insulation on rocket motors during FCO testing.
2. (U) FY 1990 Programs:
   a. (U) Continue baseline test on AAAM, evaluate thermal protection materials.
   b. (U) Develop SD and cook-off performance improvement technologies for Advanced Rocket Systems (ARS).
   c. (U) Initiate a survey of current shipping containers and missile packing configurations and commence baseline SD testing with all-up-rounds.
   d. (U) Initiate evaluation and identification of acceptable insensitive explosives in development of advanced insensitive explosives for GATOR, ABF, AIWS, and HELLFIRE.
   e. (U) Complete the IM evaluation tests on general purpose bombs.
3. (U) FY 1991 Plans:
   a. (U) Complete baseline tests on AAAM.
   b . (U) Continue transition of IM technology into ARS, GATOR, AIWS, ABF, and HELLFIRE.
   c. (U) Continue baseline testing with all-up-rounds.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: NWC, China Lake, CA; NSWC, Dahlgren, VA.

F. (U) RELATED ACTIVITIES: Development of Next Generation Fire Suppression Agent (NGFSA) is a joint project with the Air Force.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: ACFT SURVIVABILITY AND VULNERABILITY
Project Number: W1277 Project Title: NUCLEAR SURVIVABILITY AIRCRAFT

C. (U) DESCRIPTION: The Fleet Aircraft Assessment for Navy Testing and Analysis for EMP Limitations (FAANTAEL) assesses the vulnerability of tactical aircraft to damage/upset from electromagnetic pulse (EMP). FAANTAEL tests verify aircraft hardness and assess the ability for aircraft to perform their mission in an EMP environment. In response to DOD direction to validate hardness through a cost-effective testing, simulation and analysis, the Navy has developd a full scale, threat testing capability at Naval Air Test Center (NATC), Patuxent River. This project also provides research into current sensors, digital analytical instrumentation, test pulser development, and recommended solutions/work around to EMP problems. Seven fleet aircraft have been tested: A-7E, F-14A, F/A-18A, SH-60B, E-2B, A-6E, and VH-60.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Complete post test analysis of SH-60B and VH-60.
   b. (U) Conduct Free Field Test/Post Test Analysis of A-6E.
   c. (U) Conduct S-3B perform pretest analysis.
   d. (U) Completed pre-test analysis of E-2C.
2 (U) FY 1990 Programs:
   a. (U) Conduct Free Field Test/Post Test Anlysis of E-2C.
   b. (U) Conduct a complete assessment of the S-3B.
   c. (U) Upgrade facility antenna (new VPD).
3. (U) FY 1991 Plans:
   a. (U) Conduct a complete assessment of the AV-8B.
   b. (U) Conduct a complete assessment of the P-3C.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Warfare Center, White Oak, MD; Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; CONTRACTORS: Veda, Inc., Lexington Park, MD; EG&G, WASC, Lexington Park, MD; ORI, Inc., Arlington, VA.

F. (U) RELATED ACTIVITIES: P.E. 0101402N (Project X0793-01), TACAMO 1VB (MP). P.E. 0603514N (Project S1607, EMPRESS II). The U.S. Air Force conducts EMP testing at Air Force Weapons Laboratory (AFWL), Albuquerque, NM.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: ACFT SURVIVABILITY AND VULNERABILITY
Project Number: W1819 Project Title: CV AIRCRAFT FIRE SUPPRESSION

C. (U) DESCRIPTION: This project develops improved firefighting systems (FFS) and fire protective measures for aircraft carriers including assessment of aircraft fire properties, the development of the P-25 fire truck (FFT), and improvements to firefighting agents (FFA) and delivery systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Developed TEMP for P-25 FFT.
   b. (U) Evaluated FFA application techniques.
   c. (U) Initiated aircraft fire properties evaluation for improved extinguishment by carrier firefighting teams.
   d. (U) Initiated aicraft fire damage assessment effort.
   e. (U) Conducted tests on effectiveness/enhancement of Acqueous Film Forming Foam (AFFF).
2. (U) FY 1990 Programs:
   a. (U) Issue solicitation for new FFT design.
   b. (U) Award contract to fabricate prototype trucks.
   c. (U) Continue new agent tests.
   d. (U) Evaluation of aircraft fire properties and fire damage.
   e. (U) Conduct tests on improved effectivenes of AFFF.
   f. (U) Evaluate interactive video firefighting training.
3. (U) FY 1991 Plans:
   a. (U) Evaluate design proposals of prototype P-25 FFT.
   b. (U) Conduct new agent application technique testing.
   c. (U) Conduct tests on improved effectiveness of AFFF.
   d. (U) Establish firefighting procedures for new aircaft materials.
   e. (U) Develop interactive video firefighting training system.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Research Laboratory, Washington, DC; Naval Surface Warfare Center, White Oak, MD; Naval Air Engineering Center, Lakehurst, NJ; Naval Weapons Center, China Lake, CA;

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: Non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603303N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: ELECTROMAGNETIC RADIATION SOURCE ELIMINATION (ERASE)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0447	ERASE	5,713	973	5,734	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Electromagnetic Radiation Source Elimination (ERASE) program is the principal source of anti-radiation missile (ARM) guidance and emitter location technology for DOD. The ERASE program assesses the state of Soviet technology and deployment of operational systems in an effort to keep abreast of the continually changing threat environment while pursuing the development of key technology elements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed brassboard BIMODE seeker development.
   b. (U) Developed improved VHF antenna.
   c. (U) Initiated multimode seeker design.
2. (U) FY 1990 Program:
   a. (U) Complete Intermediate Frequency (IF) processor in Radio Frequency (RF) Targeting system and assemble components in F/A-18 pylon.
   b. (U) Complete Gimballed Seeker.
3. (U) FY 1991 Plans:
   a. (U) Initiate prototype demonstration of elementary ARM Seeker.
   b. (U) Build and begin testing multi-mode seekers.
   c. (U) Complete detailed design of Advanced Microscan Receiver and develop neural network architecture.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NWC, China Lake, CA. CONTRACTORS: Ford Aerospace, Newport Beach, CA; Raytheon Co., Bedford, MA; Tracor Flight Systems, Inc., Newport Beach, CA; Falon, San Diego, CA.

E. (U) RELATED ACTIVITIES: P.E. 0205601N, High Speed Anti-Radiation Missile (HARM); P.E. 0603320N, Low Cost Seeker.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NONE.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603318N Budget Activity: 4
Program Element Title: AIR TO AIR/SURFACE TO AIR MISSILE
Project Number: S1632 Project Title: AEGIS ER (SM-2 BLOCK IV)

UNCLASSIFIED

SM-2 BLOCK IV AEGIS ER

LENGTH:	257.975 IN
MAXIMUM DIAMETER:	21.03 IN
GROSS WEIGHT (EST):	3160 LBS - MISSILE/BOOSTER ≤ 6000 LBS - MISSILE/BOOSTER/ CANISTER

UNCLASSIFIED

A. (u) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				IIIB 20/FY92
Engineering Milestones	CDR AUG	1st Flt JUN	PRR NOV	
T&E Milestones			VSMR FEB-JUN OT SEP	
Contract Milestones				Full Prod. FEB

BUDGET ($K)	FY 1989	FY 1990	FY 1991	To Complete	Program Total
Major Contract	88,195	72,152	27,485	Cont.	Cont.
Support Contract	5,900	5,750	4,950	Cont.	Cont.
In-House Support	7,128	11,150	3,840	Cont.	Cont.
GFE/Other	717	464	7,480	Cont.	Cont.
Total	101,940	89,516	43,755	Continuing	

Program Element: 0603318N Budget Activity: 4
Program Element Title: AIR TO AIR/SURFACE TO AIR MISSILE
Project Number: S1632 Project Title: AEGIS ER (SM-2 BLOCK IV)

B. (u) DESCRIPTION:
The AEGIS ER Missile is the latest member of the STANDARD Missile family of area defense missiles, specifically designed to take maximum advantage of AEGIS and the Vertical Launching System (VLS). This missile, also known as SM-2 Block IV, builds upon the SM-2 Block IIIA baseline with its improved low altitude performance Adding significant propulsion, guidance, and control enhancements, AEGIS ER extends STANDARD Missile engagement capability

The resulting extension of the STANDARD Missile engagement envelope will permit utilization of

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed Booster qualification tests for lead contractor. Began Booster qualification test for follower.
   b. (U) Completed round level preliminary design review.
   c. (U) Guidance, control and airframe contractors continued development of the baseline design for flight test round design release.
   d. (U) Completed round level critical design review.
   e. (U) Completed VLS preliminary design review.
2. (U) FY 1990 Program:

   d. (U) Complete AEGIS Engineering Integration and Test software PDR.

3. (U) FY 1991 Plans:

   f. (U) Complete AEGIS tactical operations program PDR.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Johns Hopkins University, APL, Laurel, MD; Naval Weapons Center, China Lake, CA; Naval Surface Warfare Center, Dahlgren, VA; Naval Ordnance Station, Indian Head, MD. CONTRACTORS: Raytheon Company, Bedford, MA; General Dynamics, Pomona, CA; Motorola GEG, Scottsdale, AZ; Allied Signal, Communications Division, Baltimore, MD; RCA, Moorestown, NJ.

Program Element: 0603318N Budget Activity: 4
Program Element Title: AIR TO AIR/SURFACE TO AIR MISSILE
Project Number: S1632 Project Title: AEGIS ER (SM-2 BLOCK IV)

E. (U) COMPARISON WITH REVISED FY1990/1991 PRESIDENTS BUDGET:
1. (U) TECHNICAL CHANGES: No significant technical changes have occurred.
2. (U) SCHEDULE CHANGES: No significant schedule changes have occurred.
3. (U) COST CHANGES: The FY 91 budget increase of $3,355 is to fund the Raytheon FFP contract.

F. (U) PROGRAM DOCUMENTATION:
AP 541-86 approved - 21 Mar 87
PEM signed 24 Jun 87
J&A approved 30 Apr 87
PMP 87-01 approved - 21 Apr 87
TEMP 623-2 being updated
NDCP initiated

G. (U) RELATED ACTIVITIES: Program Element 0604366N (STANDARD Missile Improvement Program) supports development of SM-2 Block IIIA.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

Weapons Procurement, Navy:

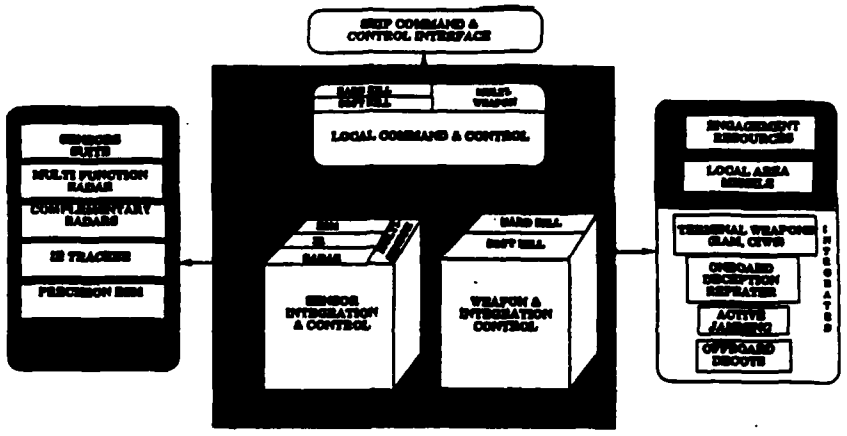
	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	To Complete
(U) FUNDS	N/A	N/A	248,600	Cont.	Cont.
(U) QUANTITY	N/A	N/A	300	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603319N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NATO AAW SYSTEM
PROJECT NUMBER: S1973 PROJECT TITLE: NATO AAW SYSTEM (NAAWS)



POPULAR NAME: NATO AAW

A. (u) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES		MS I 5/90		MS II 5/94
ENGINEERING MILESTONES	IPR 12/88 CE PHASE RPT 7/89	START D&V PHASE 6/90		START FSD 7/94 PRODUCT. 11/99
T&E MILESTONES				DT/OT I 2/94 DT/OT II 6/99
CONTRACT MILESTONES		D&V CONT 7/90		FSD 7/94 PILOT PROD 7/96 PRODUCT. 11/99

BUDGET ($K)*	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT			13,400	TBD
SUPPORT CONTRACT	1,000	3,000	3,200	TBD
IN-HOUSE SUPPORT	5,883	13,494	8,144	TBD
GFE/OTHER				TBD
TOTAL	6,883	16,494	24,744	TBD

* Reflects only U.S. funding

PROGRAM ELEMENT: 0603319N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NATO AAW SYSTEM
PROJECT NUMBER: S1973 PROJECT TITLE: NATO AAW SYSTEM (NAAWS)

B. (u) DESCRIPTION: This cooperative effort uses AEGIS technology and design disciplines in the development of a Detection through Engage System for frigate size (and larger) ships. System design expressly addresses

Forward looking concepts have been synthesized into a candidate baseline system composed of a suite of dissimilar (RF, IR, ESM) sensors closely coupled and adaptively controlled by a distributed, fiber optic based architecture. The increased quality of sensor information supports an expanded threat evaluation and weapons assignment process which integrates all shipboard hardkill and softkill engagement resources. Development items include: a phased array, multi-function radar; precision ESM; distributed processing system; and missile kinematically optimized for local area/short range engagements. Existing "national development items" (SPS-49, SAR-8, etc) will be considered for integration during D&V and potential applicability to FSD. SPARROW engineering base will be considered for missile development.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed, analyzed and evaluated CE studies/experiments. Validated system level concepts. Defined Candidate Baseline System concept, System Specification, and NFR-90 interface plan of action.
   b. (U) Approved NATO Staff Requirement and updated program documentation preparatory to Milestone I and D&V Phase MOU negotiations.

2. (U) FY 1990 PROGRAM:
   a. (U) Achieve Milestone I and sign D&V Phase MOU.
   b. (U) Award competitive D&V contact to international industry.

3. (U) FY 1991 PLANS:
   a. (U) Continue D&V.
   b. (U) Complete design of interim Land Based Test Site (ILBTS).
   c. (U) Begin fabrication of Advanced Development Model (ADM).

4. (U) PROGRAM TO COMPLETION:
   a. (U) Continue D&V.
   b. (U) Complete principal subsystem level critical experiments.
   c. (U) Conduct DT/OT-I using ADM at LBTS and identify technology applications to U.S. Short Range AAW Systems (SRAAWS) in FY 1993/1994.
   d. (U) Achieve U.S. Milestone II, conclude international MOU for Full Scale Development (FSD) and award FSD Contract in FY 1994.
   e. (U) International Low Rate Initial Production (LRIP) in FY 1996/1997.
   f. (U) Obtain international authorization and award international pilot production contract in FY 1996.
   g. (U) Conduct DT/OT-II on representative host platform in FY 1999.

PROGRAM ELEMENT: 0603319N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NATO AAW SYSTEM
PROJECT NUMBER: S1973 PROJECT TITLE: NATO AAW SYSTEM (NAAWS)

h. (U) Achieve U.S. Milestone III and conclude international MOU for Production in FY _

i. (U) Award rate production contracts in FY 2000.

D. (U) WORK PERFORMED BY:

1. (U) IN-HOUSE: NOSC, San Diego, CA; NSWC, Dahlgren, VA; NRL, Washington, D.C.; NWC, China Lake, CA; NSWSES, Port Hueneme, CA; Johns Hopkins/Applied Physics Laboratory, Laurel, MD.

2. (U) CONTRACTORS: Prime Contractors qualified for D&V; UNISAMS (McDonnell Douglas/Westinghouse), St. Louis, MO and Baltimore, MD; GE/RCA, Moorestown, NJ; Raytheon, Lexington, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

TOR	9/86
JMSNS	9/86
Staff Requirement	6/89
OR	12/89

G. (U) RELATED ACTIVITIES: Program Element P.E. 0603609N, (Conventional Puze/Varhead Package);Program Element 0604307N, (Aegis Combat System); Program Element 0604354N, (Air-to-Air Missile Systems Engineering); Program Element 0604358N, (Close-In Weapon System (PHALANX); Program Element 0604361N, (NATO SEASPARROW); Program Element 0604369N, (5 Inch Rolling Airframe Missile (RAM); Program Element 0604508N, (Radar Surveillance Equipment); Program Element 0604608N, (Surface Electro-Optic Systems).

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- o Memorandum of Understanding (MOU) for Concept Exploration Phase signed 19 October 1987.
- o United States, Canada, Germany, Netherlands, Spain, United Kingdom.

PROGRAM ELEMENT: 0603319N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NATO AAV SYSTEM
PROJECT NUMBER: S1973 PROJECT TITLE: NATO AAV SYSTEM (NAAVS)

- o Memorandum of Understanding (MOU) for Demonstration and Validation Phase negotiated and undergoing national approval. Revisions may be required to reflect subsequent decisions by the UK and Germany not to participate in the DEM/VAL phase.
- o United States, Canada, Netherlands, Spain are potential signatories.
- o US OR reflected in NATO Staff Requirement.
- o D & V MOU signature target May 90 following Milestone I Decision.

J. (U) Test and Evaluation Data: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603320N Budget Activity: 4 - Tactical Programs
Program Element Title: Low Cost Antiradiation Seeker
Project Number: W1807 Project Title: Low Cost Seeker (LCS)

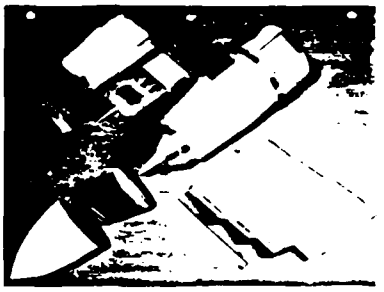


FIGURE 1 EDM Model of HARM LCS

POPULAR NAME: LCS

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			III A 5/91	III B 3Q/FY92
Engineering Milestones	Trans. SW NWC 7/89 PRR 11/89	SW CDR 7/90 1st FIRING 3/90		
T&E Milestones	DT IIA	DT IIB	OT IIB OT IIA	DT IIC/D
Contract Milestones		Award pilot Op. 1 1/90	ALRIP 7/91	AFRP 3Q/FY92

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	0	2,365	0	Continuing
Support Contract	235	200	200	Continuing
In-House Support	7,237	9,023	9,612	Continuing
GFE/ Other	50	65	545	Continuing
Total	7,522	11,653	10,357	Continuing Continuing

Program Element: 0603320N Budget Activity: 4 - Tactical Programs
Program Element Title: Low Cost Antiradiation Seeker
Project Number: W1807 Project Title: Low Cost Seeker (LCS)

B. (U) BRIEF DESCRIPTION OF ELEMENT: The HARM weapon system, approved for full production in 1983, provides satisfactory performance against the present threat spectrum. However, in order for HARM to be effective against the newer threat systems that are now being fielded, improvements to HARM's guidance system are needed. HARM Low Cost Seeker (LCS) incorporates new technology which, in addition to improving lethality, has the potential to substantially reduce hardware and software complexity resulting in potential for greater reliability, enhanced producibility and reduced cost. LCS, initiated to foster competition and expand the ARM industrial base, is a competitor against the upgrade version (Block IV) offered by the missile producer, Texas Instruments, for HARM C production.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Transitioned software responsibility from NAVWPNCEN, China Lake, CA to Ford at software CDR (JUL 89).
   b. (U) Conducted hardware CDR (Held Jan 89).
   c. (U) Delivered 4 brassboard LCS units to NAVWPNCEN.
2. (U) FY 1990 Program:
   a. (U) Deliver 45 Preproduction Missiles (PPMs) to Navy; RDT&E funded.
   b. (U) Conduct first firing (Mar 90).
   c. (U) Commence DT-IIB/C (TECHEVAL)/OT-IIA (includes 21 missile firings).
   d. (U) Award Pilot Production Option (100 seekers).
3. (U) FY 1991 Plans:
   a. (U) Obtain Approval for Limited Production, Milestone IIIA.
   b. (U) Conduct DT-IIC (four firings) and Navy TECHEVAL DT-IID (three firings).
   c. (U) Commence delivery of pilot production seekers.
   d. (U) Commence OT-IIB/OPEVAL (includes 12 Navy missile firings).
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, IN; Pacific Missile Test Center, Point Mugu, CA. CONTRACTORS: Ford Aerospace and Communications Corporation, Newport Beach, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

Program Element: 0603320N Budget Activity: 4 - Tactical Programs
Program Element Title: Low Cost Antiradiation Seeker
Project Number: W1807 Project Title: Low Cost Seeker (LCS)

F. (U) PROGRAM DOCUMENTATION:

NDCP approved in Aug 87
TEMP approved in Nov 88
Acquisition Plan approved in Jan 88
Logistics Support Plan approved in May 87
WSPD approved in Dec 87

G. (U) RELATED ACTIVITIES: P.E. 0603303N, ERASE; P.E. 0205601N, HARM Improvements Project; Block IV upgrade programs.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APPN/P-1 WPN/#13		8,588*	20,100*	Cont.	Cont.

* Procurement of LCSs only.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603321N Budget Activity: 4
Program Element Title: ADVANCED AIR-TO-AIR MISSILE
Project Number: W1671 Project Title: AAAM

NO PICTURE AVAILABLE

POPULAR NAME: AAAM

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY1989	FY1990	FY1991	To Complete
Program Milestones		MID D&V REVIEW Sep 90		MS II 1993
Engineering Milestones		GUID. DESIGN	SCTV FAB	HWIL
T&E Milestones	WIND TUNNEL		PFRT, CAPTIVE	SCTV FLIGHTS
Contract Milestones				

BUDGET ($K)	FY1989	FY1990	FY1991	Prog Total To Complete
Major Contract	21,600	59,000	73,000	Continuing Continuing
Support Contract				
In-House Support	4,019	5,630	8,973	Continuing Continuing
GFE/ Other	4,003	5,779	2,282	Continuing Continuing
Total	29,622	70,409	84,255	Continuing Continuing

CLASSIFIED BY: MULTIPLE SOURCES
DECLASSIFY ON: OADR

Program Element: 0603321N Budget Activity: 4
Program Element Title: ADVANCED AIR-TO-AIR MISSILE
Project Number: W1671 Project Title: AAAM

B. (U) DESCRIPTION: The principal anti-air warfare mission of Naval TACAIR is the protection of the outer defense zone of the carrier battle groups from air-launched anti-ship missiles (ASMs) by the destruction of bombers prior to their weapons release. AAAM will be compatible with F-14, F/A-18, A-12 and NATF. kills prior to weapon release will preclude repeated attacks and reduce saturation of area and point defense systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Started fabrication of test articles.
b. (U) Performed preliminary platform integration.

2. (U) FY 1990 Program:

a. (U) Commence guidance subsystem tests, seeker captive flights and booster firings.
b. (U) Commence wind tunnel testing.

3. (U) FY 1991 Plans:

a. (U) Commence Hardware-in-the-Loop (HWIL) development.
b. (U) Fabrication of control test vehicles.
c. (U) Aircraft integration.

4. (U) Program to Completion:

a. (U) Commence integrated guidance testing, fabrication and testing of guided test vehicles (GTV's).
b. (U) FSD will commence in FY 1993.
c. (U) FSD will be completed in FY 1998.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA. CONTRACTORS: H&R Company (Hughes/Raytheon); AAAM Joint Venture (General Dynamics/Westinghouse). (Competitive range established 9/87).

Program Element: 0603321N Budget Activity: 4
Program Element Title: ADVANCED AIR-TO-AIR MISSILE
Project Number: W1671 Project Title: AAAM

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The Department adjustment of +1,305 provides for previously deferred component fabrication, demonstration, and validation efforts.

F. (U) PROGRAM DOCUMEMTATION:

DOP	Mar 86
TEMP	Jul 88
SCP	Aug 88
OR	Mar 87

G. (U) RELATED ACTIVITIES: P.E. 0205667N, F-14 Upgrade; P.E. 0204152N, AEW Aircraft Squadrons; P.E. 0603231N, NATF.

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603382N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: BATTLE GROUP ANTI-AIR WARFARE COORDINATION
PROJECT NUMBER: S0324 PROJECT TITLE: BGAAWC

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0324	BGAAWC	7,321	9,236	3,949	Cont.	Cont.

B. (U) DESCRIPTION: This program capitalizes on the superior radar surveillance, detection, tracking, display and decision system capabilities of the AEGIS Combat System, which provides fire control data and coordination to other ship and aircraft weapon systems. Near and long term objectives will be phased in to produce higher degrees of battle coordination.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (u)

b. (u)
c. (u)
d. (u)

2. (U) FY 199
a. (u)
b. (u)
c. (u)

d. (u)

3. (U)
a. (u)

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Fleet Analysis Center, Corona, CA; NSWC Dahlgren, VA. CONTRACTORS: Johns Hopkins University, Applied Physics Laboratory Laurel, MD; ADTECH, Arlington, VA; G.E., Moorestown, NJ.

E. (U) RELATED ACTIVITIES: PE 0604303N (AEGIS Area Air Defense), PE 0604307N (AEGIS Combat System Engineering), PE 0603318N (AEGIS ER), PE 0604518N (CIC Conversion), PE 0603717N (Command and Control Systems (Advanced)).

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)
Not applicable

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Tactical Space Operations

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 ACTUAL	FY 1990 ESTIMATED	FY 1991 ESTIMATED	TO COMPLETE	TOTAL PROGRAM
X1845	TADIX-B	2,166	1,973	0	0	10,250
X1846	SLOW WALKER	3,537	1,769	1,616	0	12,816
X2055	SPACE SURVEILLANCE DEVELOPMENT	0	0	1,975	Cont.	Cont.
	TOTAL	5,703	3,742	3,591	Cont.	Cont.

B. (u) DESCRIPTION:
forces with all-wea

in ocean areas and related coastal zones where U.S. naval forces may be employed. Tactical support information will be provided

for battle force management. These projects allow the fleet to maintain an essential wide area surveillance capability

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X1845 PROJECT TITLE: TADIXS-B

C. (U) DESCRIPTION:

The project provides for the development, procurement and installation of the Tactical Receive Equipment (TRE) for this purpose. The TRE will be procured by the Navy, Air Force, Army, and Marine Corps with the Navy having lead development and testing responsibility.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed OT-IIA testing.
   b. (U) Initiated design changes to resolve TECHEVAL/OPEVAL action items.
   c. (U) Designed and coded required software changes.
   d. (U) Received successful M/S III approval for full production (AFP).
   e. (U) Completed transition of software support responsibilities to FCDSSA San Diego.
   f. (U) Completed functional performance production specification.
   g. (U) Designated In Service Engineering Agent (ISEA).
2. (U) FY 1990 PROGRAM:
   a. (U) Complete and test corrections to OPEVAL deficiencies.
   b. (U) Complete evaluation of state-of-the-art improvements.
   c. (U) Complete EDM software and hardware upgrades to functional baseline.
   d. (U) Initiate and transition EDM support and training to appropriate field activities.
   e. (U) Complete evaluation and test of additional interfaces.
   f. (U) Complete transition to full rate production.
3. (U) FY 1991 PLANS: Program Completes in FY 1990.
4. (U) PROGRAM TO COMPLETION: Not applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN #115	0	11,961	15,665	33,476	61,102
(U) MILCON	0	0	0	0	0

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X1846 PROJECT TITLE: Slow Walker

C. (u) DESCRIPTION:

D. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. ('u' _

   b. (U) Started Navy documentation including Navy Training Plan (NTP) and Computer Resources Software Life Cycle Master Plan (CRLCMP).
   c. (U) Comleted Phase IIC upgrade.
2. (U) FY 1990 PROGRAM:
   a. (U) Continue Phase IID Ada software conversion.
   b. (U) Complete Navy NTP and CRLCMP documentation.
3. (U) FY 1991 PLANS:
   a. (U) Continue Phase IID Ada software conversion.
   b. (U) Start DT/OT testing of Phase IID upgrades.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Complete Phase IID development.
   b. (U) Conduct Phase IID OPEVAL.
   c. (U) Approve Phase IID for fleet release.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVSPASYSACT, Los Angeles, CA; NAVSWC, Dahlgren, VA. CONTRACTORS: IBM, Boulder, CO; Aerospace Corp., Los Angeles, CA.

F. (U) RELATED ACTIVITIES: Program Element 0102431F, Air Force Defense Support Program.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N BUDGET ACTIVITY: 3
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X2055 PROJECT TITLE: Space Surveillance Development

C. (u) DESCRIPTION:

D. (u) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Not Applicable.
2. (U) FY 1990 PROGRAM: Not Applicable.
3. (u) FY 1991 PLANS:
   a. (U) Establish FY-91 New Start.
   b. (u)

   c. (U) Select sensor (focus on most promising, affordable technology).
   d. (U) Explore potential for International Cooperative Development Project for SSD technology component development with UK and/or Canada.
   e. (U) Develop International Cooperative Development Project Memorandum of Understanding (MOU) for spacecraft components.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Continue design and development of selected sensor.
   b. (U) Evaluate selected components as development matures.
   c. (U) Evaluate correlation and fusion requirements for SSD data processing.
   d. (U) Produce prototype components capable of transferability to space-based surveillance programs.
   e. (U) Continue ongoing International Cooperative Project.
   f. (U) Evaluate maturing technologies applicable toward improving SWAS capabilities.
   g. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Research Lab (NRL), Washington, D.C.. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: International Exchange Program (IEP-1987-UK-DOD-02, 24 SEP 87) on exchange of space-based radar, infrared, and radiometry technical data with the United Kingdom.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Mine Countermeasures

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0260	Minehunt	13,224	5,295	6,185	CONT.	CONT.
S1233	MCM Improvements	2,091	9,383	14,818	CONT.	CONT.
TOTAL		15,315	14,678	21,003	CONT.	CONT.

B. (U) DESCRIPTION: 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 fleet operating areas. It develops systems which will detect, localize and counter moored, bottom for use in MCM-1 Class, MHC-51 Class, and other surface ships.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Mine Countermeasures
PROJECT NUMBER: S0260 PROJECT TITLE: Minehunt

C. (U) DESCRIPTION: This project develops: (1) AN/SQQ-32, a variable depth minehunting sonar for use in MCM-1 and MHC-51 Class ships, which will detect bottom, moored-in-volume

and (4) a system which employs multiple, remotely-controlled minehunting vehicles operated from a single platform to conduct MCM operations in amphibious operation areas and in other areas where conventional MCM forces are not available.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: AN/SQQ-32: Conducted OT-IIA and OT-IIB; conducted EDM environmental tests; obtained approval for limited production and awarded contract for production units for MCM 10, 11 and for refurbishment of two EDMs for MHC-51 and 52. Completed provisioning documentation. Commenced installation of EDM system in MCM 1.

2. (U) FY 1990 Program: AN/SQQ-32: Complete installation EDM System in MCM 1; conduct OT-IIC in MCM 1; complete Level III drawings and training material; obtain extension of approval for limited production and award options for sonar systems required for FY 89 and FY 90 MCM and MHC ships. Prepare Rapid Shallow Water Mine Clearance System (RSWMCS) requirements documentation.

3. (U) FY 1991 Plans: AN/SQQ-32: Resolve OT-IIC Deficiencies. Rapid Shallow Water Mine Clearance System: Award contract(s) for development. Buried Mine Detection and Remote Mine Hunting Systems: Begin preparation of Requirements Documentation.

4. (U) Program to Completion: AN/SQQ-32: Conduct OPEVAL on Production System and obtain RSWMCS: Conduct OPEVAL FY 1994; MS III FY 1995; Buried Mine Detection System: Award contract for Advanced Development Model (FY 1993). Conduct OPEVAL FY 1998; MS III FY 1998; Remote Minehunt: Award contract for full scale engineering development (FY 1993). Conduct OPEVAL FY 1999; MS III FY 1999.

E. (U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL and Naval Weapons Support Center, Crane, IN. Contractors: Raytheon Co., Portsmouth, RI; Thomson-Sintra, Brest, France; and ARL, University of Texas, Austin, TX. Future development contractors TBD through competition.

PROGRAM ELEMENT: 0603502N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Mine Countermeasures
PROJECT NUMBER: S0260 PROJECT TITLE: Minehunt

F. (U) RELATED ACTIVITIES: PE 0602314N ASW Technology.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
PROCUREMENT (SCN) #16	23,445	80,705	39,370	CONT.	291,393

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Mine Countermeasures
PROJECT NUMBER: S1233 PROJECT TITLE: Mine Countermeasures Improvements

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1233	Mine Countermeasures Improvements	2,091	9,383	14,818	CONT.	CONT.

B. (U) DESCRIPTION: This project develops: (1) the AN/SSN-2 Precise Integrated Navigation System; (2) a modular mechanical Single Ship Deep Sweep (SSDS) for use by MHCs; (3) a Modular Influence Minesweeping System for use by MHCs to be developed in near-term and far-term phases; (4) a Closed Loop Degaussing System to improve the survivability of mine countermeasures and other ships when operating against magnetic influence mines; and (5) a Mine Countermeasures Tactical Environmental Data System (MTEDS) to enable the operational commander to use environmental data to maximize the safety and effectiveness of MCM platforms.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: AN/SSN-2: Completed Phase III Preliminary design, conducted PDR and initiated coding and testing. Modular Influence Minesweeping System, modular mechanical Single Ship Deep Sweep, and Closed Loop Degaussing System: Prepared requirements documentation for new start.

2. (U) FY 1990 Program: AN/SSN-2: Complete software code and test on Phase III system; Single Ship Deep Sweep: Issue RFP for FY 91 contract award for winch, procure (3) A/N 37U-1 EDM systems; near-term Modular Influence Minesweeping System: Issue RFP for FY 91 contract award.

3. (U) FY 1991 Plans: AN/SSN-2(V): Conduct system integration and testing and DT on Phase III system. SSDS and near-term MIMS: Award Engineering Development Contracts; Closed Loop Degaussing: Transition system from Nunn Program.

4. (U) Program to Completion: This is a continuing program. See Section J Milestone Schedule.

D. (U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL; Naval Weapons Support Center, Crane, IN; Naval Oceanographic Research and Development Activity, Bay St. Louis, MS; Naval Mine Warfare Engineering Activity, Yorktown, VA; Naval Surface Warfare Center, White Oak, Silver Spring, MD. Future Development Contracts to be awarded through competition.

PROGRAM ELEMENT: 0603502N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Mine Countermeasures
PROJECT NUMBER: S1233 PROJECT TITLE: Mine Countermeasures Improvements

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology Changes: None.
2. (U) Schedule Changes: None.
3. (U) Cost Changes: None.

F. (U) PROGRAM DOCUMENTATION:

AN/SSN-2	
OR	(OR-1026-CC) 4 November 1977
TEMP	#005-2 (Revision 2) 25 April 1989
MIMS	PDD CNO memo Ser 03/6S389372 of 14 February 1986
SSDS	OR S--1163-MW of 8 March 1983
MTEDS	PDD CNO memo Ser 03/6S7674 of 7 April 1986
Closed Loop Degaussing	OR #060-03-88 of 19 December 1985

G. (U) RELATED ACTIVITIES: PE 0603260N, Airborne Mine Countermeasures is developing the A/N 37U-1 Mine Clearance Set, Moored Mines which will be adapted for surface ship use as the Single Ship Deep Sweep (SSDS).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
PROCUREMENT (SCN) #16	0	13,519	0	CONT.	73,941

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None, except for NCT program on AIOS and statement of intent and draft MOU with France on Closed Loop Degaussing System for MCM ships.

J. (U) MILESTONE SCHEDULE:
AN/SSN-2: MS II-FY 1981; OPEVAL (Phase III)-FY 1991: MS III (Phase III)-FY 1992; IOC (Phase III)-FY 1994
SSDS: MS II-FY 1990; OPEVAL-FY 1993; MS III-FY 1993;
MIMS: Near term MS II-FY 1990; OPEVAL-FY 1994; MS III-FY 1994
Far-term; OPEVAL-FY 1995; MS III-FY 1996;
MTEDS: MS II - FY 1995; OPEVAL - FY 1998; MS III - FY 1998:
Closed Loop Degaussing: MS II-FY 1990; OPEVAL - FY 1994; MS III - FY 1996;

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603504N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine ASW Development (Advanced)
PROJECT NUMBER: S0223 PROJECT TITLE: Submarine ASW Improvements (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0223	Submarine ASW	11,697	15,784	29,140	CONT.	CONT.

B. (U) DESCRIPTION: This program supports the advanced development and testing of improvements to present and future sonar and combat control systems. The goal is to maintain a clear acoustic and operational superiority over high performance submarine and surface threats, circa 1995-2020, particularly the increasingly quiet and capable Soviet submarines. One-of-a-kind hardware and/or software systems are developed under this program to demonstrate selected and promising exploratory technologies and concepts in an at-sea, submarine environment. Activities in this program include transducers, hull mounted and towed arrays, onboard sonar signal processing, target motion analysis, weapons presets and post-launch control, and multiple contact processing.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) TRANSDUCERS. Evaluated materials for Initiated development of materials to support development.

b. (U) TOWED ARRAY. Continued development and sea testing of Developed designs for next generation Advanced Development Model.

c. (u) HIGH FREQUENCY SONAR. Completed development of improved obstacle avoidance functions. Transitioned program to S1739 Submarine Arctic Warfare for testing and performance evaluation. Initiated development for an

d. (u) TRANSIENT ACOUSTIC PROCESSOR. Continued development of

e. (U) RANGEX. Conducted RANGEX 1-89. Planned RANGEX 1-90 to assess tactical effectiveness of transient acoustic processor systems in development.

f. (u) Continued efforts in TMA, advanced Targeting and detecting.

PROGRAM ELEMENT: 0603504N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine ASW Development (Advanced)
PROJECT NUMBER: S0223 PROJECT TITLE: Submarine ASW Improvements (Advanced)

2. (U) FY 1990 Program:
a. (u) TRANSDUCERS. Develop the materials needed to support

b. (u) HULL ARRAY IMPROVEMENTS. Design and develop hydrophones required for a

c. (u) TOWED ARRAY IMPROVEMENTS. Analyze results of and array tests. Develop construction techniques to improve towed array performance. Design and develop a multi-line towed array.
d. (u) HIGH FREQUENCY SONAR. Develop an advanced in poor environments.
e. (u) TRANSIENT ACOUSTIC PROCESSOR (TAP). Conduct sea test of

f. (u)Continue efforts in automatic detectives and classification, TMA, and advanced targeting.
g. (U) RANGEX. Conduct RANGEX 1-90.
h. (U) ADVANCED ACOUSTIC SENSORS (AAS). Identify promising technologies and evaluate development options for the

3. (U) FY 1991 Plans:
a. (U) TRANSDUCERS. Continue development of materials.
b. (U) HULL ARRAY IMPROVEMENTS. Continue development of

c. (U) TOWED ARRAY IMPROVEMENTS. Incorporate new technology into towed array design and construction. Develop next generation advanced development model. Continue design and development.
d. (U) HIGH FREQUENCY SONAR. Continue development of Complete system options and provide specifications.
e. (U) TRANSIENT ACOUSTIC PROCESSOR (TAP). Complete development of aided classification and localization capability.
f. (u) Continue efforts in TMA, advanced targeting and detection.
g. (U) RANGEX. Plan RANGEX 1-92.
h. (u) ADVANCED ACOUSTIC SENSORS. Continue assessment of emerging technologies for the
4. (U) Program to Completion: This is a continuing program.

D. (U) WORKED PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NUSC, New London, CT, and Newport, RI; NRL, Washington, DC and Orlando, FL., DTRC Bethesda, MD. CONTRACTORS: Analysis & Technology, North Stonington, CT; ARL, University of Texas, Austin, TX.

PROGRAM ELEMENT: 0603504N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine ASW Development (Advanced)
PROJECT NUMBER: S0223 PROJECT TITLE: Submarine ASW Improvements (Advanced)

E. (U) COMPARISON WITH REVISED BY FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: NAPDD #037-02, 5/86

G. (U) RELATED ACTIVITIES: PE 0602314N, ASW Technology; PE 0603562N, Project S1739, Submarine Arctic Warfare Development; PE 0604524N, Project S1347, AN/BSY-1 Development; and PE 0604503N, Project S0219, Submarine Sonar Improvements (Engineering).

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONES SCHEDULE:

(U)	sea test	1Q/FY90
(U)	sea test	1Q/FY90
(U) RANGEX 1-90		2Q/FY90

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0225	US National SSTD Program	31,154	38,214	35,643	15,593	148,574
S2045	Joint US/UK SSTD Project	(4,600)[1]	11,396	18,276	TBD[2]	TBD[2]
TOTAL		31,154	49,610	53,919	TBD[2]	TBD[2]

Notes:
1. (U) Nunn funds provided under Program Element 0603790N.
2. (U) Total program Full Scale Development (FSD) costs are estimated to be $132M. The US/UK cost sharing ratio for FSD will be negotiated during the Demonstration and Validation (D&V) Phase prior to entry into FSD.

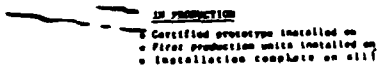
B. (u) DESCRIPTION: The Surface Ship Torpedo Defense (SSTD) Program is comprised of the US National SSTD Program and a Joint US/UK SSTD Project. The US National Program will initially provide torpedo defense for _

SSTD Phase I has been expanded starting in FY 90 to include all NIXIE equipped ships. Phase II will be expanded in FY 95 to include combatants, combat logistic force (CLF), and selected amphibious ships.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)
PROJECT NUMBER: S0225 PROJECT TITLE: US National SSTD Program

SSTD CAPABILITY



POPULAR NAME: Surface Ship Torpedo Defense (SSTD)

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS II 10/90		SSTD MS III 10/93
Engineering Milestones	9/89 Final At-Sea GT&C	Detection CDR 1/90		
T&E Milestones				SSTD DT II 10/92
Contract Milestones		FSD Award 20/90	SSTD Prod. Award	10/93

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	9,861	14,700	11,263	39,068
Support Contract	1,381	2,360	2,620	10,500
In-House Support	19,912	21,154	21,760	99,006
GFE/Other	0	0	0	0
Total	31,154	38,214	35,643	148,574 15,593

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)
PROJECT NUMBER: S0225 PROJECT TITLE: US National SSTD Program

B. (S/NF) DESCRIPTION: The US National Surface Ship Torpedo Defense Program will initially provide torpedo defense for

SSTD Phase I has been expanded, starting in FY 90, to all NIXIE equipped ships. SSTD Phase II will be expanded, starting in FY 95, to combatants, combat logistic force (CLF), and selected amphibious ships.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Exercised detection system Full Scale Development (FSD) option.
   b. (U) Conducted Performance Design Review (PDR) and began software development for the detection subsystem.
   c. (U) Selected, fabricated and tested
   d. (U) Completed feasibility test guidance/control concepts.
   e. (U) Began development of ORDALT Kits.
   f. (U) Acquired two MK 32 Surface Vessel Torpedos Tube (SVTT) launchers.
   g. (U) Continued development of support equipment.
   h. (U) Began system safety program for

2. (U) FY 1990 Program:
   a. (U) Conduct Critical Design Review (CDR) of the detection subsystem.
   b. (U) Fabricate and begin component testing of detection subsystem.
   c. (U) Begin assembly and test of Engineering Development Models (EDM).
   d. (U) Begin preparation of program documentation requirements.
   e. (U) Award FSD contract to Honeywell.
   f. (U) Begin ORDALT Kit component testing.
   g. (U) Continue development of support equipment.

3. (U) FY 1991 Plans:
   a. (U) Complete factory acceptance and environmental testing of detection system EDMs. Deliver EDMs.
   b. (U) Install and check out detection EDM on the TECHEVAL ship.
   c. (U) Complete environmental, safety, and acceptance testing of the ORDALT Kit.
   d. (U) Complete integration of the ORDALT Kit into the EDMs.
   e. (U) Complete proofing of Torpedoes for TECHEVAL.
   f. (U) Install and check out the launch system aboard the TECHEVAL ship.
   g. (U) Complete development of support equipment.
   h. (U) Complete Functional Configuration Audit (FCA) of the SSTD Detection, Torpedo, and launch systems.
   i. (U) Conduct preliminary Physical Configuration Audits (PCA) on the SSTD Detection system and Torpedo ORDALT.
   j. (U) Conduct the maintenance demonstration of the SSTD system.

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)
PROJECT NUMBER: S0225 PROJECT TITLE: US National SSTD Program

k. (U) Conduct a Production Readiness Review (PRR) on the detection system and Torpedo ORDALT.

4. (U) Program to Completion:
   a. (U) Conduct SSTD TECHEVAL.
   b. (U) Conduct SSTD OPEVAL.
   c. (U) Complete PCA.
   d. (U) Complete Production Readiness Review.
   e. (U) Complete Maintenance Demonstration.
   f. (U) Receive Milestone III approval for SSTD system.
   g. (U) Award production contracts.
   h. (U) Conduct Logistic Review Audit of the SSTD system.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Center, Panama City, FL; Naval Underwater Systems Center, New London, CT; Naval Sea Combat Systems Engineering Station, Norfolk, VA; Naval Ocean Systems Center, San Diego, CA; Naval Surface Warfare Center, White Oak, MD; Naval Undersea Warfare Engineering Station, Keyport, WA; Applied Physics Laboratory, University of Washington, Seattle, WA. CONTRACTORS: General Electric, Syracuse, NY; Honeywell, Hopkins, MN; Frequency Engineering Laboratories, Farmingdale, NJ.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
   1. (U) Technical changes: None.
   2. (U) Schedule changes: None.
   3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION:

OR-S0225	3/85	ASP	7/84	AP 6/89
NDCP	1/85	TEMP	1/86	

G. (U) RELATED ACTIVITIES: PE 0603790N, NATO Cooperative R&D.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
AN/SLQ-25 (A) OPN #67	6,198	15,555	17,500	TBD	TBD

(U) PROCUREMENT: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: A Joint US/UK SSTD Project Memorandum of Understanding (MOU) was signed 26 October 1988. The agreement covers Concept Evaluation (CE), D&V, Full Scale Development and Production with a requirement for national "decisions to proceed" between phases. A Joint Feasibility Study will be conducted in FY 88/89/90 with the United States providing Nunn funding (PE 0603790N, "NATO Cooperative Research and Development") and the United Kingdom providing matching funds. The MOU specifies the cost sharing for the CE and D&V phases.

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)
PROJECT NUMBER: S2045 PROJECT TITLE: Joint US/UK SSTD Project

POPULAR NAME: Joint US/UK SSTD Project

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			I 30/91	II 30/94
Engineering Milestones	Final D&V Specification			
T&E Milestones		Issue TEMP		ADM Subsystem Dev/Test
Contract Milestones			D&V 30/91	
BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract			4,400	TBD[2]
Support Contract	(278)[1]	638	981	TBD[2]
In-House Support	(4,222)[1]	10,654	12,788	TBD[2]
GFE/ Other	(100)[1]	104	107	TBD[2]
Total	(4,600)[1]	11,396	18,276	TBD[2] TBD[2]

Notes:

(1) (U) Nunn funding.

(2) (U) Jointly funded costs will be shared as follows: for Concept Evaluation (CE), the cost of the Joint Project Office (JPO) and its direct support will be shared equally; for Demonstration and Validation (D&V), the jointly funded costs will be shared equally; for Full Scale Development (FSD), the cost of the JPO and its direct support will be shared equally. Cost shares for the FSD contract will be established by the Participants by July 1990.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)
PROJECT NUMBER: S2045 PROJECT TITLE: Joint US/UK SSTD Project

B. (U) DESCRIPTION: The Joint US/UK Surface Ship Torpedo Defense (SSTD) Project is designed to counter

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) MOU signed 26 October 1988.
   b. (U) POA&M for Concept Evaluation (CE) implemented.
   c. (U) Began preparation of industry Request for Proposal (RFP) and Source Selection Plan (SSP).
   d. (U) Developed Integrated Logistic Support (ILS) strategy.
   e. (U) Revised program cost estimates and prepare Life Cycle Cost (LCC) estimate.
   f. (U) Updated Security Guidelines/Matrix.
   g. (U) Established JPO procedures.
   h. (U) Established Joint US/UK Funding policies.
   i. (U) Determined Test and Evaluation policies.
   j. (U) Obtained Steering Committee Acquisition Strategy.
   k. (U) Drafted Acquisition Plan.
2. (U) FY 1990 Program:
   a. (U) Revise/issue the POA&M for Demonstration and Validation (D&V).
   b. (U) Complete preparation of, and issue, D&V RFP.
   c. (U) Begin proposal evaluation for D&V.
   d. (U) Begin preparation of documentation for Milestone I.
   e. (U) Issue Common Performance Requirement (CPR).
   f. (U) Complete the Joint Feasibility Study.
   g. (U) Develop Joint SSTD System Performance Specification.
   h. (U) Draft Platform Interface Specifications.
   i. (U) Initiate definition of National Variants.
   j. (U) Revise/update LCC estimate.
   k. (U) Issue ILS Plan.
   l. (U) Issue Draft TEMP.
   m. (U) Provide attachment to MOU to reflect FSD cost sharing negotiations.
   n. (U) Issue Acquisition Plan.
   o. (U) Issue TEMP.
   p. (U) Begin Weapon System Explosive Safety Review Board (WSESRB) Reviews.
3. (U) FY 1991 Plans:
   a. (U) Begin development of Advanced Development Model (ADM) hardware.
   b. (U) Continue evaluation of threat data.
   c. (U) Update logistic documentation.

PROGRAM ELEMENT: 0603506N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense (SSTD)
PROJECT NUMBER: S2045 PROJECT TITLE: Joint US/UK SSTD Project

d. (U) Revise system cost estimates.
e. (U) Evaluate proposals, select two consortia, and award contract for D&V.
f. (U) Complete Logistic Review Audit.
g. (U) Complete Milestone I NPDM and Milestone I EPC (UK equivalent).

4. (U) Program to Completion:
a. (U) Review MOU to define agreements for FSD.
b. (U) Obtain national approvals of MOU attachment for FSD.
c. (U) Conduct Performance Design Review.
d. (U) Continue to evaluate each consortia.
e. (U) Revise all program documentation required for Milestone II.
f. (U) Complete Milestone II Logistics Review Audit.
g. (U) Finalize the FSD specification.
h. (U) Complete the D&V phase.
i. (U) Prepare, issue, evaluate, and award an FSD contract to single consortia.
j. (U) Complete TECH/OPEVAL.
k. (U) Complete FSD.
l. (U) Negotiate attachment to MOU for production.
m. (U) Prepare all documentation required for Milestone III.
n. (U) Compete a production contract.
o. (U) Award production contract.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVCOASTSYSCEN, NTIC, NAVOCEANSYSCEN, NAVSWC, NUSC, NUWES, APL/UW. CONTRACTORS: To be determined prior to D&V award. UNITED KINGDOM: ARE Portland, ARE Portsdown, ARE Teddington, ARE Bincleaves CINC Fleet, Director of Intelligence.

E. (U) COMPARISON WITH REVISED FY 1990/91 PRESIDENT'S BUDGET:
1. (U) Technical changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: Program documentation will be prepared during the Concept Evaluation phase.

G. (U) RELATED ACTIVITIES: PE 0603506N, Project Number S0225 (US National SSTD Program). The US National SSTD Program for Phase II and development of variants not covered in the joint program are being conducted in parallel with the Joint US/UK SSTD Project, PE 0603790D (NATO Cooperative Research and Development). Joint Potential Designator is not applicable.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.
(U) PROCUREMENT: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: A Joint US/UK SSTD Project MOU was signed 26 October 1988. The agreement covers Concept Evaluation, D&V, Full Scale Development and Production with a requirement for national "decisions to proceed" between phases.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603512N Budget Activity: 4
Program Element Title: SHIPBOARD AVIATION SYSTEMS

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 199C Estimate	FY 1991 Estimate	To Complete	Total Program
W1722	CV Wpns Elev.	1,204	3,592	5,025	Cont.	Cont.
W1723	Launch/Recovery Systems	8,325	3,450	3,093	Cont.	Cont.
W1875	EAF Matting	0	584	0	0	584
TOTAL		9,529	7,626	8,118	Cont.	Cont.

B. (U) DESCRIPTION: This program addresses all technology areas associated with Navy/Marine Corps aircraft operations aboard ships and development of improved Expeditionary Airfield (EAF) matting. The program includes: (1) Development of standardized, supportable weapons elevator components; (2) Development of all systems required to service, support, launch, provide approach and landing control, and recover aircraft operating onto or from ships; and (3) Marine peculiar expeditionary operations. Payoffs include increased safety, greater sortie generation rates, enhanced aircraft boarding rates, reduced manning, increased aircraft service life, and force modernization.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603512N Budget Activity: 4
Program Element Title: SHIPBOARD AVIATION SYSTEMS
Project Number: W1722 Project Title: CV WPNS ELEVATOR IMPROVEMENT

C. (U) PROJECT DESCRIPTION: This project provides for the development, test, evaluation and documentation of standardized elevator components such as control systems, hydraulic power units, doors and hatches, safety devices, platforms and hoist machinery for aircraft carriers. Emphasis will be placed on the improvement of elevator trunks, doors and hatches to upgrade watertight integrity, corrosion control, and development of lighter weight structures.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
a. (U) Awarded contracts for design and fabrication of weapons elevator components listed above.
b. (U) Awarded contracts for specification definition of high-pressure accumulator, composite air flask, and hybrid relay controller.

2. (U) FY 1990 Program:
a. (U) Continue fabrication of weapons elevator components and deliver selected prototypes to Naval Ship Systems Engineering Station (NAVSSES) test site.

3. (U) FY 1991 Plans:
a. (U) Continue fabrication of weapons elevator components and deliver selected prototypes to NAVSSES test site.
b. (U) Conduct weapons elevator component prototype tests and evaluation at NAVSSES.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Systems Engineering Station, Philadelphia, PA. CONTRACTOR: Rosenblatt, Philadelphia, PA; MTD, Philadelphia, PA; Westinghouse, Pittsburg PA.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATE FUNDS: This is not a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603512N Budget Activity: 4
Program Element Title: SHIPBOARD AVIATION SYSTEMS
Project Number: W1723 Project Title: LAUNCH AND RECOVERY SYSTEMS

C. (U) DESCRIPTION: This project addresses (1) modernization of catapults and arresting gear, and (2) development of covert air traffic control approach and landing systems. The first area develops a stand-alone Electromagnetic Aircraft Launch System (EMALS) including associated advanced control system. Also being developed is a control system for arresting gear to replace antiquated, manpower intensive systems of the 1950's, and advanced high-temperature tolerant Jet Blast Deflecters (JBD). The second area develops electronic and optical tracking, approach, landing and guidance systems for covert all-weather operations on ships. Improved optical landing systems will provide active and passive displays so that the pilot and the Landing System Officer (LSO) can take early corrective action to prevent accidents and increase boarding rate. The Signature Managed Air Traffic Control, Approach and Landing Systems (SMATCALS) will allow all-weather operations from ships during radio frequency emission control conditions.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued fabrication of ADMs for AAGCS, ICOLS, and CAI Mod 2.
   b. (U) Awarded concept definition contracts for SMATCALS.
   c. (U) Issued EMALS Development Options Paper (DOP), completed ADM program plan, issued RFP for EMALS ADM preliminary design.

2. (U) FY 1990 Program:
   a. (U) Complete ADMs of AAGCS, ICOLS, and CAI Mod 2 and install at NAVAIRENGCEN test site.
   b. (U) Award multiple EMALS ADM preliminary design contracts.
   c. (U) Initiate design of advanced JBD and integration of FLIR, laser range finder and stabilization platform for Covert Aircraft Recovery Tracking System (CARTS).

3. (U) FY 1991 Plans:
   a. (U) Conduct DEMVALs of AAGCS, ICOLS, and CAI Mod 2.
   b. (U) Issue RFP for design and fabrication of SMATCALS ADM.
   c. (U) Complete EMALS ADM preliminary design.
   d. (U) Continue JBD and CARTS efforts.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Engineering Center, Lakehurst, NJ; Naval Ocean Systems Center, San Diego, CA; Naval Avionics Center, Indianapolis, IN; David Taylor Research Center, Bethesda, MD. CONTRACTOR: Bell Aerospace, Buffalo, NY; Boeing, Seattle, WA; Hazeltine Corp, Greenlawn, NY.

F. (U) RELATED ACTIVITIES: P.E. 0602122N, Aircraft Technology.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603514N
Program Element Title: SHIP COMBAT SURVIVABILITY

Budget Activity: 4

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0384	Ship Survivability (Adv)	11,765	12,931	16,752	Cont.	Cont.
S1121	Personnel Protection	3,974	4,491	5,625	Cont.	Cont.
S1565	Ship Damage Control	4,883	6,570	8,253	Cont.	Cont.
S1607	EMPRESS II	8,150	6,354	0	0	40,425
S2053	CBR Defense	0	1,163	1,457	Cont.	Cont.
TOTAL		28,772	31,509	32,087	Cont.	Cont.

B. (U) DESCRIPTION: The advanced development of equipment/systems/engineering data and full scale weapons effects simulation will provide protection of ships and their personnel from conventional, nuclear, chemical, and biological 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.

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S0384 Project Title: Ship Survivability Advanced

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0384	Ship Survivability	11,765	12,931	16,752	Cont.	Cont.

B. (U) DESCRIPTION: This project undertakes developments to increase survivability of mission essential systems, equipment, and personnel from conventional, nuclear, chemical/biological/radiological (CBR) threat weapons effects, and cold weather operations. Major areas include passive fire protection for cables, hull structure hardening, Electromagnetic Pulse Hardening (EMP), CBR personnel protection, and cold weather operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Developed composite deckhouse test plans; constructed and completed airblast testing of full scale module.

b. (U) Developed system/equipment EMP hardening for precursor ship; completed the development and testing of EMP hardened cable trunk designs.

c. (U) Conducted investigations/testing for topside ice prevention/removal techniques for cold weather operations; conducted hull/floating ice interaction model tests.

d. (U) Evaluated advanced shipboard CBR filtration concepts for transition to Engineering Development.

e. (U) Completed scaled penetration and material tests of Spaced Armor SYSTEM 2.

f. (U) Developed application guidelines for limited-life icephobic coatings.

g. (U) Initiated evaluation of communication antenna and launcher performance with ice loading.

h. (U)

i. (U) Initiated development of Combat Power Circuitry Survivability Guidelines.

j. (U) Developed requirements for non-combustible shipboard electrical cables; completed Navy acceptance tests on coatings and coatings spec; initiated MIL-SPEC mods for fire resistant replacement sealant.

k. (U) Completed Computer Aided Design of Survivable Distributed Systems (CADSDiS) Code, Test, and Demonstration of at least two interacting system modules.

l. (U) Completed the Combat Systems Proportional Timer ADM.

m. (U) Initiated transition of CBR microsensor technology from techbase.

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S0384 Project Title: Ship Survivability Advanced

2. (u) FY 1990 Program:
   a. (U) Complete DDG-51 (Flight III) CIWS Enclosure development plan.
   b. (U) Conduct and document Precursor Ship EMP Trial.
   c. (u)
   d. (u)
   e. (U) Refine Electro-Expulsive Deicer (EED) technology through laboratory testing.
   f. (U) Develop MIL-C-17F modifications for semi-rigid RF coaxial cable construction.
   g. (U) Conduct localized ice impact load tests on ship hull structural models.
   h. (U) Finalize HM&E/Combat System Power Interface Design Data Standard.
   i. (U) Initiate Dynamic Armor task and small scale tests.
   j. (U) Complete MIL-SPEC mods for fire resistant packing materials for cables.
   k. (U) Conduct CADSDiS demo of all systems supporting Combat And Mobility Mission areas.
   l. (U) Initiate MIL-SPEC modifications to existing cable specifications to include Phase B fire-tolerant cable technology.
   m. (U) Complete combat systems antenna and launcher ice loading tests.
   n. (U) Conduct system level testing to determine ordnance EMP susceptibilities in conjunction with the precursor ship EMP trial.
   o. (U) Develop interim ship hull structural design guidelines for operations in Marginal Ice Zone (MIZ).
   p. (U) Initiate interim appendage structural design guidelines for operations in MIZ.
3. (u) FY 1991 Plans:
   a. (u)
   b. (U) Develop EMP Hardening methods for full threat ship.
   c. (U) Complete revisions to cable specifications to incorporate new whole cable fire test methods.
   d. (U) Conduct Multiple Cable Penetrator (MCP) test and evaluation.
   e. (U) Continue EMP ordnance testing and initiate documentation.
   f. (U) Develop ordnance EMP testing procedures for full threat ship trial.
   g. (U) Complete MIL-SPEC mod for non-combustible critical circuit cable.
   h. (U) Complete New Concept Electronic power supply engineering model.
   i. (U) Develop interim ice impact ship operational guidelines.
   j. (U) Complete Phase B Fire-Tolerant Cable MIL-SPEC modifications.
   k. (U) Develop preliminary sensor and weapons systems cold weather design criteria/specifications/standards.
   l. (U) Develop long-life icephobic coatings formulations.

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S0384 Project Title: Ship Survivability Advanced

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; DTRC, Bethesda, MD; NSWC, White Oak, MD; NSWC, Dahlgren, VA; NCTRF, Natick, MA; NOSC, San Diego, CA; CRDC, Edgewood, MD. CONTRACTORS: D&P Inc., Arlington, VA; PRC, McLean, VA; RI Corp., Anaheim, CA; AdTech, Inc., Vienna, VA; JJMA, Arlington, VA; MAR, Inc., Annapolis, MD; NKF Engineering, Reston, VA; CASDE Corp., Arlington, VA; EG&G, Inc., Rockville, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
1. (U) NAPDD #148-03B of 9 Dec 86, Passive Fire Protection Electrical Cable Initiatives.
2. (U) NAPDD #153-03 of 18 Feb 87, Cold Weather Operations.
3. (U) Draft NAPDD, Conventional Weapons Survivability.
4. (U) Draft NAPDD, Nuclear Weapons Survivability.
5. (U) Draft NAPDD, Shipboard Inherent Contamination.
6. (U) Draft NAPDD, Advanced CBR Filtration System.
7. (U) Draft TOR, Automatic Liquid Agent Detector.

G. (U) RELATED ACTIVITIES: Program Element 0604516N (Ship Survivability)
Program Element 0602233N (Mission Support)
Program Element 0604506N (Chemical Warfare Countermeasures)

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S1121 Project Title: Personnel Protection

C. (U) DESCRIPTION: Provides for design/development of shipboard personnel protective clothing and equipment to protect ship's complement from the effects of hostile actions and peacetime accidents.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Began production phase of Auto-Inflatable Utility Life Preserver and Naval Battle Helmet programs.

2. (U) FY 1990 Program:

a. (U) Continue development and testing of Fire Fighter's Breathing Apparatus.

b. (U) Continue development of laser eye protection and Special Application Fire Fighter's Helmet.

3. (U) FY 1991 Plans:

a. (U) Begin pre-production phase of Fire Fighter's Breathing Apparatus.

b. (U) Continue development and testing of laser eye protection.

c. (U) Achieve Initial Operational Capability of Auto-Inflatable Utility Life Preserver and Naval Battle Helmet.

d. (U) Begin production phase of Naval Flak Vest program.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Laboratory, Washington, DC; David Taylor Research Center, Bethesda and Annapolis, MD; Navy Clothing and Textile Research Facility, Natick, MA; Naval Sea Combat Systems Engineering Station, Norfolk, VA; Naval Coastal Systems Center, Panama City, FL; Naval Personnel R&D Center, San Diego, CA; Naval Ocean System Center, San Diego, CA; Naval Ship Systems Engineering Station, Philadelphia, PA; Department of Energy, Los Alamos, NM; Naval Aerospace Medical Research Lab, Pensacola, FL. CONTRACTORS: Sharp, Inc., Arlington, VA; AMSEC, Inc., Arlington, VA; Weidlinger Associates, New York, NY; Weidlinger Associates, Arlington, VA; JJH, Inc., Arlington, VA.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S1565 Project Title: Ship Damage Control

C. (U) DESCRIPTION: This project provides advanced development of improved Damage Control and Firefighting equipment, devices, and systems for rapid control and suppression of fire and damage with retention of ship's mission.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Completed shipboard feasibility demonstration of an Ultrasonic Hull Communications System.

b. (U) Completed shipboard testing of HALON test gas simulant.

2. (U) FY 1990 Program:

a. (U) Conduct shipboard tests of Ultrasonic Hull Communication System Advanced Development Model.

b. (U) Initiate weapons induced fire tests in Full Scale Fire Test Facility.

c. (U) Evaluate non-developmental safety and survivability items (NDIs) for fleet use.

3. (U) FY 1991 Plans:

a. (U) Complete tactics and doctrine for fighting weapons induced fires and develop design guidelines for combating conflagration size fires.

b. (U) Complete Ultrasonic Hull Communications System Advanced Development and transition to Engineering Development.

c. (U) Complete specification for near-term Damage Control Management System and transition to Engineering Development.

d. (U) Complete Portable Power and Pumping System Advanced Development and transition to Engineering Development.

4. (U) Program to completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; DTRC, Annapolis, MD; NAVSSES, Philadelphia, PA; NWC, China Lake, CA. CONTRACTORS: SRI International, Menlo Park, CA; Hale Fire Pump Company, Conshohocken, PA; Applied Research Laboratory, Arlington, VA; Advanced Technology, Inc., Vienna, VA.

F. (U) RELATED ACTIVITIES: Program Element 0604516N - Project S2054 (Damage Control Engineering)

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: N/A.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
PROJECT NUMBER: S1607 PROJECT TITLE: EMPRESS II

C. (U) DESCRIPTION: This program develops the Navy's only full threat simulator for assessing/validating/maintaining Electromagnetic Pulse (EMP) hardness of surface ships. This capability cannot be mathematically modeled due to the complex characteristics of EMP system interaction. This program will be completed once the EMPRESS II facility completes acceptance testing and reaches Initial Operational Capability.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed fabrication/integration of developmental test and evaluation of Data Acquisition and Processing System (DAAPS) #1.
   b. (U) Completed DAAPS #1 and transmitter acceptance testing (at sea).
   c. (U) DAAPS #2 and #3 hardware buys initiated.
   d. (U) Completed National Environmental Policy Act (NEPA) process for a shift in VACAPES operating area site.
2. (U) FY 1990 Program:
   a. (U) Complete DAAPS #2 & #3 developmental test and evaluation.
   b. (U) Complete DAAPS #2 & #3 acceptance testing.
   c. (U) Complete DAAPS and transmitter validation testing.
   d. (U) Achieve Initial Operation Capability of EMPRESS II.
   e. (U) Transfer operations and maintenance to GOCO contractor after IOC.
   f. (U) Complete EMPRESS II RDT&E contract with Main Systems Integrator contractor.
   g. (U) Complete NEPA process for use of Gulf of Mexico winter operating site.
3. (U) FY 1991 Plans: Not Applicable.
4. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, White Oak Laboratory, Bethesda, MD; CONTRACTORS: EG&G, Rockville, MD; Maxwell Laboratories, Inc., San Diego, CA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S2053 Project Title: CBR Defense

C. (U) DESCRIPTION: Advanced development of chemical, biological and radiological (CBR) defensive systems: protective clothing compatible with naval ops; citadel areas for collective protection ashore and on ships; detectors to locate and identify CBR contamination; and contamination control procedures, materials and equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: See Project S0384, Ship Survivability Advanced.

2. (U) FY 1990 Program:

a. (U) Advanced development of new technologies for integrated detection systems; advanced filtration concepts; shipboard collective protection systems (CPS) interferents.

b. (U) Initiate Shipboard Automatic Liquid Agent Detector (SALAD) ADM development and initiate DT-I.

3. (U) FY 1991 Plans:

a. (U) Continue SALAD development and DT-I.

b. (U) Conduct pre-DT I on Chemical Warfare Interior Compartment Sensors (CWICS) and advanced suit (ACPO).

c. (U) Initiate feasibility testing of liquid scrubber and catalytic air purification technologies for advanced shipboard and ashore CPS.

4. (U) Program to Completion: This is a continuing program. Tasks from technology base are evaluated and transitioned to Program Element 0604506N, Project S0410SL at Milestone II.

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NORDA, Bay St. Louis, MS; NAVSWC, Dahlgren, VA; DTRC, Annapolis, MD. CONTRACTORS: Nuclear Research Corp., Philadelphia, PA; Solar Turbine, San Diego, CA; Argonne National Laboratories, Chicago, IL.

F. (U) RELATED ACTIVITIES: Program Elements 0604506N CW Countermeasures, 0602233N Mission Support Technology.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)
(See RDDS for P.E. 0604506N, Project S0410)

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: N/A.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603522N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Submarine Arctic Warfare Support Equipment Program
PROJECT NUMBER: S0770 PROJECT TITLE: Advanced Submarine Surveillance Support Program

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0770	Advanced Submarine Surveillance Support Program	3,342	2,629	2,892	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops new submarine Electronic Support Measures (ESM) technologies and algorithms that allow submarines to operate effectively in an increasingly dense and sophisticated electromagnetic environment. The progam includes better threat warning, over-the-horizon targeting support for submarine-launched cruise missiles, and expanded tactical reconnaissance. Specific efforts include development of ESM block upgrades, radar cross section reduction techniques, improved targeting techniques, and advanced sensor development in the areas of non-imaging infrared, millimeter wave, and laser threat warning.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments
   a. (U) Tested ability of modified airborne system to exploit unique modulation anomalies.
   b. (U) Began risk reduction on the Integrated, Multi-sensor ESM mast (IEM).
   c. (U) Tested AN/BRD-7 integral RAM radome and DF improvement.
   d. (U) Tested AN/BRD-7 bearing processing improvement system at sea.
2. (U) FY 1990 Plans:
   a. (U) Complete AN/BRD-7 bearing display improvement development.
   b. (U) Test IEM risk reduction hardware.
   c. (U) Plan AN/WLQ-V(1) block upgrade development.
3. (U) FY 1991 Program:
   a. (U) Begin IEM block upgrade including optical and milimeter wave sensors.
   b. (U) Continue to develop AN/WLQ-V(1) block upgrade.
   c. (U) Investigate innovative Radar Cross-section Reduction techniques.
4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NUSC, New London, CT. CONTRACTORS: Raytheon, Goleta, CA; Sanders, Nashua, NH.

E. (U) RELATED ACTIVITIES: Program Element 0604515N (Submarine Surveillance Support Program) continues ASSSP projects through FSD.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603528N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Non-Acoustic Anti-Submarine Warfare
PROJECT NUMBER: X0967 PROJECT TITLE: Non-Acoustic Anti-Submarine Warfare

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0967	Non-Acoustic ASW	15,379	0	22,884	CONT.	CONT.

B. (u) DESCRIPTION: Continuing advances in Soviet submarine technology and reduce the effectiveness of U.S. Anti-Submarine Warfare forces. Current ASW forces rely primarily on acoustic technology in the detection and tracking of submarines. Developments in the technologies related to Non-Acoustic Anti-Submarine Warfare can potentially augment the Anti-Submarine Warfare capabilities of U.S. forces. The purpose of this program is to ensure that Non-Acoustic Anti-Submarine Warfare concepts are properly evaluated and exploited. This program monitors progress in research and exploratory development areas,

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 Accomplishments:
   a. (u) Completed analysis of FY 87 field test data.
   b. (u) Analyzed results of two FY 88 ASW tests using P-3 system.
   c. (u) Conducted final test of experimental development model analyzed data and initiated design for an advanced system.
   d. (u) Continued development of contact sensor system AXM.
   e. (u) Completed design of sensor.
   f. (U) Continued to monitor non-acoustic development for potential ASW utility.
   g. (u) Initiated development of

2. (u) FY 1990 Program: Not Applicable
3. (U) FY 1991 Plans:
   a. (u) Complete design of system and initiate fabrication.

PROGRAM ELEMENT: 0603528N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Non-Acoustic Anti-Submarine Warfare
PROJECT NUMBER: X0967 PROJECT TITLE: Non-Acoustic Anti-Submarine Warfare

b. (U) Provide support for major ASW test of P-3

c. (U) Complete contact sensor system AXM, perform system integration and conduct Phase I of test aboard submarine.

d. (U) Initiate development of AXM.

e. (U) Develop concepts for CLUSTER ROB phenomenology.

f. (U) Continue to monitor non-acoutic developments for potential ASW utility.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NUSC, Newport, RI (Lead Lab); NADC, Warminster, PA; NORDA, Stennis Space Center, MS; NOSC, San Diego, CA; NCSC, Panama City, FL. Contractors: Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; TRW Space Systems, Redondo Beach, CA; Sanders Assoc. Inc., Nashua, NH; ARETE Associates, Sherman Oaks, CA; McDonnell Douglas Electronics Systems Corp., Huntington Beach, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technology Changes: The Department had increased funding of this program by +$5.8M in FY 91 to broaden the technical scope to include

2. (U) Schedule Changes: None

3. (U) Cost Changes: None

F. (U) PROGRAM DOCUMENTATION: NAPDD #033-095 10 March 1986
TOR Ser 098R/6S357617 22 December 1986

G. (U) RELATED ACTIVITIES:

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603529N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Anti-Submarine Warfare Target

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0968	Advanced Anti-Submarine Warfare Target	5,602	22,130	5,020	CONT.	CONT.
S1017	Expendable Mobile ASW Training Target	2,244	3,905	0	Completed	19,058
S1955	Fast/Deep Prototype Target	7,095	4,386	0	Completed	16,348
TOTAL		14,941	30,421	5,020	CONT.	CONT.

B. (U) DESCRIPTION: This Program Element develops underwater Anti-Submarine Warfare (ASW) mobile targets for weapon and sensor evaluation and fleet training.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603529N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Anti-Submarine Warfare Target
PROJECT NUMBER: S0968 PROJECT TITLE: Advanced Anti-Submarine Warfare Target

C. (U) PROJECT DESCRIPTION: The MK 30 Mod 3 Fast Deep Target is being developed to establish a continuing capability for test & evaluation of the Navy's newest torpedoes. This project will use the acoustic signal processor, power amplifier and towed array under development in this project from the MK 30 Mod 2 Advanced ASW Target, the guidance and control hardware from the current inventory MK 30 Mod 1 Target, and the MK48 ADCAP CCAPS propulsion system under development for the Fast Deep Prototype Target (Project S1955).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed system design and planning.
   b. (U) Initiated design modification of electro-acoustic subsystem.
   c. (U) Project S1955 consolidated with this effort in restructured program.
2. (U) FY 1990 Program:
   a. (U) Complete design modification of electro-acoustic subsystem.
   b. (U) Initiate fabrication of electro-acoustic subsystems.
   c. (U) Conduct electro-acoustic subsystem testing.
3. (U) FY 1991 Plans:
   a. (U) Continue system testing of electro-acoutic subsytem.
   b. (U) Integrate electro-acoustic MK 30 Mod 3 payload with propulsion system.
4. (U) Program to Completion:
   a. (U) Deliver propulsion systems to Navy for in-house system level testing and integration with electroacoustic subsystem.
   b. (U) Conduct in-water demonstration testing with advanced weapons.
   c. (U) Complete site activation efforts fo~ MK30 Mod 3.

PROGRAM ELEMENT: 0603529N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Anti-Submarine Warfare Target
PROJECT NUMBER: S0968 PROJECT TITLE: Advanced Anti-Submarine Warfare Target

E. (U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, D.C. (Program Office); Naval Underwater Systems Center, Newport, RI (Lead Laboratory and Systems Integrator); Loral Systems Group, Akron, OH; Raytheon Corp., Portsmouth, RI; and ARL/University of Pennsylvania, State College, PA.

F. (U) RELATED ACTIVITIES: MK 4 Advanced Capability Engineering, Project Number S0366.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
MK30 WPN	0	2,492	3,440		
Quantities	0	0	0	CONT.	CONT.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603529N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Anti-Submarine Warfare Target
PROJECT NUMBER: S1017 PROJECT TITLE: Expendable Mobile ASW Training Target

C. (U) DESCRIPTION: The MK 39 Expendable Mobile ASW Training Target (EMATT) is being developed to meet a Fleet requirement for an expendable, open ocean, mobile target system for use by all surface and airborne ASW platforms. The air deployment capability does not exist in the current MK 38 Mini-Mobile Target. EMATT will also provide increased dynamic capability, programmed run capability vice the MK 38's random course, acoustic compatibility with all Fleet surface ship and air platform sonars/sonobuoys, and Magnetic Anomaly Detection (MAD) simulation.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Completed DT-IIB Testing.
   b. (U) Initiated Test Analyze and Fix (TAAF) for reliability growth.
2. (U) FY 1990 Program:
   a. (U) Continue TAAF Prog.
   b. (U) Conduct DT-IIC Testing.
   c. (U) Conduct OT-IIA. Receive approval for Low Rate Production.
3. (U) FY 1991 Plans:
   a. (U) Conduct TECHEVAL. (FY90 Funds)
   b. (U) Conduct OPEVAL. (FY90 Funds)
   c. (U) Receive approval for Full Rate Production based on OPEVAL.
4. (U) Program to completion: Not applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington, D.C. (Program Office); Naval Underwater Systems Center, Newport, RI (Lead Laboratory). Prime Contractor: Sippican Ocean Systems Inc., Arlington, VA.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TOTAL COMPLETE	TOTAL PROGRAM
1. (U) PROCUREMENT					
EMATT (WPN)	0	10,491	12,823		
Quantities	0	1,105	1,768	CONT.	CONT.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603529N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Anti-Submarine Warfare Target
PROJECT NUMBER: S1955 PROJECT TITLE: Fast Deep Prototype Target

C. (U) DESCRIPTION: This project developed an in-water capability of simulating maximum projected threat speed, depth and acoustic compatibility with the MK 48 Advanced Capability (ADCAP) and MK 50 Advanced Lightweight Torpedo.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Conducted in-water testing and operations with weapons.

2. (U) FY 1990 Program: Not applicable - This program has been consolidated with project S0968.

3. (U) FY 1991 Plans: Not applicable.

4. (U) Program to Completion: Not applicable. Funding from this project will shift to project S0968 in FY 90 to fund the MK 30 MOD 3 (Fast Deep Target).

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington, D.C. (Program Office); Naval Underwater Systems Center, Newport, RI (Lead Laboratory and Systems Integrator); Prime Contractor: Applied Physics Laboratory Pennsylvania State University, State College, PA.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Radiological Controls

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1825	Radiological Controls	170	184	206	CONT.	CONT.
S1830	RADIAC Development	2,998	3,610	3,856	CONT.	CONT.
Total		3,168	3,794	4,062	CONT.	CONT.

B. (U) Description: This program coordinates all Navy efforts for the development of nuclear radiation detection devices. This includes hand-held RADIAC meters, personnel dose measurement devices, and area monitors used to measure radiation fields. Present RADIAC instrumentation is based largely on obsolete electronic technology and incurs expensive calibration and maintenance costs. The development of a new generation of microprocessor based instrumentation will cut calibration costs by 75% (resulting in a saving of $5 million per year) and reduce the requirements for spare parts by 85%. The estimated savings to investment ratio of this program is approximately 5 to 1. New requirements for the measurement of lower tritium and 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. This program also provides required improvements in nuclear weapon intrinsic radiation (gamma and neutron) shielding determinations, in mixed-field (gamma and neutron) dosimetry and in neutron measurement to ensure safety and health of personnel.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Radiological Controls
PROJECT NUMBER: S1825 PROJECT TITLE: Radiological Controls

C. (U) DESCRIPTION: This project provides required improvements in nuclear weapon intrinsic radiation (gamma and neutron) shielding determinations, in mixed-field (gamma and neutron) dosimetry and in neutron measurement to ensure safety and health of personnel.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Improvements were made to the Navy computer program that maps radiation levels in Navy ships to allow installation in a microcomputer. The overresponse of DT 648 in Navy neutron environments was determined.

2. (U) FY 1990 Program: Complete refinements in the computer program that maps radiation levels to simplify and accelerate its operation. Development of methods for using bubble dosimetry techniques for environmental monitoring of neutrons in Navy ships.

3. (U) FY 1991 Plans: Continue development of methods for using bubble dosimeter techniques for environmental monitoring of neutrons in Navy ships.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: Naval Surface Warfare Center (NSWC), White Oak Laboratory, Silver Springs, MD; Naval Research Laboratory, Washington, DC; and Naval Sea Systems Command.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Radiological Controls
PROJECT NUMBER: S1830 PROJECT TITLE: RADIAC Development

C. (U) Description: Project S1830 involves the development of microprocessor based instrumentation which will consolidate the Navy's RADIAC requirements by using a general purpose display box with a number of calibrated probes instead of buying numerous special purpose instruments. Instrumentation is being developed to meet new requirements for tritium and neutron detection. A laser-heated personnel dosimetry system is being developed to provide better sensitivity and accuracy than current systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Dem/Val model for Laser Heated Thermoluminescent Dosimetry System was delivered to Navy. Request for Proposals (RFP) for Demonstration/Validation (Dem/Val) Phase for Multifunction RADIAC and ARCADE System was issued. Conceptual Development of Tritium Monitor, EOD Personal Dosimeter was continued. Dem/Val phase for Neutron Dosimetry System and Underwater RADIAC was begun.

2. (U) FY 1990 Program: Begin Full Scale Development (FSD) for Laser Heated Thermoluminescent Dosimetry System. Begin Dem/Val phase for Multifunction RADIAC and ARCADE System and EOD Personal Dosimeter. Continue Conceptual Development of Tritium Monitor. Continue Dem/Val Phase for Neutron Dosimetry System, and Underwater RADIAC.

3. (U) FY 1991 Plans: Continue FSD phase for Laser Heated Thermoluminescent Dosimetry System. Begin FSD for EOD Personal Dosimeter, Neutron System, Multifunction RADIAC and Underwater RADIAC. Begin Demonstration/Validation Phase for Tritium Monitor.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: NSWC White Oak, Oak Ridge National Labs, Oak Ridge, TN; and Naval Sea Systems Command.

F. (U) RELATED ACTIVITIES: A Memorandum of Understanding is being prepared for concurrence by the Air Force on the Joint Service Operational Requirement for the Multifunction RADIAC System.

G. (U) OTHER APPROPRIATIONS FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0229	Surface Ship Silencing	2,867	3,710	9,324	CONT.	CONT.
S1704	ASW Advanced Development Technology	58,448	36,129	36,477	CONT.	CONT.
S2032	Coast Guard Sonar	5,000	0	0	0	5,000
TOTAL		66,315	39,839	45,801	CONT.	CONT.

B. (U) DESCRIPTION: This program develops surface ship antisubmarine warfare and silencing technology and supports the AN/SQQ-89(I) Project. The Surface Ship Silencing Project develops technology to reduce sonar self-noise and radiated noise, particularly at higher operating speeds. The ASW Advanced Development Technology Project develops advanced technology for surface ship ASW systems improvement programs, including design definition and supporting sea tests for the AN/SQQ-89(I) Project and the CNO's ASW Master Plan initiatives.

UNCLASSIFIED

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare
PROJECT NUMBER: S0229 PROJECT TITLE: Surface Ship Silencing

C. (U) DESCRIPTION: Surface ship acoustic quieting provides for the development and at-sea demonstration of quieting techniques to reduce ASW surface ship sonar self-noise, ship radiated noise, and shipboard machine-generated airborne noise. Projects are directed toward increasing the survivability of ships by making threat sensor determination of ship presence, position, classification, and predicted intercept more difficult and by reducing the interference impact of surface ship noise on our force ASW ship sonars, and sonobuoys.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Continued propulsor and machinery quieting, AN/SQS-53C baffle development, and airborne noise reduction work related to FF 1052, DD 963 and FFG 7 Classes. Completed installation in

2. (U) FY 1990 Program: Complete diagnostic evaluation of CG 47 Class. Initiate detailed design of combatant Continue propulsor quieting, AN/SQS-53C baffle development and airborne noise reduction evaluations.

3. (U) FY 1991 Plans: Complete diagnostic evaluation of DDG 51 Class. Continue detailed design of prototype coatir system. Continue propulsor quieting, baffle development, airborne noise reduction, fleet evaluations and acoustic design support. Initiate detailed design of prototype.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Carderock, MD; NUSC, New London, CT; NOSC, San Diego, CA. CONTRACTORS: ARL/PSU, State College, PA; and Epoch Engineering, Gaithersburg, MD.

F. (U) RELATED ACTIVITIES: PE 0602121N and PE 0602323N (Ship and Submarine Technology); PE 0604561N (SSN 21).

G. (U) OTHER APPROPRIATION FUNDS: Not applicable.
(U) PROCUREMENT: Not applicable.
(U) MILCON: Not applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare
PROJECT NUMBER: S1704 PROJECT TITLE: ASW Advanced Development

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1704	ASW Advanced Development	58,448	36,129	36,477	CONT.	CONT.

B. (U) DESCRIPTION: This project provides advanced development of technology for ongoing surface ship ASW system improvement programs, and supports developments in Active Sonar Classification and ASW Master Plan initiatives. Concepts will be developed and validated to support AN/SQQ-89 (Improved) upgrades to provide capability against the year 2000 submarine threat. System capabilities include with reception on a high gain (25 dB) receiver. Efforts beyond Block 3 of the AN/SQQ-89 (Improved) Program (see Program Element 0604713N/S1916 Surface ASW Systems Improvement) will be the development and evaluation of technologies for test of systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Designed and evaluated concepts of systems.
   b. (U) Performed preliminary engineering for low cost and systolic adaptive processing/beamforming techniques.
   c. (U) Installed test tool aboard USS GLOVER.
2. (U) FY 1990 Program:
   a. (U) Complete AN/SQQ-89(I) design support tests in GLOVER with arrays.
   b. (U) Complete fabrication of source (proof of principle system) in support of AN/SQQ-89(I) and battle group requirements.
   c. (U) Initiate procurement of GLOVER Processing Suite that will support SQQ-89I engineering development. test beds.
   d. (U) Develop and conduct real time laboratory evaluations of advanced sensor systems.
   e. (U) Demonstrate the ability to meet the active performance specified in OR 062-03-86.
   f. (U) Perform evaluation of prime contractor's FFG technical proposals and complete contract documentation for Milestone II approval.
   g. (U) Perform Phase III tests in USS GLOVER using bow mounted to receive.

PROGRAM ELEMENT: 0603553N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare
PROJECT NUMBER: S1704 PROJECT TITLE: ASW Advanced Development

3. (U) FY 1991 Plans:
a. (U) Complete testing and analysis of tactical towed source sea trial data.
b. (U) Complete fabrication of GLOVER processing suite.
c. (U) Initiate fabrication of multistatic ADM transmitters and ADM receivers.
d. (U) Conduct additional testing of _ _ proof of principal critical items.
e. (U) Conduct at-sea real time evaluations of _ for low frequency sensor systems.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORKED PERFORMED BY: IN-HOUSE: Naval Underwater Systems Center, New London, CT; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC and Orlando, FL. CONTRACTORS: Johns Hopkins University, Laurel, MD; University of Texas, Austin, TX; Gould Inc., Glen Burnie, MD; SCT Inc., Palo Alto, CA; Orincon Inc., La Jolla, CA; ESL Inc., Sunnyvale, CA.

E. (U) COMPARISON WITH REVISED BY FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) *Technology changes:* Low cost towed array work deferred.
2. (U) Schedule changes: None.
3. (U) Cost changes: -$4,509K (FY 1991).

F. (U) PROGRAM DOCUMENTATION: NAPDD (154-03) 3/87

G. (U) RELATED ACTIVITIES: Program Element 0604713N/S1916 (Surface ASW Systems Improvement; AN/SQQ-89 (Improved)): development of upgrades to the AN/SQQ-89 system to counter recently identified threat improvements, including reductions in radiated noise.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.
(U) PROCUREMENT: Not applicable.
(U) MILCON: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Submarine Systems Development

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2033	Advanced Submarine Systems Development	0	19,574	35,807	CONT.	CONT.
S2034	R&D Submarine	0	8,749	16,330	CONT.	CONT.
Total		0	28,323	52,137	CONT.	CONT.

B. (U) DESCRIPTION: The principal challenge to the U.S. Navy is to optimize state-of-the-art and leading edge technology to ensure our submarines are technologically superior and capable of implementing the Nation's Maritime Strategy worldwide. This program supports revolutionary research and developments in attack submarine technologies and their evaluation and demonstration on a submarine platform. The intent of the program is to increase the technology base, to provide design options not currently feasible, to support the current submarine force's technology improvement requirements, and provide a hedge against technology surprises. Project S2033 takes the most promising of these technologies into specific advanced developments. HM&E and non-nuclear technologies will receive the initial emphasis but the program expands within available funding limits to include sensors and combat systems, countermeasures and weapons technologies, and other appropriate research and technology developments. Planned new starts include the transition of technologies developed by Navy technology bases, those developed under the Congressionally mandated DARPA Advanced Submarine Technology Program, and those planned for testing on the R&D submarine. Project S2034 will provide time and space for demonstrating at sea advanced technologies and concepts on board an operational attack submarine. These developments will directly support the attack submarine mission to aggressively seek out and destroy enemy submarines and surface ships across a wide spectrum of tactical scenarios as well as expanded roles and missions of the submarine force.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2033	Advanced Submarine Systems Development	0	19,574	35,807	CONT.	CONT.

B. (U) DESCRIPTION: The principal challenge to the U.S. Navy is to optimize state-of-the-art and leading edge technology to ensure our submarines are technologically superior and capable of implementing the Nation's Maritime Strategy worldwide. This project will provide the advanced submarine technology required to support these requirements. Efforts initially emphasize HM&E and non-nuclear propulsion technologies but later may include sensors and combat systems, countermeasures and weapons, and other submarine technologies. The overall intent is to increase the submarine technology base to provide design options not currently feasible to support the current submarine forces' technology improvement requirements and provide a hedge against technology surprises. These developments will directly support the attack submarine mission to aggressively seek out and destroy enemy submarines and surface ships across a wide spectrum of tactical scenarios as well as expanded roles and missions of the submarine force.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not applicable.
2. (U) FY 1990 Program:
   a. (U) Begin fabrication of steel hull section.
   b. (U) Continue development of advanced propulsion machinery technology to support enabling technologies for electric direct drive.
   c. (U) Initiate development of advanced, quiet machinery and silencing technology.
   d. (U) Continue development of materials to include
   e. (U) Transition support for operation of the Large Scale Vehicle (LSV) from PE 0604561N and commence use as a test platform for advanced development programs.
   f. (U) Establish formal process for evaluation of emerging technologies and for incorporating these in long range technology development plans.
   g. (U) Continue tactical acoustic systems and award contracts for mine search system and remote surveillance systems.

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

3. (U) FY 1991 Plans:

a. (U) Initiate development of advanced propulsors.

b. (U) Continue development of advanced, quiet machinery and silencing techniques.

c. (U) Initiate development of a fully automated handling and stowage system for weapons.

d. (U) Continue development of

e. (U) Initiate development of advanced techniques.

f. (U) Initiate development of advanced drag reduction system for testing on the R&D submarine.

g. (U) Initiate program to transition an advanced motor program and a propulsor development program from DARPA.

h. (U) Continue to evaluate emerging technologies and to incorporate these technologies into existing R&D development plans.

i. (U) Continue utilization of and support for the LSV as an advanced technology test platform.

j. (U) Initiate development of an advanced hull array for testing on the R&D submarine.

k. (U) Initiate development of an for testing on the R&D submarine.

l. (U) Initiate development of automated monitoring and control devices for auxiliary machinery systems.

m. (U) Complete Tactical acoustic systems development and Transition and Navy mission demonstrations. Continue mine search systems and remote surveillance systems.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; NADC, Warminister, PA; NOSC, San Diego, CA; NUSC, Newport, RI; NRL, Washington, DC; Mare Island NAVSHIPYD, Vallejo, CA; NCSC, Panama City, FL; and COMSPAWARSYSCOM, Washington, DC. CONTRACTORS: General Dynamics, Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Eastport International, Bovie, MD; ARL/Penn State, State College, PA; and other laboratories and industry as appropriate.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technology changes: The decrease of funding of -$4,172M in FY 91 has required the transfer of HY-130 development effort to PE 0604561N, SSN 21 Development.

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

2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Most submarine related RDT&E programs will provide inputs into PE 0603561N in the form of new technologies, systems, and components that can be used in future attack submarine classes. 0604561N, SSN 21 Development, 0603504N, Advanced Submarine ASW Dev; 0603522N, Submarine Arctic Warfare Support Equip Program; 0603562N, Submarine Tactical Warfare Systems; and 0603570N, Advanced Nuclear Reactor Components and Systems.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Submarine Systems Development
PROJECT NUMBER: S2034 PROJECT TITLE: R&D Submarine

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2034	R&D Submarine	0	8,749	16,330	CONT.	CONT.

B. (U) DESCRIPTION: This project will provide time and space aboard an at-sea attack submarine for demonstrating advanced technologies and concepts. Developments from industry, DARPA, and in-house Navy programs will be accommodated.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Not applicable.
2. (U) FY 1990 Program: Begin design of submarine modifications necessary to support R&D objectives.
3. (U) FY 1991 Plans:
   a. (U) Continue submarine modification effort.
   b. (U) Initiate long lead procurement.
   c. (U) Commence detailed design of research and development submarine modifications.
   d. (U) Begin design integration to overhaul work.
   e. (U) Begin prefabrication efforts.
4. (U) Program to completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; NUSC, Newport, RI. CONTRACTORS: GD/Electric Boat Div, Groton, CT; Newport News Shipbuilding and Drydocking, Newport News, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology Changes: None
2. (U) Schedule Changes: None
3. (U) Cost Changes: None

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: 0603504N, Advanced Submarine ASW Dev; 0603522N, Submarine Arctic Warfare Support Equip Program; 0603570N, Advanced Nuclear Reactor Components and Systems; 0604502N, Submarine Communications; 0604503N, Submarine Sonar Development; 0604561N, SSN 21 Development; 0604562N, Submarine Tactical Warfare System; and 0604567N, Ship Development.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603562N BUDGET ACTIVITY: 4-Tactical Program
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System (Advanced)

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1739	Submarine Arctic Warfare	6,037	7,282	7,417	CONT.	CONT.

B. (U) DESCRIPTION:
_ It develops advanced capabilities for
conduct warfare in the Arctic, including ASW, tactical surveillance, and other
_ Efforts include _

of an ice
pool.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Conducted ICEX 1-89 and ICEX 2-89
b. (U) Conducted Arctic testing of
c. (U) Continued
d. (U) Planned testing of _
2. (U) FY 1990 Program:
a. (U) Conduct
b. (U) Analyze and report results of
c. (U) Conduct at-sea testing,
d. (U) Measure additional
3. (U) FY 1991 Plans:
a. (U) Conduct
b. (U) Continue development
c. (U) Assess Arctic performance of systems

4. (U) Program to Completion: This is a continuing program.

D. (U) WORKED PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NUSC, Newport, RI; DTRC, Carderock, MD. NRL, D.C.. CONTRACTORS: APL-University of Washington, Seattle, WA; Analysis and Technology Inc., North Stonington, CT; ARL-University of Texas, Austin, TX.

E. (U) RELATED ACTIVITIES: (a) PEs 0602314N (ASW Technology), 0602323N (Submarine Technology), and 0602435N (Ocean and Atmosphere Support Technology) provide technologies for advanced development efforts; (b) PEs 0604561N (SSN 21 Development) and 0604524N (Submarine Combat System) incorporate Arctic specific improvements.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NONE

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP DEVELOPMENT (ADVANCED)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPL	TOTAL PROGRAM
S0408	SHIP DEV.(ADV)	7,942	5,489	14,702	CONT.	CONT.
S2043	SUB TENDER DEV	0	0	4,162	CONT.	CONT.
S2087	FAST SEALIFT	0	14,598	0	0	14,598
TOTAL		7,942	20,087	18,864	CONT.	CONT.

B. (U) DESCRIPTION OF ELEMENT: The overall objective of the Ship Development (Advanced) Program is to enhance the Navy's ability to design more capable ships at reduced cost, with reduced manning and increased producibility and to allow for greater utilization of the latest technology during this process. This program is directly focused at supporting the Navy's Shipbuilding Plan by performing the Advanced Ship Design (concept) Studies, Feasibility Studies and Preliminary Designs for new ships in that plan. The Advanced Ship Design Studies provide system engineering of R&D concepts to develop a Tentative Operational Requirement (TOR). Feasibility studies, the first phase of the ship design process, provides the alternatives for the Development Options Paper (DOP). The Preliminary Design is the selected ship alternative to be developed and proceed to Contract Design. Project S2043 performs the first three phases of design (Advanced Concept Studies, Feasibility, and Preliminary Design) for a new class of attack submarine tender (AS-42 class). Completion of these phases will allow OPNAV to review and approve transfer of the new submarine tender to the Ship Contract Design Program, P.E. 0604567N. Project S2087, Fast Sealift Ship, performs the initial design phases and technology development for the Sealift program as directed by Congress.

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP DEVELOPMENT (ADVANCED)
PROJECT NUMBER: S0408 PROJECT TITLE: SHIP DEVELOPMENT (ADVANCED)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPL	TOTAL PROGRAM
S0408	SHIP DEV.(ADV)	7,942	5,489	14,702	CONT.	CONT.

B. (U) DESCRIPTION: This project performs the first three phases of design (Advanced Concept Studies, Feasibility and Preliminary Design) for all new surface ships (excluding aircraft carriers) in the Navy's Shipbuilding Program. Completion of these phases allows OPNAV to review and approve transfer of a ship to the Ship Contract Design Program, PE 0604567N. Develops and evaluates unconventional hull form concepts suitable for future acquisiiton. The Navy has benefited from the research, development, design and deployment of the the air cushion vehicle (ACV) LCAC landing craft. Presently under acquisition is the SWATH TAGOS, a promising hull form well suited for North Atlantic operations. Performs impact studies of warfare, hull, machinery and electrical subsystems on advanced ship designs. Develops the initial documentation and the design methodology required by government for the design of surface ships in the Shipbuilding Program.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Performed destroyer (DDG 51 Flight III), repair ship (AR(X)), amphibious ship (LHD-5) GT-plug, and surveying ship (TAGSO(ICE)) feasibility studies.
   b. (U) Investigated design concepts for the Battle Force Capable (BFC) Combatant, Mission Essential Unit (MEU), and Large Capacity Missile Carriers (LCMC).
   c. (U) Continued development of total ship design methodology including electromagnetic systems engineering.
   d. (U) Assessed warfare, hull, machinery and electrical subsystems for advanced ships.
   e. (U) Evaluated ship stabilization and seaway performance technology for hull form and subsystem impacts.

2. (U) FY 1990 PROGRAM:
   a. (U) Perform AR(X), feasibility study. Begin AOE(V) feasibility study.
   b. (U) Assess warfare, hull, machinery and electrical subsystems for advanced ships.
   c. (U) Perform HM&E system assessments of BFC, MEU, LCMC type ships and support ships.
   d. (U) Continue development of total ship design methodology, including electromagnetic systems engineering.
   e. (U) Define and plan HM&E subsystem technology improvements for advanced ships (e.g., fiber optics impact).
   f. (U) Continue Seaway Performance Technical Improvement Program.

PROGRAM ELEMENT: 0603564N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP DEVELOPMENT (ADVANCED)
PROJECT NUMBER: S0408 PROJECT TITLE: SHIP DEVELOPMENT (ADVANCED)

3. (U) FY 1991 Plans:
   a. (U) Conduct preliminary design of DDG 51 FLT III and AR.
   b. (U) Continue development of total ship design methodology.
   c. (U) Perform HM&E and combat systems assessment of BFC, MEU, LCMC type ships and support ships.
   d. (U) Assess warfare and HM&E subsystems for advanced ships.
   e. (U) Define and plan HM&E subsystem technology improvements for advanced ships.
   f. (U) Perform feasibility studies or preliminary design updates for AOE (Variant) and L(X).
   g. (U) Continue Seaway Performance Technical Improvement Program.

4. (U) Program to Completion: This is a continuing program to replace ships in the force levels with new technology to reduce cost, manning, weight, volume and to maximize ordnance carried.

D. (U) WORK PERFORMED BY: IN-HOUSE: NCSC, Panama City, FL; DTRC, Bethesda, MD; NSWC, White Oak, MD; NOSC, San Diego,CA. CONTRACTOR: John J. McMullen Associates Inc., Arlington, VA; Gibbs and Cox, Arlington, VA; Bath Iron Works, Bath, Me.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET
1. (U) TECHNOLOGY CHANGES: None
2. (U) SCHEDULE CHANGES: DDG 51 FLT III PD moved to FY91.
3. (U) COST CHANGES: (Dollars in Thousands) An increase of +4,579 results from Department program and budget adjustments. This increase will be applied to Electromagnetic Engineering.

F. (U) PROGRAM DOCUMENTATION:
a. (U) Extended Planning Annex

G. (U) RELATED ACTIVITIES: PE 0603508N Ship Propulsion System (Advanced); P.E. 0603513N Shipboard System Component Development; P.E. 0604567N Ship Subsystem Development/LBTS (Advanced); P.E. 0602121N Surface Ship Technology.

H. (U) OTHER APPROPRIATION FUNDS: None.
(U) PROCUREMENT: None
(U) MILCON: None

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:
a. (U) AR(X) Feasibility Study - FY 90
b. (U) DDG 51 FLT III Preliminary Design - FY 91
c. (U) AR (X) Preliminary Design - FY 91
d. (U) L(X) Feasibility Studv - FY 91
e. (U) AOE (Variant) Feasibility Study - FY 91

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP DEVELOPMENT (ADVANCED)
PROJECT NUMBER: S2043 PROJECT TITLE: ADVANCED SUBMARINE TENDER DEVELOPMENT

C. (U) PROJECT DESCRIPTION: This project performs the first three phases of design (Advanced Concept Studies, Feasibility and Preliminary Design) for a new class of attack submarine tender (AS-42 class). Completion of these phases will allow OPNAV to review and approve transfer of the new submarine tender to the Ship Contract Design Program, P.E. 0604567N. A new design tender is required to support the new SSN-21 attack submarine. The new design tender will also be capable of providing the full range of support services to SSN-637 and SSN-688 class attack submarines. The project funds impact studies of hull, machinery, electrical systems, self-defense capabilities, and submarine repair capabilities for an advanced design tender. The project develops the initial documentation required for the inclusion of a logistic support ship in the FY 1995 Shipbuilding Program.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not Applicable.

2. (U) FY 1990 Program:
   a. (U) Issue Tentative Operational Requirement (TOR).

3. (U) FY 1991 Plans:
   a. (U) Initiate concept development studies
   b. (U) Start cost and feasibility study
   c. (U) Start Development Options Paper

4. (U) Program to Completion:
   a. (U) Complete feasibility study.
   b. (U) Conduct Preliminary Design.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington, DC; David Taylor Naval Ship Research and Development Center, Annapolis, MD and Carderock, MD. CONTRACTOR: TBD

F. (U) RELATED ACTIVITIES: P.E. 0604561N, SSN-21 Submarine Development.

G. (U) OTHER APPROPRIATION FUNDS: None

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP DEVELOPMENT (ADVANCED)
PROJECT NUMBER: S2087 PROJECT TITLE: FAST SEALIFT SHIP TECHNOLOGY DEVELOPMENT

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2087	Fast Sealift	0	14,598	0	0	14,598

B. (U) DESCRIPTION: The fast sealift technology development program was established as a new start in FY 90 by Congressional action. The Secretary of the Navy is authorized to establish this program for the purpose of completing, within 24 months after the date of enactment the technology development program described in the January 1989 report f the Secretary to Congress entitled "Fast Sealift Program Technology Assessment Report". The near-term goal of this program will be to ensure the ships authorized and appropriated in fiscal year 1990 for fast sealift are designed to possess multimission capabilities and to be useful in day to day fleet operations. Commercial viability shall be considered. While military effectiveness and affordability will be the primary focus of this program, it will be conducted with sensitivity to commercial viability of not only the ship concepts but also the underlying technologies. To accomplish this the Navy will seek the participation, both financially and substantively, of the Maritime Administration and industry. Mid-term and far-term SEALIFT R&D will include analyses to determine the effect of performance characteristics such as speed, payload carrying capacity, signature reduction, endurance, and survivability on the military effectiveness and affordability of candidate concepts. Commonality and producibility using advanced shipbuilding technologies will be considered. Key synergistically-related technologies will be identified to serve as building blocks for the development strategy. This strategy will capitalize on and/or reinforce existing hull, machinery and electrical development programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Not applicable

2. (U) FY 1990 PROGRAM:
   a. (U) Near Term - Conduct planning and design work necessary to develop and evaluate the Circular of Requirements (COR) for the near-term sealift ship procurement.

   b. (U) Mid-Term - Investigate application of HM&E technologies/programs planned or in process to an FY 92-95 sealift ship concept considering speed, payload, signature, endurance, survivability, etc. requirements in an innovative R&D perspective.

   c. (U) Far-Term - Conduct analyses on potential of advanced concepts such as surface effect ships and planing hulls for future fast sealift applications.

PROGRAM ELEMENT: 0603564N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP DEVELOPMENT (ADVANCED)
PROJECT NUMBER: S2087 PROJECT TITLE: FAST SEALIFT SHIP TECHNOLOGY DEVELOPMENT

3. (U) FY 1991 Plans: Not Applicable

4. (U) Program to completion: Not Applicable

D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; Other Labs to be determined; MARAD. CONTRACTOR: (TBD)

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET

1. (U) TECHNOLOGY CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION: None

G. (U) RELATED ACTIVITIES: PE 0603573N (Electric Drive)

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:
a. (U) 1 March 1990 - Submit program plan for Fast Sealift Ship Technology Development Program (90 Day Report) including the identification of the Program Manager.
b. (U) 1 September 1990 - Submit acquisition strategy and refined plan per Congressional language.

UNCLASSIFIED DATA

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1258	Nuclear Technology Development	40,740	30,861	80,909	CONT.	CONT.
S1914	S6W Nuclear Propulsion Plant	43,515	28,700	29,184	CONT.	CONT.
TOTAL		84,255	59,561	110,093	CONT.	CONT.

B. (U) DESCRIPTION: Work is directed toward the design, development and testing of new and improved components and their related systems for use in nuclear propulsion plants. The intent is to develop safe, reliable, high performance, long life, nuclear propulsion plants and components. Work includes development of a nuclear propulsion plant for the new SEAWOLF class attack submarine. Work in other areas includes instrumentation and control equipment, fluid and heat transfer equipment, reactor plant equipment, and development of nuclear power technology for future fleet applications. Significant heat transfer technology improvements are being developed. Work underway to improve steam generators, if successful, will significantly and increase plant efficiency by improving heat transfer capability. New instrumentation and control equipment designs are needed to replace installed systems which are over 20 years old, difficult to support, require a growing amount of maintenance and lack the accuracy and reliability available with modern technology. In addition, better component and system designs are being developed to reduce and improve performance.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1258 PROJECT TITLE: Nuclear Technology Development

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1258	Nuclear Technology Development	40,740	30,861	80,909	CONT.	CONT.

B. (U) DESCRIPTION: The purpose is to design, develop, and test new and improved reactor components and systems for use in all types of naval nuclear propulsion plants.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued to design and develop new concept steam generator components and manufacturing processes emphasizing

b. (U) Continued development of remote robotic steam generator inspection equipment.

c. (U) Qualified advanced design instrumentation and control equipment such as monitoring and detection equipment.

d. (U) Continued to design, develop, and test fluid transfer and control components that incorporate noise quieting features.

e. (U) Continued to test reactor plant systems and components to prove new designs and improve existing designs.

2. (U) FY 1990 Program:

a. (U) Develop advanced heat transfer technology to improve efficiency and prolong life expectancy; conduct reactor plant optimization and configuration work applicable to an improved propulsion plant; incorporate fiber optics into plant systems.

b. (U) Design better instrumentation and control equipment including development of advanced reactor plant detectors

inclusion of advanced diagnostic capability into equipment to simplify maintenance, start of improved monitoring and indication equipment qualification, and development of improved equipment.

c. (U) Develop fluid transfer and control equipment emphasizing improved features.

PROGRAM ELEMENT: 0603570N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1258 PROJECT TITLE: Nuclear Technology Development

3. (U) FY 1991 Plans:

a. (U) Continue advanced heat transfer technology efforts to improve efficiency and prolong life expectancy and conduct reactor plant optimization and configuration work applicable to an improved propulsion plant.

b. (U) Continue development of alternate power supplies and conversion equipment

c. (U) Design and develop new instrumentation and control equipment and related systems continue development of advanced reactor plant detectors, diagnostic equipment, sensors, and data transmission means; begin test of preproduction units.

d. (U) Develop fluid transfer and control equipment this will include effort to reduce noise generated by current and advanced design pumps and bearings.

e. (U) Develop high performance plant component and system designs that will offer improved

f. (U) Develop techniques and computational methods for reactor plant designs to allow

g. (U) Evaluate advanced nuclear plant components

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: Contractors: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA; General Electric Company, Knolls Atomic Power Laboratory and Machinery Apparatus Operation, Schenectady, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technology changes: None.

2. (U) Schedule changes:

3. (U) Cost changes: The Congressional reduction of $20,615 in FY 1990 and OSD action to increase FY 1991 by $21,400 will result in the delay and rescheduling of work from FY 1990 to FY 1991 and slightly higher total cost, but costs will be contained within the budgeted levels.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: This project is related to PE 0602324N, Nuclear Propulsion Technology and PE 0205675N, Operational Reactor Development. There is no duplication of effort within the Navy or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS: This is a non acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1914 PROJECT TITLE: S6W Nuclear Propulsion Plant

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1914	S6W Nuclear Propulsion Plant	43,515	28,700	29,184	CONT.	CONT.

B. (u) DESCRIPTION: This effort is developing aspects of the nuclear propulsion plant for the new attack submarine (SEAWOLF). Work is directed toward design, development, and test of pumps, instrumentation and control equipment, valves, heat transfer equipment, and plant arrangements. A key objective is to meet stringent goals so the new attack submarine will have an acoustic advantage over Soviet submarines well into the next century. To accomplish the reduction requires applying new features throughout the plant and especially to large rotating equipment. Also, the propulsion plant will be increased to achieve the overall displacement and performance goals.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 Accomplishments:

a. (U) Continued to develop and qualify improved heat exchanger components, including steam generator and moisture separator.

b. (U) Continued to develop and qualify pumps and valves; continue

c. (U) Tested preliminary engineering models of plant indication, protection, monitoring and control equipment.

d. (u) Designed and qualified plant systems and arrangements. Work will include:

(1) (U) Continuing the detailed design of the reactor plant layout to confirm component designs.

(2) (U) esting to ensure goals are met.

(3) (U) Developing plant operating procedures.

(4) (U) Confirming design acceptability.

2. (u) FY 1990 Program:

a. (U) Evaluate reactor components such as pumps, valves, and heat transfer equipment to ensure design goals concerned with and improved performance are met.

PROGRAM ELEMENT: 0603570N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1914 PROJECT TITLE: S6W Nuclear Propulsion Plant

b. (U) Develop and test instrumentation and control systems and equipment, begin manufacture of preproduction test units, set system parameters, and begin plant analysis.

c. (U) Develop and qualify plant components, systems and arrangements.

3. (U) FY 1991 Plans:

a. (U) Design and qualify plant components, systems and arrangements:

(1) (U) Continue detailed reactor plant design to support equipment procurement schedules;

(2) (U) Develop configuration drawings;

(3) (U) Conduct tests to determine structural adequacy of components;

(4) (U) Develop reactor plant operating and acceptance test procedures;

(5) (U) Continue reactor plant fluid system designs;

(6) (C) Perform testing of component designs to ensure they meet ship goals.

b. (U) Continue to develop and test instrumentation and control equipment.

c. (U) Continue to evaluate reactor components such as pumps, valves, and heat transfer equipment to ensure design goals for and improved performance are met.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: Contractors: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA; General Electric Company, Knolls Atomic Power Laboratory and Machinery Apparatus Operation, Schenectady, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: None.

G. (U) RELATED ACTIVITIES: This project is related to PE 0602324N, Nuclear Propulsion Technology and PE 0205675N, Operational Reactor Development. There is no duplication of effort within the Navy or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS: This is a non acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603573N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: ELECTRIC DRIVE
PROJECT NUMBER: S1314 PROJECT TITLE: ELECTRIC PROPULSION SYSTEM

A. (U) RESOURCES (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1314	ELEC PROP SYS	16,877	31,204 (1)	43,799	CONT.	CONT.

NOTE: (1) Congress consolidated PE 0603513N and PE 0603508N into PE 0603573N in FY 1990.

B. (U) DESCRIPTION: In the FY 90 Authorization Act, Congress directed the Secretary of the Navy to establish the Integrated Electric Drive (IED) Program by merging the Ship Propulsion Program (PE 0603508N) and the Shipboard System Component Program (PE 0603513N) with the Electric Drive Program. IED technologies and plans include: Electric Drive Propulsion, Propulsion Derived Ship Service (PDSS) power, Intercooled Recuperated (ICR) Gas Turbine, Epicyclic Gear, Advanced Propulsor System, Electric Distribution System, Machinery Monitoring and Control System, Advanced Auxiliaries and Systems Integration. These advanced machinery systems are to be developed, demonstrated and evaluated in land based and ultimately at-sea tests as appropriate for incorporation in the design of the BFC to be initiated in FY98. Congress has also directed that IED must be at sea in a DDG-51 class ship by the year 2000. In order to achieve this more near-term goal, the Program Manager is developing an accelerated development and acquisition strategy targeted at earlier ships such as L(X), AOE(V) and Fast Sealift.

Electric Drive Propulsion provides the ability to design, re-arrange, interconnect, and operate without the constraints of a mechanical shaftline and leads to fuel efficiency and survivability benefits, as well as new and better system arrangements. Furthermore, the entire installed propulsion power of the ship can be momentarily re-directed to supply pulse power to future electrically powered weapons with a minor effect on ship speed. Alternating-Current electric drive includes those system components that provide electrical power transmission between the propulsion prime movers and the propeller. Major components include liquid cooled alternating current synchronous motors and generators with motor speed regulated by a full range solid state frequency changer. Other vital components include high power switchgear, cooling systems, transmission lines, controls and an epicyclic reduction gear.

Propulsion-Derived Ship Service (PDSS) power generation is accomplished by driving a variable speed/high frequency generator from the propulsion turbine either directly or through a geared power take off. A solid state converter is used to convert the high, variable generator frequency into constant 60 hertz, 450 volt ship service power. PDSS can be used with current propulsion gas turbines (LM 2500), the Intercooled-Recuperated (ICR) Gas turbine, through electrical or mechanical drives. A 3000 KW variable speed constant frequency generator operating at 7000 to 10,000 rpm is the likely PDSS candidate. The proposed system will take advantage of commonality of components (generator solid state converter and controls) between the electric drive and mechanical drive systems.

PROGRAM ELEMENT: 0603573N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: ELECTRIC DRIVE
PROJECT NUMBER: S1314 PROJECT TITLE: ELECTRIC PROPULSION SYSTEM

Advanced Propulsors will be quieter and more efficient than existing propeller systems. Principal tasks include advanced propulsor designs, 1/4 scale demonstration of advanced propulsors, full scale operational test and evaluation of advanced propulsors, and propulsion machinery acoustical signature control.

The Integrated Power Distribution System will interface power sources (such as Propulsion Derived Ship Service (PDSS) or Electric Drive) with combat loads and ensure power quality and continuity to vital loads under all operating conditions. The advanced distribution system will interface power sources with combat systems requirements including pulsed loads such as high power weapons and sensors. Components to be developed will be determined by distribution system performance goals and future load requirements. This project will develop generic types of components to assure optimum system performance.

The Machinery Monitoring and Control System (MMC) system will integrate the sensing, transmission, interpretation, and display of HM&E parameters necessary for machinery control, condition monitoring, and damage control management. It also provides the interface for the machinery controls with the ship combat and control systems. Technologies and components to be considered in the MMC system include: fiber optic sensors, "smart" sensors, fiber optic data networks, distributed microprocessor control, standard man-machine interface consoles, high resolution, software based displays, knowledge based expert systems, failure predictive algorithms, and embedded training. The MMC system will be developed, demonstrated, and evaluated in land based and at-sea tests as appropriate for incorporation in the design of the BFC to be initiated in FY98.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Avarded contract for design and development of AC electric drive system NOV 88.
b. (U) Started component development (motor, generator and frequency changer).
c. (U) Completed the procurement request for the epicyclic gear; began preparations for 1/4 scale propulsor development and demonstration; began Integrated Electric Drive (IED) system integration.
d. (U) Completed acquisition plan for the Intercooled Recuperated (ICR) Gas Turbine; completed ICR heat exchanger flow and fouling testing; performed risk reduction analyses of ICR.

2. (U) FY 1990 PROGRAM:

a. (U) Complete Preliminary Design of AC Electric Drive system and initiate Detail Design.
b. (U) Issue RFP and avard ICR contract.
c. (U) Continue preparations for 1/4 scale propulsor development and demonstration.
d. (U) Continue ground fault locator, variable speed motor controller, and 100 KW variable speed constant frequency generator (VSCF) development.

PROGRAM ELEMENT: 0603573N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: ELECTRIC DRIVE
PROJECT NUMBER: S1314 PROJECT TITLE: ELECTRIC PROPULSION SYSTEM

e. (U) Initiate machinery monitoring control development; continue 60/400 HZ/DC electric power system continuity/quality developments.

3. (U) FY 1991 PLANS:

a. (U) Complete Detailed Design of AC Electric Drive System, conduct Critical Design Review and initiate component manufacture.
b. (U) Continue ICR engine development and demonstration; continue 1/4 scale propulsor development and demonstration.
c. (U) Continue machinery monitoring control and 60/400 HZ/DC power systems development.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORKED PERFORMED by. IN-HOUSE: NAVSEA, NAVSSES, DTRC, others as required. CONTRACTORS: General Electric, Fitchburg, MA, and others selected competitively.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: Accelerate program.
3. (U) COST CHANGES: The +$31997 will accelerate the program in development.

F. (U) PROGRAM DOCUMENTATION:
1. Electric Drive AP - 3/86
2. ICR Program Definition Document CNO LTR SER 03/7U386701 of 11Sep87.
3. Program Endorsement Memorandum for ICR engine dated 11 Apr 89.

G. (U) RELATED ACTIVITIES: PE 0602121N (Surface Ship Technology), PE 0603724N (Navy Energy Program), PE 0604710N (Navy Energy Program), DARPA Submarine Electric Drive Program.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

1. (U) Award ICR engine contract 2Q FY 90.

2. (U) Other milestones being developed and revised.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0164	COMBAT SYSTEM INTEGRATION	8,589	9,748	10,173	Cont.	Cont.

B. (U) DESCRIPTION: This project provides shore based testing of integrated combat direction, weapon, sensor and computing systems prior to their installation in operational fleet units. System computer programs are assembled and tested to assure proper configuration and interoperability prior to their utilization in an operational environment. This project also develops Overall Combat System Operability Test (OCSOT) which is the primary system test performed by ships at sea to verify proper system performance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Completed integration testing of ASW Module, Carrier Air Traffic Control Center, Directional Altitude Identification Radar and NATO Sea Sparrow in CV/CVN classes and Tomahawk, ASWCS, VLS, SGS/AC and LAMPS MK III upgrade in DD 963 class.

b. (U) Continued OCSOT development for applicable ship classes to reflect system upgrades.

2. (U) FY 1990 PROGRAM:

a. (U) Complete integration testing of AN/SYS-2, TAS and SLQ-32(V4) in CV/CVN classes and SGS/AC in CG16/26 classes.

b. (U) Continue OCSOT development.

3. (U) FY 1991 PLANS:

a. (U) Complete integration testing of AN/SYS-2 and AN/SPS-48E Radar in CV/CVN classes, New Threat Upgrade in CGN 36 class, C2P and Advanced Combat Direction Systems (Block 0) in CG 16/26 classes, and ASWCS Upgrade in DD 963 class.

b. (U) Continue OCSOT development.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: INTCOMBATSYSTESTFAC, San Diego, CA; NAVSWC, Dahlgren, VA; NAVSHIPWPNSENGSTA, Port Hueneme, CA; FLTCOMBATDIRSSACT, Dam Neck, VA and San Diego, CA. CONTRACTORS: UNISYS, St. Paul, MN; Advanced Technology, Reston, VA; Automation Industries, Vitro Lab, Silver Spring, MD; Integrated System Analysts, Inc., Arlington, VA.; Science Applications International Corp., San Diego, CA.

E. (U) RELATED ACTIVITIES: PE 025620N, ASW Combat System Integration; PE 063228N, CV ASW Module; PE 064361N, NATO Sea Sparrow; PE 064372, New Threat Upgrade; PE 064518N, CIC Conversion; PE 064602, Naval Gunnery Improvement.

F. (U) OTHER APPROPRIATED FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603588N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: SSBN Survivability
PROJECT NUMBER: S1871 PROJECT TITLE: SSBN Survivability

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1871	SSBN Survivability	8,710	11,598	15,649	CONT.	CONT.

B. (U) DESCRIPTION: The SSBN Security Program identifies countermeasures for maintaining or enhancing the current tactical superiority and stealth characteristics of the Fleet Ballistic Missile Submarine Force. The SSBN Survivability Program then bridges the gap between the SSBN Security Program and full scale development by validation of countermeasures and enhancing submarine survivability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued development of
   b. (U) Continued data analysis ran at-sea tests in both the Atlantic and Pacific. Commenced data analysis.
   c. (U) Redesigned and fabricated conducted sensitivity measurements. Successfully tested prototype using dummy electronics.
   d. (U) Continued and performed weathering tests
   e. (U)
   f. (U) Established project to detect and localize own ship
   g. (U) Initiated new project to provide appropriate countermeasur' Project renamed
   h. (U) Monitored DARPA's development of the Commenced Concept of Operations study.
2. (U) FY 1990 Program:
   a. (U) Initiate Acoustic/Non-acoustic Program,
   b. (U) Define
   c. (U) Complete ADM system and conduct sea testing.

PROGRAM ELEMENT: 0603588N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: SSBN Survivability
PROJECT NUMBER: S1871 PROJECT TITLE: SSBN Survivability

d. (U) Develop tactics and ADM system.
e. (U) Conduct performance test and evaluation.
f. (U) Perform data analysis of collected data.
g. (U) Continue development of
h. (U) Continue prototype development for
i. (U) Continue programming development for
j. (U) Continue monitoring development.

3. (U) FY 1991 Plans:
a. (U) Develop algorithms.
b. (U) Continue tactics and ADM development.
c. (U) Commence transition of
d. (U) Commence transition of formulas as a result of data analysis.
e. (U) Incorporate sensor outputs to computerized tactical guidance
f. (U) Continue development of
g. (U) Continue prototype development.
h. (U) Conduct acceptance testing.
i. (U) Continue development.
j. (U) Continue development.
k. (U) Conduct data analysis of FY90 sea test, and initiate specification development for transition to

4. (U) Program to Completion: This is a continuing program.

D. (U) WORKED PERFORMED BY: IN-HOUSE: NUSC, New London, CT; DTRC, Bethesda, MD; NOSC, San Diego, CA; NRL, Washington, DC. CONTRACTORS: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; Scientific-Atlanta, San Diego, CA; Draper Laboratory, Boston, MA; others to be determined.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: NONE
2. (U) Schedule changes: NONE
3. (U) Cost changes: The Department's reduction of $-1,225 in FY 1991 will delay the planned FY 1991 sea test of the Low Frequency Acoustic Intercept Receiver (LFAIR).

F. (U) PROGRAM DOCUMENTATION: NAPDD 0128-02 of 25 June 86

G. (U) RELATED ACTIVITIES: SSBN Security Program (PE 0101224N, Project R0092) investigates all potential submarine detection technologies and identified requirements for developing countermeasures to those technologies.

PROGRAM ELEMENT: 0603588N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: SSBN Survivability
PROJECT NUMBER: S1871 PROJECT TITLE: SSBN Survivability

The submarine Acoustic Warfare Project (PE 0101226N, Project S1265) develops only acoustic countermeasure launchers and devices which protect the submarine from active sonar detection and torpedo attack.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONES SCHEDULE:

1. (U) ADM development completed by Dec 89, operational by April 90.
2. (U) Conduct at-sea test by Dec 89.
3. (U) Transition technology to New Sonar Intercept System by end FY91.
4. (U) Perform ADM demonstration testing FY91.
5. (U) Conduct initial in 3rd quarter FY90.
6. (U) Conduct in 1st quarter FY91.
7. (U) Conduct sea test by 4th quarter FY91.
8. (U) Conduct test.
9. (U) Conduct full scale at-sea test by 3rd quarter FY92.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603601N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Mine Development (Advanced)

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1556	Advanced Sea Mine	9,960	0	0	0	30,600
S2024	Improved CAPTOR	0	2,781	3,747	CONT.	CONT.
S1917	Remote Control of Mines (RECO)	1,459	1,114	1,295	CONT.	CONT.
Total		11,419	3,895	5,039	CONT.	CONT.

B. (U) DESCRIPTION: This program provides for the development of new mines, mine systems, and major improvements to existing mine systems necessary to meet the Navy's requirement into the 21st century for mine warfare against evolving targets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603601N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Mine Development (Advanced)
PROJECT NUMBER: S2024 PROJECT TITLE: CAPTOR Improvement

C. (U) DESCRIPTION: The Mine MK 60 Mod 2 ORDALT will maintain effectiveness of the weapon against the

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Not Applicable
2. (U) FY 1990 Program:
a. (U) Conduct in-water testing of sensor Arrays.
b. (U) Analyze data & refine design approach.
c. (U) Begin design, fabrication & procurement of ADM hardware for FY 91 testing.
3. (U) FY 1991 Plans:
a. (U) Complete subsystem testing.
b. (U) Develop system performance specification.
c. (U) Develop FSD contract data package.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NAVSWC, White Oak Laboratory, Silver Spring, MD, and Naval Mine Warfare Engineering Activity, Yorktown, VA. Contractor: ARL/University of Texas. Development Contractor to be selected competitively.

F. (U) RELATED ACTIVITIES: RECO (PE 0603601N, Proj. S1917).

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603601N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Mine Development (Advanced)
PROJECT NUMBER: S1917 PROJECT TITLE: Remote Control of Mines (RECO)

C. (U) DESCRIPTION: This project develops a system to control minefields from standoff ranges. The capability will increase the strategic and tactical flexibility of mine warfare. RECO will be provided for mines.

D. (U)PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) as

b. (U) Continued long-term in-water noise study.
c. (U) Developed coding/decoding algorithms for mines of interest.
d. (U) Continued propagation model development.
e. (U) Evaluated transmitter component concepts, such as deployment systems and safing/arming devices.
2. (U) FY 1990 Program:
a. (U) Complete long-term in-water noise study.
b. (U) Continue development of coding/decoding algorithms, propagation models, and transmitter components.
c. (U) Prepare RFP for transmitter development.
3. (U) FY 1991 Plans:
a. (U) Continue coding/decoding algorithm development.
b. (U) Complete source selection for transmitter development.
c. (U) Continue propagation model development.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NAVSWC, White Oak Laboratory, Silver Spring, MD; Naval Mine Warfare Engineering Activity, Yorktown, VA. Contractors: Applied Research Laboratory, Penn State University.

F. (U) RELATED ACTIVITIES: RECO involves coordination with Improved CAPTOR (PE 0603601N-S2024), and Mine Systems Development (PE 0604601N-S0272) to assure compatibility among mines requiring RECO capability.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 BIENNIAL RDT&E. NAVY DESCRIPTIVE SUMMARY

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0363	Insensitive Munitions Advanced Development	13,488	13,150	21,713	Cont.	Cont.
S1821	Conventional Fuze/Warhead Package	11,259	31,081	31,608	Cont.	Cont.
	TOTAL	24,747	44,231	53,321	Cont.	Cont.

B. (U) DESCRIPTION: Insensitive Munitions (IM) (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 program will provide, validate, and transition technology to enable production of munitions insensitive to unplanned stimuli with no reduction to combat performance and meet the CNO goal of transitioning to insensitive munitions by 1995.

(U) Conventional Fuze/Warhead Package (Project S1821): 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 to defeat existing and near-term low-altitude targets; improve SPARROW Missile through the Missile Homing Improvement Program to counter deceptive countermeasures; demonstrate advanced missile fuzing systems to defeat extremely low-altitude targets by combining Dual Mode RF/IR Fuze and advanced fuzing to defeat reduced observable targets. 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.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S0363 Project Title: Insensitive Munitions Advanced Development

A. (U) RESOURCES: (Dollars in Thousands)

Title: Insensitive Munitions Advanced

Project Number	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0363	13,488	13,150	21,713	Cont.	Cont.

B. (U) DESCRIPTION: 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. It will enable production of munitions insensitive to these stimuli with no reduction in combat performance to meet the CNO goal of transitioning to an insensitive munitions arsenal by 1995. The 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 sub-tasks addressing specific munition and 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments

a. (U) Initiated large-scale testing of sympathetic detonation resistant explosive; and large-scale testing of advanced propellants and explosives.

b. (U) Demonstrated advanced initiation systems.

c. (U) Completed vulnerability tests on advanced propulsion concepts, demonstration of initial reactive case, composite and dual explosive warhead design concepts, and design of generic container.

d. (U) Continued validation and shortfall analysis of weapon POA&Ms.

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S0363 Project Title: Insensitive Munitions Advanced Dev.

2. (U) FY 1990 Program

a. (U) Continue validation and shortfall analysis of weapon POA&Ms.

b. (U) Develop high performance metal accelerating explosives for fragmentation, shaped charges, and submunitions.

c. (U) Perform large-scale hazard tests of advanced propellants and advanced case designs, and conduct full scale testing of IMAD warhead designs.

d. (U) Complete and document study of advanced case concepts and design method; and complete continuous explosive processing studies.

e. (U) Evaluate new/improved barrier and dunnage materials for packing, design, and fabricate generic containers.

3. (U) FY 1991 Plans

a. (U) Continue large scale advanced propellants vulnerability tests and full scale testing of ordnance items.

b. (U) Begin development of insensitive high-energy cruise missile booster propellant and rocket motor.

c. (U) Initiate development of high bubble energy undervater explosive for torpedo application.

d. (U) Select explosive candidate for Advanced Bomb Family (ABF).

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In House: NSWC, Dahlgren, VA; NWC, China Lake, CA; DTNSRDC, Annapolis, MD; NOS, Indian Head, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

NAPDD Mar 86

G. (U) RELATED ACTIVITIES: PE 0601153N (Defense Research Sciences (energetic materials research)), PE 0602111N (AAW/ASUW Technology), PE 0602315N (Mine and Special Warfare), PE 0603262N (Aircraft Ordnance and Safety), PE 0604602N (Naval Gunnery Improvements) and PE 0603514N (Shipboard Damage Control Program).

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NATO AC/310 Subgroup I-Group on the Safety and Suitability of Munitions for Use (explosives).

Program Element: 0603609N Budget Activity 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S0363 Project Title: Insensitive Munitions Advanced Dev.

J. (U) MILESTONE SCHEDULE

	EVENT	COMPLETE
1.	Reactive case warhead	FY 1990 (4th Qtr)
2.	Explosive Selection for ABF	FY 1991 (2nd Qtr)
3.	High performance explosive for shaped charge warheads	FY 1991 (4th Qtr)
4.	Container/barrier designs	FY 1991 (4th Qtr)
5.	Sympathetic detonation resistant explosive for large missile warheads and GP bombs	FY 1992 (1st Qtr)
6.	Composite and armored warheads	FY 1992 (2nd Qtr)
7	Insensitive rocket motor concept	FY 1992 (4th Qtr)
8.	New fuzing/detonator concept boosters for missile warheads	FY 1992 (4th Qtr) FY 1992 (4th Qtr)
9.	Continuous processing/ injection loading techniques	FY 1992 (4th Qtr)
10.	High output insensitive boosters for missile warheads	FY 1993 (2nd Qtr)
11.	Insensitive low sig. propellant	FY 1993 (4th Qtr)
12.	Insensitive motor case design	FY 1993 (4th Qtr)
13.	Insensitive booster propellants	FY 1994 (4th Qtr)
14.	Insensitive underwater explosive	FY 1996 (4th Qtr)

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S1821 Project Title: Conventional Fuze/Warhead Package

A. (U) RESOURCES: (Dollars in Thousands)

Popular Name	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
CONVENTIONAL FUZE/WARHEAD PACKAGE	11,259	31,081	31,608	Cont.	Cont.

B. (U) DESCRIPTION: The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. Current requirements include the ability to defeat anti-ship missiles attacking at extremely low altitudes. This project improves SPARROW missile by combining Dual Mode RF/IR Fuze and low observable fuze to defeat existing and near-term low-altitude targets. 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments.

a. (U) SPARROW LOW ALTITUDE FUZE PIP SUBPROJECT: Completed development and delivery of first development test (DT) missiles in October 1988. Completed DT and OT.

b. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Completed preparations to competitively award brassboard development contract.

c. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECT: Initiated fabrication of ten advanced development models.

d. (U)

2. (U) FY 1990 Program:

a. (U)

b. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Fabricate three brassboards and conduct tests and analysis of performance.

c. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECTS: Complete fabrication and evaluate ten advanced development test units.

d. (U)

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S1821 Project Title: Conventional Fuze/Warhead Package

3. (U) FY 1991 Plans:

a. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Fabricate six second generation brassboards and conduct tests and analysis of performance.

b. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECT: Fabricate sixty advanced development test units.

c. (U) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM SUBPROJECT: Complete design and

d. (U) LETHALITY ENHANCEMENT BY DETONATION OF UNEXPENDED FUEL SUBPROJECT: Assign lead activity and initiate design process.

4. (U) Program to Completion:

a. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Complete advanced development and evaluation and transition to FSED.

b. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECT: Evaluate test units and transition to FSED.

c. (U) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM SUBPROJECT:

d. (U) LETHALITY ENHANCEMENT BY DETONATION OF UNEXPENDED FUEL SUB-PROJECT: Design, fabricate and evaluate advanced development models for availability for transition to FSED.

e. (U) NEW INITIATIVES TO MEET EMERGING REQUIREMENTS: Initiate, develop and evaluate specific advanced development projects as required to enhance lethality and safety of air and surface target ordnance.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Naval Surface Warfare Center, Dahlgren, VA; Pacific Missile Test Center, Pt. Mugu, CA. CONTRACTORS: Raytheon, Lowell, MA; Motorola, Scottsdale, AZ; General Dynamics, Pomona, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

DNSARC III	Nov 1982
PMP	Nov 1986.

G. (U) RELATED ACTIVITIES: SPARROW missile mods, RIM 7M WPN (P.E. 0204229N).

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S1821 Project Title: Conventional Fuze/Warhead Package

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) PROCUREMENT	44,300	44,100	44,000	Cont.
WPN SPARROW MODS				
PE 24229N (42EA)				
LI 230400 BA-2 #8				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

EVENT	DATE
Sparrow Lov Altitude PIP Milestone IIIA	
Sparrow Lov Altitude PIP Milestone IIIB	
Sparrow Lov Altitude IOC	
Sparrow Missile Homing Improvement Program IOC	

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603610N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Advanced Warhead Development
PROJECT NUMBER: S1873 PROJECT TITLE: Advanced Warhead Development

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1873	Advanced Warhead Development	(500)*	4,593	5,163	CONT.	CONT.

* From PE 0604610N/S1099 (MK 50 Torpedo)

B. (U) DESCRIPTION: Program improves the MK 50 Torpedo to ensure that it retains an advantage over the evolving Soviet submarine threat. Program includes propulsion (Advanced Stored Chemical Energy Propulsion System (ADSCEPS)), and guidance and control (G&C) (Very High Speed Integrated Circuitry (VHSIC)) improvements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Conducted design tradeoff study.
2. (U) FY 1990 Program:
   a. (U) Begin hardware development.
   b. (U) Begin G&C and propulsion design.
   c. (U) Continue analysis of warhead-target coupling and lethality.
3. (U) FY 1991 Plans: Continue FY 1990 effort.
4. (U) Program to Completion:
   a. (U) Complete development; begin production.
   b. (U) Complete development and begin production of G&C, and propulsion system improvements.
   c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NSWC, White Oak, Silver Spring, MD. Contractors: None.

E. (U) RELATED ACTIVITIES: PE 0604610N (MK 50 Torpedo): FSD for MK 50 Torpedo; PE 0602633N (Technology Development): New underwater warhead concepts; PE 0603792N, ATD: G&C, warhead and propulsion technologies.

F. (U) OTHER APPROPRIATION FUNDS: Not applicable.
(U) PROCUREMENT: Not applicable.
(U) MILCON: Not applicable.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0020	Advanced Assault Amphibious	0	2,616	26,348	Continue	Continue
C1293	Stratified Charge Rotary Engine	7,333	13,068	16,243	Continue	Continue
PROGRAM ELEMENT TOTAL		7,333	15,684	42,591	**Continue**	**Continue**

B. (U) DESCRIPTION: The Advanced Assault Amphibious (AAA) Program will design, develop, produce, and field a successor to the Marine Corps' current amphibian, the AAV7A1. The AAA will provide the Marine Corps with over-the-horizon forcible-entry amphibious capability as well as the requisite survivability, firepower, and mobility to support operations ashore for 1999 (IOC) and beyond. The Stratified Charge Rotary Engine (SCRE) is a Congressionally mandated development project for a lightweight/low volume, high horsepower engine for combat vehicles and other DoD applications. The SCRE is a candidate engine for the AAA program.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)
PROJECT NUMBER: C0020 PROJECT TITLE: Advanced Amphibious Assault

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POPULAR NAME: ADVANCED ASSAULT AMPHIBIOUS VEHICLE (AAAV)

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES			MS-1 Apr FY91	MS-II 1st Qtr FY95 MS-III 2nd Qtr FY99
ENGINEERING MILESTONES			Conceptual Mockups	PDR 2nd Qtr FY95 CDR 2nd Qtr FY96
T&E MILESTONES				DT/OT I 1st-4th Qtr FY94 DT/OT II 1st Qtr FY97 4th Qtr FY98
CONTRACT MILESTONES		Concept Exploration Award 1st Qtr FY90	Demo/ Validation Award 3rd Qtr FY91	FSD Contract Award 2nd Qtr FY95 Production Award 2nd Qtr FY99

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT		1,500	23,848	Continuing
SUPPORT CONTRACT		440	600	Continuing
IN-HOUSE SUPPORT		676	1,900	Continuing
GFE/ OTHER		0	0	Continuing
TOTAL		2,616	26,348	Continuing

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)
PROJECT NUMBER: C0020 PROJECT TITLE: Advanced Amphibious Assault (AAA)

B. (U) DESCRIPTION: Qualitative and quantitative improvements in Soviet equipment and forces used in support of their Anti-Amphibious Landing Doctrine have evidenced severe deficiencies in the Marine Corps' current assault amphibian, the AAV7A1. Significant improvement in the areas of offensive fire power, armor protection, water and land speed, cross country mobility, and overall crew and system survivability will be the main objectives during this design and development program for a replacement of the AAV7A1. The AAA will eliminate multiple mission deficiencies in the ship-to-shore movement phase of the amphibious assault and during subsequent combat operations ashore.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Completed Mission Area Analysis. Submitted Mission Needs Statement to DoD. Submitted Cooperative Opportunities Document to DoD. Submitted Program Managers Life Cycle Cost Estimate to DoD. Received favorable Deputy Secretary of Defense Program Decision Memorandum. Received favorable USD(A) Acquisition Decision Memorandum. DIA validated threat update.

1. (U) FY 1989 ACCOMPLISHMENTS: N/A.

2. (U) FY 1990 PROGRAM: The Concept Exploration/Definition (CE/D) phase will begin with the Competitive Award of up to four conceptual study/design contracts that will conduct requirements and trade-off analyses, and develop characteristics as performance, supportability, cost, schedule and risk. Principle CE/D products will consist of conceptual design studies.

3. (U) FY 1991 PLANS: Following the successful transit of MS-I Concept Demonstration/Validation (CD/V) phase, contracts will be awarded to no less than two contractors. Award of the CD/V contract will initiate the design and fabrication of two prototype systems per contractor based on their respective conceptual designs. The design of additional mission role variants if required will also be initiated at this time.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSSC (NAVSEA-PMS310), Crystal City, VA. CONTRACTORS: TBD.

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)
PROJECT NUMBER: C0020 PROJECT TITLE: Advanced Amphibious Assault (AAA)

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: N/A.

2. (U) SCHEDULE CHANGES: Milestone I from 2nd to 3rd quarter FY91.

3. (U) COST CHANGES: N/A.

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) MAA	December 1987
b. (U) COD	April 1988
c. (U) MNS	April 1988
d. (U) LCCE	May 1988
e. (U) PDM	July 1988
f. (U) ADM	August 1988

G. (U) RELATED ACTIVITIES: Project C1293 (Stratified Charge Rotary Engine - SCRE) under this program element is related. The SCRE is a Congressionally mandated development project for a lightweight/low volume, high horsepower engine for combat vehicles and other DoD applications. The SCRE is a candidate engine for the AAA system. Joint Program Decision (JPD) to be determined at MS-I.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)
PROJECT NUMBER: C1293 PROJECT TITLE: Stratified Charge Rotary Engine (SCRE)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1293	SCRE	7,333	13,068	16,243	Continue	Continue

B. (U) DESCRIPTION: To operate and survive in future threat environments, amphibious and combat vehicle must feature greater mobility, requiring higher output engines. Because of its inherently high power-to-weight/volume ratios, the SCRE offers significant increases in power without significant weight and volume penalties. It will also have fewer parts and utilize a wider range of fuels for potential reduction in the logistics burden and life cycle costs, and will have other potential applications, e.g., generator sets. Recognizing these capabilities, the Congress has mandated the development of the rotary engine as a national asset.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The current Demonstration and Validation (D&V) effort encompasses the design, fabrication, test, and delivery of nine two-rotor engines and is being expanded to incorporate the family-of-engines (FOE) concept in both three-rotor and two-rotor designs featuring over 90 percent common parts. D&V laboratory and vehicular testing will demonstrate the SCRE performance, reliability, and durability. The follow-on, Full Scale Development (FSD) phase will feature further refinement of the FOE design, extensive development and applications testing, and delivery of a Level III Production Data Package (PDP).

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)
PROJECT NUMBER: C1293 PROJECT TITLE: Stratified Charge Rotary Engine (SCRE)

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Completed contractor D&V test program, including 800 hours of NATO cycle endurance testing, 1200 hours of mission profile reliability testing, and specified performance/environmental tests.

b. (U) Delivered rebuilt engines and required contract data to the Government.

c. (U) Awarded contract for $24.1 Million/26 months to expand D&V for the development of the FOE.

d. (U) Modified original D&V contract to incorporate contractor cost sharing, totalling $4.8 Million.

2. (U) FY 1990 PROGRAM:

a. (U) Conduct Government operational testing of current two-rotor SCRE in prototype amphibious vehicles.

b. (U) Design/procure/fabricate both two-rotor and three-rotor engines reflecting the FOE concept.

3. (U) FY 1991 PLANS: Complete contract testing of both two-rotor and three-rotor engines. Deliver rebuilt engines and required contract data to the Government.

4. (U) PROGRAM TO COMPLETION: This is a continuing program, with FSD contract award in first quarter of FY 1992.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSSC (NAVSEA, PMS310), Washington, DC. CONTRACTORS: John Deere Technologies International, Inc., Wood-Ridge, NJ.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET: No change in funding between the Revised FY 1990/1991 President's Budget and the current request.

G. (U) RELATED ACTIVITIES: Project C0020 (AAA) in this program element: The AAA will succeed the AAV7A1 amphibian and provide an over-the-horizon, forcible-entry amphibious capability, plus the survivability, firepower, and mobility to support operations ashore. Joint Program Decision (JPD) to be determined at Milestone II.

PROGRAM ELEMENT: 0603611M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Advanced)
PROJECT NUMBER: C1293 PROJECT TITLE: Stratified Charge Rotary Engine (SCRE)

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Milestone I	FY 1982
b. (U) Milestone II	FY 1992
c. (U) Milestone III	N/A
d. (U) Initial Operational Capability	Dependent upon application vehicle

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0077	Mine Warfare (Advanced)[a]	(351)	1,846	1,155	Continue	Continue
C1968	Mine Detection System (Advanced)[b]	(5)	4,198	0	Continue	Continue
C2029	Directed Energy Countermeasures[c]	(2,160)	3,290	4,633	Continue	Continue
	TOTAL	0	9,334	5,788	Continue	Continue

a Transferred from Program Element 0603729M, Marine Corps Combat Service Support (Advanced).

b Funded in Program Element 0603729M in FY 1989.

c Funded in Program Element 0603729M in FY 1989.

B. (U) DESCRIPTION: This Program Element demonstrates, through prototyping, a wide variety of present and emerging technologies which contribute to USMC Mine/Countermine/Directed Energy system capabilities. Largely focused on countermine efforts, this program element will specifically demonstrate technologies and systems which will detect and neutralize mines/minefields in the surf zone and ashore. The dynamic nature and complexity of the countermine problem, and its relative urgency, necessitates evaluating multiple technologies, each potentially contributing to overall countermine effectiveness. The presence of mines is a major hazard to amphibious operations at the surf zone (very shallow water), across the beach, and inland. This program brings a new approach to the problem of detection/neutralization of mines by using laser technology and distributed explosive technology. Additionally, the program attempts to solve problems associated with laser eye protection, laser detection, optical countermeasures, and directed energy countermeasures.

PROGRAM ELEMENT: 0603612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT Title: Marine Corps Mine/Countermeasures Systems (Advanced)
PROJECT NUMBER: C0077 PROJECT TITLE: Mine Warfare (Advanced)

C. (U) DESCRIPTION: This project funds the Marine Corps Advanced Development efforts on the capability to breach, proof, and mark minefields during countermine warfare operations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Proved feasibility of Advanced Assault Vehicle (AAV) mine plow; Completed testing of Portable Mine Neutralization System (POMINS). Demonstrate technology through prototyping for a Distributed Explosive Mine Neutralization System (DEMNS). Demonstrate technology for improved safety and low temperature performance of fuel air explosive (FAE). Conduct demonstration and validation for a minefield marking system for an amphibious assault landing against mined beaches.

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under 0603729M) Transitioned AAV Mine Plow to engineering development, to C1969. Initiated development on DEMNS. Terminated POMINS for failure to pass DT/OT I tests.

2. (U) FY 1990 PROGRAM: Initiate Preliminary Design of Advanced Technology Demonstration Prototype of DEMNS. Select most promising Distributed Explosive Technology. Transition enhanced FAE Technology.

3. (U) FY 1991 PLANS: Initiate advanced development of Enhanced (Safer) FAE. Initiate advanced development of Surf Zone Marker. Transition DEMNS to Advanced Technology Demonstration (ATD) Program Element No. 0603640M

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA.; NCSC, Panama City, FL; NWC China Lane, CA; BRDEC, Ft Belvoir, VA; NOSC, Indian Head, MD. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Advanced)
PROJECT NUMBER: C1968 PROJECT TITLE: Mine Detection System (Advanced)

C. (U) DESCRIPTION: This project develops USMC unique ground and air platform mine detection systems. The Airborne Mine Detection and Survey (AMDAS) system detects land and shallow water mines as small as six inches in diameter in turbid water and on land. The forward detection land-based system will detect mine fields on the move and at long stand-off ranges.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded in Program Element 0603729M) Completed non-developmental item, individual mine detection program testing.

2. (U) FY 1990 PROGRAM: Transition AMDAS program from Exploratory Development (6.2). Initiate preliminary designs of Blue/Green Laser Sub-System, associated optics, and imaging sub-systems. Conduct trade-offs and design analysis to prepare System Concept Paper (SCP). Conduct preliminary design review for the laser sub-system and AMDAS system concept.

3. (U) FY 1991 PLANS: Transition AMDAS to Advanced Technology Development (ATD), Program Element Number 0603640M.

4. (U) PROGRAM TO COMPLETION: Transition ADMAS to demonstration/Validation phase in FY 1993 and Program Manager responsibility. AMDAS system will undergo DT I/OT I in FY 1994. Milestone I will be conducted in FY 1993 with initial operational capability planned for FY 2001.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCSC, Panama City, FL. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: US Army Program Elements 0603104A, Fuels/ Lubricant Development; 0603210A, Aircraft Power/Propulsion; 0604204A, Air Mobility Support Equipment; 0603602A and 0603606A, Land Mine Warfare; and 0603621A Vehicle Componentry.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROJECT ELEMENT: 0603612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Advanced)
PROJECT NUMBER: C2029 PROJECT TITLE: Directed Energy Countermeasures

C. (U) DESCRIPTION: This project develops and demonstrates the technologies needed to meet Marine Corps unique responsibilities, and subsequent operations ashore, in a Directed Energy Warfare (DEW) environment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Provide Basic Laser Eye Protection (BLEP). Develop improved filters for Advanced Protection. Test items for directed energy susceptibility. Develop and transition laser countermeasures capabilities.

1. (U) FY 1989 ACCOMPLISHMENTS: Demonstrated laser simulator and counter-sensors devices. Developed multi-wavelength protection. Tested items for susceptibilities to laser energy. (Funding contained in PE 0603729M).

2. (U) FY 1990 PROGRAM: Develop and demonstrate advanced technologies in laser protection, detection, countermeasures and multi-wavelength laser eye protection. Transition laser simulator technology.

3. (U) FY 1991 PLANS: Continue development of advanced technologies in laser protection, detection, countermeasures and multi-wavelength laser protection for image intensifiers. Explore laser hardening techniques for selected USMC equipment. Transition laser countermeasure device to Advanced Technology Demonstration (ATD) Program Element 0603640M.

4. (U) PROGRAM TO COMPLETION: Directed energy hardening of USMC systems. Demonstrate vehicle laser detection system. This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: LANL, Los Alamos, NM; NWC, China Lake, CA; MICOM, Huntsville, AL; NADC, Warminster, PA; PMTC, Pt Mugu, CA; NRDEC, Natick, MA; DARPA, Arlington, VA. CONTRACTORS: Allied Corporation, Westlake Village, CA; Optical Shields, Menlo Park, CA; Barnes, Shelton, CT; Foster-Miller Inc, Waltham, MA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
33	Directed Energy Countermeasures Laser Filters	0	259	356	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603634N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Nuclear Development
PROJECT NUMBER: S0342 PROJECT TITLE: Tactical Nuclear Development

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0342	Tactical Nuclear Development	10,068	14,623	14,485	CONT.	CONT.

B. (U) DESCRIPTION: This project strengthens deterrence, enhances Navy warfighting capabilities, and provides a hedge against Soviet technological surprise through essential modernization of aging Navy and Marine Corps theater nuclear weapons in joint non-strategic programs with the Department of Energy. It assesses weapons effectiveness and enhances Navy force survivability, especially against the potential cheap kill effect of nuclear electromagnetic pulse (EMP). Projects involve nuclear weapons conception and feasibility determination, developmental interface engineering of weapons, nuclear hardness testing of military equipment, application of nuclear effects survivability technology, and technical aspects of nuclear employment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Provided interface engineering services to accommodate major revisions in the DOE design of the W82 projectile.

b. (U) Development flight testing and interface engineering is being performed for the new design features of the B61 Stockpile Improvement Series of the bombs.

c. (U) Submarine lethality studies and revised safe stand-off calculations were performed for alternate yield variants of submarine launched nuclear SEA LANCE.

d. (U) Studies were conducted of the military utility of surface ship launched nuclear SEA LANCE.

e. (U) Joint engineering development (DOE/Navy) activities regarding technical definition of interfaces and testing is being conducted on the B90 Nuclear Depth Strike Bomb (NDSB).

f. (U) Ship vulnerability assessments and test planning are being performed to assure that a protocol is established for comprehensive, valid measurement of surface ship survivability in EMP environments.

g. (U) A combination of circuit redundancy, radiation event circumvention, and component hardening techniques were evaluated. Tests were performed to identify failure modes of fire control computers and microprocessors to determine the best combination of techniques for hardening.

PROGRAM ELEMENT: 0603634N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Nuclear Development
PROJECT NUMBER: S0342 PROJECT TITLE: Tactical Nuclear Development

h. (U) Specifications and standards for EMP hardened equipment are being refined as data becomes available from EMP tests. Refinement of design practices for various types of equipment is the goal of this effort.

i. (U) Models of surface ships' gas turbine engine ducting were constructed and tested in a DNA sponsored conventional simulation of a nuclear detonation to ensure that structural and blast design practices are valid in these specific sensitive areas.

2. (U) FY 1990 Program:
   a. (U) Continue USMC W82 engineering development.
   b. (U) Continue B61 Improvement engineering.
   c. (U) Continue B90 engineering development.
   d. (U) Continue ship EMP vulnerability asessments and test planning.
   e. (U) Continue specifications and standards development for EMP hardened equipment for DD-963.
   f. (U) Continue BLAST/THERMAL vulnerability test of DDG-51 radar and radio antennas.
   g. (U) Test EMP hardened prototype area surveillance radar.
   h. (U) Initiate radiation vulnerability assessments, test planning and testing of selected DDG-51 equipment.
   i. (U) Initiate Air Standoff Advance Technology effort.
3. (U) FY 1991 Plans:
   a. (U) Certify USMC W82 for fleet introduction.
   b. (U) Continue B61 Improvement engineering.
   c. (U) Continue B90 engineering development.
   d. (U) Continue specifications and standards development for EMP hardened equipment.
   e. (U) Continue BLAST/THERMAL and radiation exposure testing.
   f. (U) Continue EMP assessments on shipboard equipment.
   g. (U) Continue Air Standoff Weapon Advance Technology effort.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, NUSC, NWC, NOSC, NWEF, DNA. CONTRACTORS: None.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: Not Applicable.
2. (U) Schedule changes: Not Applicable.
3. (U) Cost changes: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: TACNUC NAPDD #221-TAC98 of 08/11/89.

G. (U) RELATED ACTIVITIES: PE 0604603N, Project W1844, Bomb Dummy Unit and A/C Interface; PE 0603514N, Project S1607, EMPRESS II, and Project S0384, Ship Survivability (Advanced). The Tactical Nuclear Development Program has no funds for EMPRESS II which is budgeted separatelv under PE 0603514N, Project S1607.

PROGRAM ELEMENT: 0603634N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Tactical Nuclear Development
PROJECT NUMBER: S0342 PROJECT TITLE: Tactical Nuclear Development

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (CFRD) MILESTONE SCHEDULE:

	Major Milestones	Date
1.	(U) B61-6 IOC	03/91
2.	(U) Complete Air Standoff Advance Tech Study	09/91
3.	(U) Est. Complete USMC W82 engineering devel.	03/92
4.	(U) Est. USMC W82 IOC	
5.	(U) B61-8 IOC	
6.	(U) Complete B90 development	08/93
7.	(U) B90 IOC	

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1598	NBC Equipment	1,350	2,430	3,086	Continue	Continue
C1963	HVM*	0	*	*	Continue	Continue
C1964	Anti-Armor (Fire and Forget)	6,898	3,956	8,067	Continue	Continue
C1981	GATERS**	2,347	0	0	0	3,500
	TOTAL	**10,595**	**6,386**	**11,153**	**Continue**	**Continue**

* This project was consolidated into C1964, Anti-Armor (Fire and Forget) in FY 1990 and beyond.

** Airborne Remotely Operated Device portion of this program was transferred to the RPV program office in FY 1989.

B. (U) DESCRIPTION: This program element supports advanced development of Marine Corps Ground Combat/Supporting Arms Systems for utilization in Marine Air Ground Expeditionary Force amphibious operations.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
PROJECT NUMBER: C1598 PROJECT TITLE: Nuclear/Biological/Chemical Equipment (NBC)

C. (U) DESCRIPTION: This project develops NBC equipment jointly. Marine Corps efforts concentrate on unique aspects of amphibious operations as they relate to amphibious characteristics involving detection, decontamination, and individual/collective protection.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Continue to strengthen NBC Defensive posture through development and acquisition of equipment.

1. (U) FY 1989 ACCOMPLISHMENTS: Completed evaluations of Portable Collective Protective System (PCPS). Continued development of PCPS and M43A1 PIPs, Remote Sensing Chemical Agent Alarm (RSCAAL), Multipurpose CB Overboot (MULO), Individual Chemical Agent Detector (ICAD), NBC Recon System (NBCRS), CAM and LIGHTFIGHTER SUIT (LFS).

2. (U) FY 1990 PROGRAM: Continue development of PCPS and M40/M42 Mask/ PIP, RSCAAL, MULO, ICAD, CAM, NBCRS and LFS. Start development on Transportable Emergency Response Medical Mobile (TERMM).

3. (U) FY 1991 PLANS: Continue development of PCPS and M40/M42 Mask/ PIPs, RSCAAL, MULO, ICAD, CAM, NBCRS, LFS, and TERMM. Start development on Pocket Radiac, Chem Bio Detector, Non-Aqueous Equipment Decon System (NAEDS) and AABC M-11 Stretch.

4. (U) PROGRAMS TO COMPLETION: Continue joint service/unique Marine Corps programs.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC/SSCNBC, Washington, DC; MCRDAC/AWT, Quantico, VA; US Army NRDEC, Natick, MA; US Army CRDEC, Aberdeen, MD. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: Monitor other services NBC development.

G. (U) OTHER APPROPRIATION FUNDS: (Procurement) (Dollars in Thousands)

BUD LINE ITEM	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
111	LDS	4,000	0	3,600	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
PROJECT NUMBER: C1964 PROJECT TITLE: Joint Anti-Armor Weapons Systems (JAAWS)

C. (U) DESCRIPTION: This project provides for Marine Corps participation in Joint Anti-Armor programs. These programs include Advanced Anti-Tank Weapons System - Medium (AAWS-M) and related efforts in the joint Defense Advance Research Projects Agency (DARPA)/Army/Marine Corps Armor/Anti-Armor program. Funds support unique Marine Corps developmental requirements and the necessary travel to support the program.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The Texas Instruments/Martin Marietta system (fire and forget) was selected in February 1989 as AAWS-M prime contractor. A 36-month, Full Scale Development (FSD) contract was awarded June 1989.

1. (U) FY 1989 ACCOMPLISHMENTS: Continued participation in the joint development of AAWS-M and the joint DARPA/USA/USMC Armor/Anti-Armor efforts.

2. (U) FY 1990 PROGRAM: Continue to monitor and participate in joint programs. The joint program continues to develop advanced technology by funding over 100 contracts in the joint DARPA/USA/USMC Anti-Armor program.

3. (U) FY 1991 PLANS: Continue to monitor and participate in joint programs. Continue to provide Marine Corps share of the joint DARPA/USA/USMC Armor/Anti-Armor program.

4. (U) PROGRAM TO COMPLETION: Participate in the DARPA/USA/USMC Joint Armor/Anti-Armor Program. Complete outstanding contract efforts to demonstrate technology feasibility. Transition successful advanced technologies demonstration to advanced and engineering development. Transition AAWS-M to production.

E. (U) WORK PERFORMED BY: IN-HOUSE: US Army MICOM, Redstone Arsenal, AL; Los Alamos National Laboratory, NM; NSWC, Dahlgren, VA. CONTRACTORS: AAWS-M-Texas Instruments and Martin Marietta Team.

F. (U) RELATED ACTIVITIES: Army Armor/Anti-Armor programs for heavy and light systems.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C2078	Mine Neutralization	(0)	(1,846)a	2,455	Continue	Continue
C2079	Standoff Mine Detection	(0)	(4,198)b	10,178	Continue	Continue
C2080	Weaponry	(0)	0	1,022	Continue	Continue
C2081	Battlefield Electronic Support	(0)	(250)c	577	Continue	Continue
C2082	Chemical/Biological Defense	(1,350)	(2,430)d	1,022	Continue	Continue
	TOTAL	(1,350)	(8,724)	15,254	Continue	Continue

a Funded in Program Element 0603612M, Marine Corps Mine/Countermeasures Systems (Advanced), Project C0077, Mine Warfare (Advanced)
b Funded in Program Element 0603612M, Marine Corps Mine/Countermeasures Systems (Advanced), Project C1968, Mine Detection System (Advanced)
c Funded in Program Element 0603612M, Marine Corps Mine/Countermeasures Systems (Advanced), Project C2029, Joint Directed Energy
d Funded in Program Element 0603635M, Marine Corps Ground Combat/Supporting Arms Systems (Advanced), Project C1598, Nuclear, Biological/Chemical (NBC) Equipment

B. (U) DESCRIPTION: Critical Marine Corps Deficiencies being addressed in this program element are stand-off mine detection for application in very shallow water, surf zone and ashore; mine neutralization; chemical/biological defense capabilities for Marine personnel and material; advanced infantry and vehicle mounted weapon systems; and application of computer technology to battlefield electronic support systems.

UNCLASSIFIED

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2078 PROJECT TITLE: Mine Neutralization

C. (U) DESCRIPTION: This project will develop and demonstrate explosive technologies and concepts for neutralizing advanced and hardened threat mines. The Distributed Explosive Mine Neutralization System (DEMNS) concept emerged out of the need for a system that will provide uniform coverage of the target area.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Funded under Program Element 063612M. Completed Non-Acquisition Program Definition Document (NAPDD) for DEMNS. Demonstrated candidate explosive technology in support of DEMNS. Advanced Technology Program.

2. (U) FY 1990 PROGRAM: Funded under Program Element 063612M. Initiate DEMNS ATD. Initiate preliminary design of ATD prototype of DEMNS. Select most promising Distributed Explosive Technology. Conduct deployment and neutralization Sub-system Preliminary Design Review.

3. (U) FY 1991 PLANS: Complete detail DT/OT Test Plan. Complete Systems Concept Paper. Complete Draft Test and Evaluation Master Plan (TEMP). Complete Draft Life Cycle Cost Estimate (LCCE).

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCSC, Panama City, FL; NWC, China Lake, CA; NOS, Indian Head, MD. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: US Army efforts on Advanced Mine Neutralization.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2079 PROJECT TITLE: Standoff Mine Detection

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C2079	Standoff Mine Detection	(0)	(4,198)	10,178	TBD	Continue

(U) Funded in Program Element 0603612M, Marine Corps Mine/Countermeasures Systems (Advanced) in FY 1990.

B. (U) DESCRIPTION: This project will develop and demonstrate technology for ground and air platform mine/minefield detection systems to meet USMC-unique requirements. Mining operations can be rapidly conducted by threat forces using a variety of platforms anywhere within the Amphibious Objective Area (AOA), seriously endangering the successful execution of an Amphibious Assault. The USMC does not currently possess a capability to rapidly detect mines, minefields, or obstacles in the surf zone and beach areas of the AOA. The Airborne Mine Detector and Survey (AMDAS) system will provide the Amphibious Task Force Commander (CATF) and Landing Force Commander (CLF) with the capability to collect high-resolution imagery of the AOA and detect mines as small as six inches in diameter that are located in either shallow water, in the surf zone, or on land. Technology demonstrations to support development of both air and ground system will be conducted.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Technical feasibility to meet imaging resolution and laser power level requirements were demonstrated in the laboratory in FY 1988. An Airborne Imaging Test Bed (AITB) capable of collecting high-resolution underwater imagery was successfully tested in FY 1989. Underwater single laser pulse imaging was accomplished and a large amount of imagery and collateral data was collected, demonstrating the viability of the AMDAS concept. Additionally, a Non Acquisition Program Definition Document (NAPDD) was completed. During FY 1990 an AMDAS ATD base station, airborne imaging and data handling subsystem will be designed. Procurement for the laser, scanning subsystem and Airborne Imagery Transmission (AIT) data link receiver will be initiated. The AMDAS program will result in the demonstration of a prototype AMDAS system in an operational-like environment. Further developmental plans are to downsize the system so that it can be carried by mid- or long-range Unmanned Aerial Vehicles (UAV). Future efforts will focus on technology to demonstrate a stand-off mine detection capability in support of ground operational forces.

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2079 PROJECT TITLE: Standoff Mine Detection

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded in Program Element 0603612M).

a. (U) Successfully tested Airborne Imaging Test Bed (AITB).

b. (U) Completed NAPDD for AMDAS.

c. (U) Demonstrated technical feasibility of AMDAS concept over open water, collecting a large amount of data using single laser pulse imaging.

2. (U) FY 1990 PROGRAM: (Funded in Program Element 0603612M).

a. (U) Complete AMDAS trade-off analysis.

b. (U) Complete design of AMDAS ATD base station, airborne imaging and data handling subsystems.

c. (U) Initiate procurement of the laser, scanning subsystem and Airborne Imagery Transmission (AIT) data link receiver for the AMDAS ATD demonstrator.

3. (U) FY 1991 PLANS:

a. (U) AMDAS program transitions to ATD, this program element.

b. (U) Begin fabrication of AMDAS ATD imager and complete the fabrication of the scanner.

c. (U) Produce Drafts of the Integrated Logistics Support Plan (ILS), System Concept Paper (SCP) and the System Development Plan (SDP).

4. (U) PROGRAM TO COMPLETION:

a. (U) Complete fabrication of the airborne imaging components and data handling subsystem.

b. (U) Integrate and test all AMDAS ATD components in the laboratory before application to the AMDAS ATD prototype system.

c. (U) Subject AMDAS ATD system to flight testing in an operational environment. Downsize AMDAS system so that it can be carried in a mid or long range UAV.

d. (U) Complete program documentation.

e. (U) Transition standoff mine detection, ground from Program Element 0602131M. This is a continuing program.

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2079 PROJECT TITLE: Standoff Mine Detection

D. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCSC, Panama City, FL; Department of Energy; Lawrence Livermore National Laboratory. CONTRACTORS: TBD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: Justification for Systems New Start FY 1986: Non-Acquisition Program Definition (NAPDD), August 1989; ROC. FY 1992 (projected).

G. (U) RELATED ACTIVITIES: US Navy - DEMON and Magic Lantern; monitored. US Army - AMIDARS; monitored. US Air Force - ABIT and IDL; Discussions underway for AMDAS to directly to participate in the ABIT program.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Transition to ATD Program	FY 1991
b. (U) Transition to Demonstration/Validation	FY 1993
c. (U) Milestone I	FY 1993
d. (U) Developmental Test I/Operational Test I	FY 1994
e. (U) Milestone II	FY 1995
f. (U) Developmental Test II	FY 1996
g. (U) Operational Test II	FY 1997
h. (U) Milestone III	FY 1998
i. (U) Initial Operational Capability	FY 2001
j. (U) Follow on Capability	FY 2002

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2080 PROJECT TITLE: Weaponry

C. (U) DESCRIPTION: This project develops and demonstrates Advanced Weaponry concepts. Reduced weight, logistics support, increased lethality and versatility of weapons for both mounted and dismounted infantry will be investigated. Program goals are focus are polymer, electro-magnetic, and directed energy technologies.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Feasibility investigations, test, and trade-off analysis will be on-going in the USMC and US Army Exploratory Development program through FY 1990. Technologies involving laser energy, electromagnetic fields to accelerate projectiles, and polymer weapons are being investigated.

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under Program Element 0602313M).

2. (U) FY 1990 PROGRAM: (Funded under Program Element 060313M).

a. (U) Prepare and approve a Non-Acquisition Program Definition Document (NAPDD) for small caliber EM launcher. Conduct a trade-off analysis of technology options for infantry weapons utilizing advanced lethality mechanisms.

b. (U) Fabricate and test of experimental prototypes of infantry weapons (laboratory and field environment).

c. (U) Fabricate a prototype of Electro-magnetic launch mechanism for small caliber projectiles.

3. (U) FY 1991 PLANS: Initiate ATD for a small caliber EM launcher. Initiate preliminary design of launcher components.

4. (U) PROGRAM TO COMPLETION: This is a continuing program. The ATD for the small caliber EM launcher will be completed in FY 1993. An ATD for An advanced infantry weapon will be initiated in 1993.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; ARDEC, Dover, NJ; NSWC, Dahlgren, NWC, China Lake, CA. CONTRACTORS: University of Texas, Austin, TX.

F. (U) RELATED ACTIVITIES: Joint Service Small Arms Program; Marine Corp Directed Energy Technology Program.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2081 PROJECT TITLE: Battlefield Electronic Support

C. (U) DESCRIPTION: This project develops and demonstrates the capability to successfully conduct command, control, communication surveillance, and intelligence operations on the future battlefield. Projects will focus on demonstration of advanced computer, sensors, integration, communication, and data processing technology to enhance the battlefield electronic support functions. Demonstration will be conducted during simulated and actual field operations to provide maximum interaction with the users. Commercial advances in technology will be pursued actively. Joint coordination with Navy/Army will be heavily emphasized.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Battlefield Laser Simulator (BLS) hardware designed by DARPA. (Funded under Program Element 0603612M)

2. (U) FY 1990 PROGRAM: (Funded under Program Element 0603612M)

a. (U) Fabricate and test BLS hardware (DARPA).

b. (U) Prepare BLS Training package (USMC).

c. (U) Initiate Unified Networking Technology (UNT) (NAVY).

3. (U) FY 1991 PLANS:

a. (U) Conduct BLS DT/OT.

b. (U) Demonstrate BLS in field training operations.

c. (U) Initiate ATD for Amphibious Assault unified network.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NOSC, San Diego, CA. CONTRACTORS: Foster Miller Association, Waltham, MA.

F. (U) RELATED ACTIVITIES: DARPA Directed Energy (Laser) program; Navy ATD on United Network Technology and Marine Corps Air-Ground Technology.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)
PROJECT NUMBER: C2082 PROJECT TITLE: Chemical/Biological Defense

C. (U) DESCRIPTION: The High Mobility Multi-purpose Wheeled Vehicle (HMMWV) NBC Recon System (NBCRS) ATD will demonstrate a reconnaissance system to detect, collect, analyze, and disseminate NBC hazard information for expeditionary forces; Transportable Emergency Response Monitoring Module (TERMM), define a concept for a transportable laboratory for rapid analysis of chemical and field unknown agent/pathogen samples; Lightweight Suit, demonstrate protective suit, rainwear, and under-garment concepts for expeditionary assault forces; and NBC Aerial Detector, a lightweight, standoff agent detector for aircraft or Unmanned Aerial Vehicle (UAV) payloads.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under 060635M). Development plans were prepared for HMMWV NBCRS and TERMM. The HMMWV NBCRS ATD obtained two M997 Maxi-Ambulance HMMWV's for prototype development. A load plan for both HMMWV NBCRS was decided and Preliminary Life Cycle Cost Estimates (LCCE) established. The Non-Acat Program Definition Document (NAPDD) for both TERMM and HMMWV NBCRS were approved.

2. (U) FY 1990 PROGRAM: (Funded under Program Element 0603635M). TERMM will complete concept definition and transition early in FY 1990. HMMWV NBCRS will continue prototype development and complete demonstration planning. Tech Base (C3160) support for Lightweight Suit and Aerial Detector efforts, will continue. Development plans will be completed for Lightweight Suit and Aerial Detector.

3. (U) FY 1991 PLANS: HMMWV NBCRS will be demonstrated and transitioned to C1598 for Demonstration/Validation. Lightweight Suits and Aerial Detector ATD's will continue prototype development and demonstration planning. Automated Decon systems will be considered for a new start ATD.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA.; CRDEC, APG, MD.; NSWC, Dahlgren, VA.; NRDEC, Natick, MA. CONTRACTORS: ECO, Annapolis, MD.

F. (U) RELATED ACTIVITIES: EPA TERMM Program, US Army, NBCRS (XM93) program and US Army Soldier Integrated Protective Ensemble (SIPE) program.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0377	Explosive Ordnance Disposal Procedures	8,774	4,185	5,008	CONT.	CONT.
S1317	Explosive Ordnance Disposal Diving Systems	2,340	3,428	4,137	CONT.	CONT.
Total		11,114	7,613	9,145	CONT.	CONT.

B. (U) DESCRIPTION: Provides for the development of Explosives 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 and remotely operated vehicles 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 underwater ordnance.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Dev (Adv)
PROJECT NUMBER: S1317 PROJECT TITLE: Explosive Ordnance Disposal Diving Systems

C. (U) DESCRIPTION: Development of life support diving equipment and remote vehicles to support Explosive Ordnance Disposal 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 underwater ordnance.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Commenced TECHEVAL for the MK-98 Neutralization Charge, and Chemical Warfare Protective Dive Suit.
b. (U) Received Milestone II decision for the EX 19 Underwater Breathing Apparatus (UBA).
2. (U) FY 1990 Program:
a. (U) Start TECHEVAL for the EX 2 Remotely Operated Vehicle.
b. (U) Complete TECHEVAL and OPEVAL for the 65' EOD Support Craft.
c. (U) Approval for Navy use decision for the Diver Timer/Depth Gauge.
d. (U) Complete TECHEVAL for Chemical Warfare Dive Protective Suit.
3. (U) FY 1991 Plans:
a. (U) AFP for the Chemical Warfare Protective Dive Suit, the EX2 Remotely Operated Vehicle and the MK-98 Neutralization Charge.
b. (U) Complete TECHEVAL for MK-98 Neutralization.
c. (U) Complete TECHEVAL and OPEVAL for the MK-98 Neutralization Charge and OPEVAL for the EX2 Remotely Operated Vehicle.
d. (U) Start TECHEVAL for the EX19 Breathing Apparatus.
e. (U) Conduct certification testing for Emergency Breathing System.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NCSC, Panama City, FL; NSWC, White Oak, MD; NOSC, San Diego, CA; Naval EODTC, Indian Head, MD; NEDU, Panama City, FL. CONTRACTORS: Micronics International, Inc., Brea, CA; Texas Research Institute, Inc., Austin, TX; Raliod Inc., Reisterstown, MD.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS:

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE
OPN	0	2,342	2,855

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Dev (Adv)
PROJECT NUMBER: S0377 PROJECT TITLE: Explosive Ordnance Disposal Procedures

C. (U) DESCRIPTION: Provide Explosive Ordnance Disposal 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.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Commenced TECHEVAL on Diver Acoustic Positioning System.
   b. (U) Completed TECHEVAL on Magnetometer Search System.
   c. (U) Completed TECHEVAL on Jet Perforator.
2. (U) FY 1990 Program:
   a. (U) Complete TECHEVAL on ROVER.
   b. (U) Initiate the All Metals Dectector.
3. (U) FY 1991 Plans:
   a. (U) Approval for Production for Diver Acoustic Positioning System.
   b. (U) Initiate Directed Energy Neutralizing System.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval EODTC, Indian Head, MD. CONTRACTORS: Forster-Miller Associated, Inc., Waltham, MA; Datasonic, Inc., Cataumet, MA.

F. (U) RELATED ACTIVITIES: PE 0604654N, Joint Service Explosive Ordnance Disposal Development (Engineering), provides for the integration of specialized tools and equipment into specified procedures required for individual weapons and ordnance items.

G. (U) OTHER APPROPRIATION FUNDS:

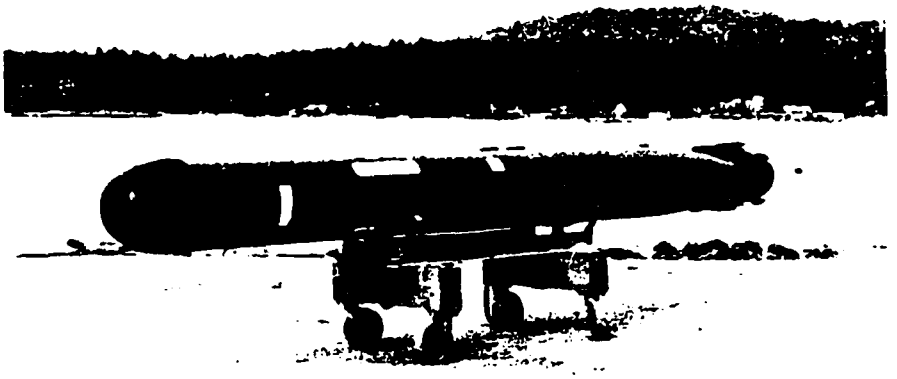
	FY 89 ACTUAL	FY 90 ESTIMATE	FY 91 ESTIMATE	TOTAL PROGRAM
Procurement (OPN) #240	0	0	4,300	4,300

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603691N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK48 Advanced Capability (ADV)
PROJECT NUMBER: S0366 PROJECT TITLE: MK48 Advanced Capability



POPULAR NAME: MK48 ADCAP

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		CCAPS M/S II 9/90		M/S III 10/94
Engineering Milestones				
T&E Milestones		FOT&E G&C 8/90		
Contract Milestones			CCAPS FSD 10/90	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	12,534	10,345	40,398	CONT
Support Contract	106	109	112	CONT
In-House Support	13,585	20,194	19,754	CONT
GFE/Other				
Total	26,225	30,648	60,264	CONT CONT

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603691N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK48 Advanced Capability (ADV)
PROJECT NUMBER: S0366 PROJECT TITLE: MK48 Advanced Capability

B. (U) DESCRIPTION:

Performance is gained with the ADCAP digital, multi-beam processing and propulsion system improvements to increase ADCAP follow-on improvements,

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued CCAPS demonstration and validation.
   b. (U) Commenced the Guidance and Control Software Block I Improvement Program.
2. (U) FY 1990 Program:
   a. (U) Complete CCAPS demonstration and evaluation.
      (1) (U) Continue in-water test program (Development Testing)
   b. (U) Continue Logistics Support Analysis
   c. (U) Complete Guidance and Control Software Block I Improvement Program.
   d. (U) Conduct under ice ADCAP DT/OT testing.
3. (U) FY 1991 Plans:
   a. (U) Start CCAPS full scale development.
      (1) (U) Initiate procurement of hardware; 8 EDM units.
      (2) (U) Continue development of technical data package/Level 3 drawings.
      (3) (U) Developmental Testing in-water runs.
      (4) (U) Procure 18 units for TECHEVAL/OPEVAL.
   b. (U) Start Guidance and Control Software Block II Improvement Program.
4. (U) Program to Completion:
   a. (U) Complete CCAPS Full Scale Development.
   b. (U) Continue Guidance and Control Software Block Upgrade Improvement Program.
   c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NUSC, Newport, RI, is the technical direction agent for the program; NUWES, Keyport, WA; NOSC, San Diego, CA; CONTRACTORS: ARL/Penn State University, State College, PA; Allied Signal, Tempe, AZ; Hughes Aircraft Company, Fullerton, CA; Sundstrand, Rockford, IL.

PROGRAM ELEMENT: 0603691N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK48 Advanced Capability (ADV)
PROJECT NUMBER: S0366 PROJECT TITLE: MK48 Advanced Capability

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None
2. (U) Schedule changes: None.
3. (U) Cost changes: Funding increase of +1,114 will be used to support the restructuring of the CCAPS program.

F. (U) PROGRAM DOCUMENTATION:
1. (U) NDCP Rev. 2, dated 6 Sep 88, subject "Navy Decision Coordinating Paper (NDCP) for Torpedo MK 48 ADCAP Program."
2. (U) OPNAV TEMP 371 Rev. 3 draft, subject "Test and Evaluation Master Plan NO. 371 for Torpedo MK48 ADCAP."
3. (U) OPNAV TEMP 371-1 "Test and Evaluation Master Plan for CCAPS" draft in review cycle.

G. (U) RELATED ACTIVITIES: Submarine Arctic Warfare Development Program (PE 0603562N, Proj S1739) and Submarine Combat Control System Improvement Program (PE 0604562N, Proj S0236).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT*					

* Propulsion systems only, not all-up-round torpedoes.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: Not Applicable

UNCLASSIFIED

Program Element: 0603701N Budget Activity: 2
Program Element Title: Human Factors Engineering Development

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0542	Air Human Factors Engineering	716	855	1,002	Cont	Cont
R1771	Ship Human Factors Engineering	1,705	1,617	1,881	Cont	Cont
	TOTAL	2,421	2,472	2,883	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program improves fleet readiness through human factors technology. It provides a better fit between the operator, equipment, and mission so that hardware systems will be operated with fewer human-induced errors and with greater safety and maintainability. The objectives of this program are: (1) to improve crew and work station design and evaluation methods so as to reduce errors and increase effectiveness of operations, (2) to establish target-acquisition and weapon-system standards for displays people can understand, (3) to develop airborne tactical decision aids for fleet Air Defense, ASW and strike missions, (4) to provide initial human factors support for new systems, and (5) to improve the integration between ships and their crews. The program also develops and evaluates new techniques for human-factors-based system design.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603701N Budget Activity: 2
Program Element Title: Human Factors Engineering Development
Project Number: W0542 PROJECT TITLE: Air Human Factors

C. (U) PROJECT DESCRIPTION: This project develops/demonstrates human factors engineering technology for (1) establishing human factors requirements for new systems, and (2) evaluating impact of human factors on effectiveness of systems in development or test and evaluation.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Demonstrated AEW decision aid, and transitioned to classified program; completed, demonstrated and implemented rapid prototyping tool; continued development of tools for developmental T&E; delayed start of ASW decision aid due to resource constraints; restructured program to focus on high-payoff efforts, and to focus later efforts on HFE design requirements analysis and HFE T&E tools; employed rapid transition (within 3 years) criterion to proposals for FY90 and beyond; and initiated interagency (DOD, DOT, DOE) HFE R&D strategy planning efforts.

3. (U) FY 1990 Program: Initiate ASW decision aid development; continue work on HFE DT&E tools; complete development, demo and transition of IEMD to tactical programs, including F/A-18, X-31, and NATF; and initiate development/evaluation of HFE design requirements analysis tools.

4. (U) FY 1991 Plans: Complete development, demo and transition of HFE DT&E tools to Air Combat Environment Test Evaluation Facility (ACETEF); complete development, demo and transition of ASW decision aid; continue development of HFE design requirements analysis tool; and start development of HFE tools for operational T&E.

5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: Primarily In-House: Naval Air Development Center, Warminister, PA.; Naval Weapons Center, China Lake, CA; Naval Air Test Center, Patuxent River, MD.

F. (U) RELATED ACTIVITIES: PE 0602234N, Training and Human Factors Technology; PE 0604703N, Personnel, Training, Simulation and Human Factors.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603701N Budget Activity: 2
Program Element Title: Human Factors Engineering Development
Project Number: R1771 Project Title: Ship HF Engineering Development

C. (U) PROJECT DESCRIPTION: Responds to GAO, Defense Science Board, and Naval Research Advisory Committee recommendations to improve shipboard performance by incorporating human engineering during system acquisition. Thrust areas: (1) tactical info management and decision making, (2) battle force information management, (3) multisensor integration and data display, (4) combat system design, and (5) computer-based operator aids.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 Accomplishments: Evaluated combat data displays for submarine approach officer; entered major platforms, weapons systems, and equipments into Force Performance Database; identified requirements for MILSTAR communications operator aid; evaluated prototype display formats for Rapid Air Defense System; developed operator interaction displays for battle group escort operations; and evaluated techniques to enable warfare officers to transform fleet exercise data into information requirements.

2. (U) FY 1990 Program: Use submarine simulation facility to measure decision-making performance of submarine approach officer; incorporate command effectiveness data into Force Performance Database; develop user interface for MILSTAR communications operator aid; identify ASW scenarios to use in evaluating prototype display formats for surface ship combat systems; and select and evaluate additional techniques for analyzing performance during fleet exercises.

3. (U) FY 1991 Plans: Complete interactive workstation for submarine approach officer; incorporate manpower and training data into Force Performance Database; validate software algorithms for MILSTAR communications operator aid; evaluate prototype display formats for surface ship combat systems in operational ASW environment; and complete development of tools for assessing performance during fleet exercises.

4. (U) Program to completion: This is a continuing program.

E. (U) WORK PERFORMED BY: Naval Ocean Systems Center, San Diego, CA.

F. (U) RELATED ACTIVITIES: PE 0602234N, Training and Human Factors Technology; PE 0604703N, Personnel, Training, Simulation and Human Factors.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603702N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Ocean Engineering System Development
PROJECT NUMBER: S0394 PROJECT TITLE: Shallow Depth Diving Equipment

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0394	Shallow Depth Diving Equipment	1,829	2,126	2,278	CONT.	CONT.

B. (U) DESCRIPTION: This program develops systems to support conventional diver operations from surface platforms to depths of 450 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted operational evaluation of the Lightweight Dive System (LWDS).
   b. (U) Conducted milestone II for the Conventional Dive System (CDS).
   c. (U) Achieved approval for the full scale production of the LWDS (Milestone III).
2. (U) FY 1990 Programs:
   a. (U) Complete Test and Evaluation CDS units.
   b. (U) Develop Navy certifiable, lightweight diver's air compressor.
3. (U) FY 1991 Plans:
   a. (U) Complete TECHEVAL and OPEVAL of CDS.
   b. (U) Conduct diver testing of underwater diver tools and diver's communications.
   c. (U) Reliability and operability testing of lightweight air compressor.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Center, Panama City, FL; Navy Experimental Diving Unit, Panama City, FL. CONTRACTORS: Various competitive.

E. (U) RELATED ACTIVITIES: PE 0603713N, PE 1110011N

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
OPN #42 (11300)	0	1,912	1,965	8,950	12,827

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: US/UK MOU for diving R&D; US-France cooperation.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603704N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Oceanography

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0118	Ocean Measurement Sensors	2,461	3,542	3,671	CONT.	CONT.
R1299	Ocean Measurement Techniques	1,516	(Combined with R0118 in FY 90)			
X1596	Satellite Applications and Technology	3,365	4,084	4,722	CONT.	CONT.
R1987	Mapping, Charting and Geodesy Techniques	2,383	1,520	1,401	CONT.	CONT.
Total		9,725	9,146	9,794	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops highly specialized, ultra-high resolution oceanographic instrumentation and techniques to measure acoustic and non-acoustic ocean parameters in support of ASW operations. This program also develops techniques to analyze and display the measured data to support ocean survey, ocean reconnaissance and Fleet command requirements for ASW and submarine operations. This program is the principal source of advanced technology for Naval oceanographic survey support to [redacted] and for transitioning oceanographic data from forward operating areas into Navy operational oceanographic support products. The Mapping, Charting and Geodesy project addresses the needs of the Fleet for greater accuracies and densities of geophysical data to support the more advanced weapon systems and navigation systems being introduced to the Fleet. The Satellite Applications and Technology project develops algorithms to process and display remotely sensed satellite data and to assimilate these data into numerical models and expert systems.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603704N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Oceanography
PROJECT NUMBER: R1299 PROJECT TITLE: Ocean Measurement Techniques

C. (U) DESCRIPTION: This project provides for the advanced development of improved or new techniques for non-acoustic ASW systems. New oceanographic survey methods as well as advanced techniques of data reduction, analysis, archiving and presentation are included.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Initiated Strategic Area Long Term Environmental Assessment.
   b. (U) Completed global optical "K" atlas.
   c. (U) Completed empirical ice model work.
   d. (U)

2. (U) FY 1990 Program: Funds transferred to Project R0118.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Oceanographic and Atmospheric Research Laboratory, Bay St. Louis, MS; Naval Ocean Systems Center, San Diego, CA; Naval Postgraduate School, Monterey, CA. CONTRACTORS: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; Applied Physics Laboratory, University of Washington, Seattle, WA; Scripps Institute of Oceanography, Unversity of California, La Jolla, CA; Arete Associates, Washington, DC; Science Applications International Corporation, Monterey, CA.

F. (U) RELATED ACTIVITIES: PE 0602435N, Ocean and Atmospheric Support Technology; PE 0605853N, Acoustic and Non-Acoustic Analysis Support; PE 0101224N, SSBN Security; PE 0603528N, Non-Acoustic Submarine Warfare.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603704N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Oceanography
PROJECT NUMBER: R0118 PROJECT TITLE: Ocean Measurement Sensors

C. (U) DESCRIPTION: This project supports the advanced development of non-acoustic oceanographic sensors that will allow the.

Additionally, the project develops instrumentation in response to Fleet environmental requirements and Naval Oceanographic Office survey requirements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Initiated 3-month satellite communication drifter with tail.
b. (U) Initiated towed bioluminescence sensor.
c. (U) Continued NAASW sensor system suite including vorticity sensor.
d. (U) Completed expendable conductivity sensor (XCTD).
2. (U) FY 1990 Program:
a. (U) Continue towed bioluminescence sensor.
b. (U) Complete AXKT and vorticity sensor.
c. (U) Demonstrate utility of environmental sensors on SSN.
3. (U) FY 1991 Plans:
a. (U) Transition remote ice thickness measurement system.
b. (U) Initiate expendable bioluminescence sensors.
c. (U) Complete towed bioluminescence system.
d. (U) Complete NA-16/towed system evaluation.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Bay St. Louis, MS; NOSC, San Diego, CA. CONTRACTORS: APL, Johns Hopkins University, Laurel, MD; APL, University of Washington, Seattle, WA; Sippican Corporation, Marion, MA; University of California at Santa Barbara, Santa Barbara, CA.

F. (U) RELATED ACTIVITIES: PE 0602435N, Ocean and Atmospheric Support Technology; PE 0605853N, Acoustic and Non-Acoustic Analysis Support; PE 0101224N, SSBN Security; PE 0603528N, Non-Acoustic Submarine Warfare.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603704N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications
PROJECT NUMBER: X1596 PROJECT TITLE: Satellite Applications and Technology

C. (U) PROJECT DESCRIPTION: This project develops software techniques for the integration and subsequent application of tactically significant ocean and atmospheric features derived from satellite-borne sensors. This work includes data assimilation, modeling, and expert systems (artificial intelligence) development. Improved oceanographic and meteorological predictions will be provided for Navy tactical use.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. Developed tactical ocean wave products using satellite altimeter and SSM/I data.
   b. Tested atmospheric 3-D data merge techniques for single station analysis.
   c. Completed definition of synthetic aperture radar (SAR) sensor for Navy application.
2. (U) FY 1990 Program:
   a. Develop AI methods and software modules for tactical exploitation.
   b. Begin developing software and methods for precipitable water and rain rate determinations from satellite data.
   c. Develop satellite applications for interactive display.
   d. Begin participation in acoustic exercises.
   e. Support analysis of DMSP Block 6 (Navy Option) Sensors.
3. (U) FY 1991 Plans:
   a. Test technique to conduct atmospheric 3-D data merge.
   b. Continue development of Radar Altimetry (focusing on SPINSAT altimetry), interactive display and acoustic exercise participation applications.
   c. Begin tactical scale expert system image analysis.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Monterey, CA; NOARL, Bay St. Louis, MS; NRL, Washington, DC.

F. (U) RELATED ACTIVITIES: PE 0305111N, Weather Service; PE 0603207N, Air/Ocean Tactical Application; PE 0604230N, Warfare Support Systems.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603704N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Oceanography
PROJECT NUMBER: R1987 PROJECT TITLE: Mapping, Charting and Geodesy (MC&G)

C. (U) PROJECT DESCRIPTION: This project develops new charting, bathymetry, magnetic, and graviometric survey techniques necessary to reduce the existing 300 shipyear shortfall in accessible, coastal hydrographic survey requirements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Evaluated prototype Digital MC&G products such as the Digital Bathymetric Data Base, ARC Digitized Raster Graphics and Tactical Terrain Data Base.
b. (U) Investigated environmental effects on laser bathymetry.
c. (U) Investigated and correlated Arctic MC&G Requirements.
d. (U) Investigated standards for electronic chart products.
2. (U) FY 1990 Program:
a. (U) Develop and maintain a library of standard digital MC&G products.
b. (U) Refine algorithms for processing optical bathymetry.
c. (U) Initiate aircraft positioning techniques for graviometry.
d. (U) Construct tidal anomaly data base for measurement requirements.
3. (U) FY 1991 Plans:
a. (U) Continue to perform technical coordination for digital MC&G products.
b. (U) Investigate spatial variability of bathymetry for interpretation schemes.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Bay St. Louis, MS. CONTRACTORS: Planning Systems, Inc., Slidell, LA; San Diego State University, San Diego, CA.

F. (U) RELATED ACTIVITIES: PE 0601153N, Defense Research Sciences; PE 0602435N, Ocean and Atmospheric Support Technology; PE 0301327N, Technology, Reconnais-sance, and Surveillance; PE 0305160N, Defense Meteorological Satellite Program; PE 0603785N, ASW Environmental Acoustic Support.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603706N Budget Activity: 2
Program Element Title: Medical Development (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0095	Fleet Health Technology	12,543	12,815	12,781	Cont.	Cont.
M0096	Fleet Health Standards	5,473	4,251	4,185	Cont.	Cont.
M2022	Bone Marrow Registry	2,500	0	0	*	*
Total		20,516	17,066	16,966	Cont.	Cont.

* Program transferred to Department of Health and Human Services

B. (U) DESCRIPTION:

The Navy Medical Department's mission is the care and treatment of Navy and Marine Corps personnel in operational theaters with the ultimate goals of increased return-to-duty rates, enhanced performance, and reduced morbidity and mortality. Also, medically based standards must be developed to permit the optimal selection of personnel for specific Navy jobs and to ensure the physical readiness and safety of these personnel in the operational environment. Specifically, this program element will support the development of better methods for treating battlefield casualties. A further objective is to improve the quality of combat personnel by developing validated techniques for medical selection and training, as well as standards and procedures for protecting personnel during exposure to Navy and Marine Corps operational environments. The results of this program will be the identification of the best qualified Navy personnel, improved job- task performance, and the reduction of costs attributable to attrition and injury. In FY 1990 the program in toxicological assessment of chemicals used in Navy operations will transition to O&M,N funding.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603706N Budget Activity: 2
Program Element Title: Medical Development (Advanced)
Project Number: M0095 Project Title: Fleet Health Technology

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0095	FLEET HEALTH TECHNOLOGY	12,543	12,815	12,781	Cont.	Cont.

B. (U) DESCRIPTION: The Navy Medical Department's ultimate mission is the care and treatment of Navy and Marine Corps casualties in operational theaters. In addition, the Medical Department must be able to prevent or treat non-battle injuries to guarantee that the optimal number of personnel are combat ready. This project supports the development of improved methods for treating battlefield casualties. Specifically, better methods for guaranteeing an adequate blood supply in operational theaters; improving wound healing; treating shock and sepsis; preventing cold-injuries and treating casualties in extreme environments; treating failure of blood-forming cells; and preventing and treating incapacitating dental conditions are being developed.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Evaluated stroma-free hemoglobin and the liposome-encapsulated hemoglobin for suitability as blood substitutes
   b. (U) Obtained FDA licensure for human platelets frozen for up to 2 years
   c. (U) Evaluated whether prostaglandins are able to prevent shock lung syndrome
   d. (U) Began development of sutureless vascular anastomosis
   e. (U) Began assessment of a pourable, field-usable, hemostatic wound dressing
   f. (U) Began study of wound treatment with theater implantable antibiotic beads
   g. (U) Began studies on the effect of freezing and thawing on the shelf life of medical pharmaceuticals and other materiel
   h. (U) Completed advanced development of a radiofrequency device to rewarm casualties
   i. (U) Began studies to define casualty rates and medical logistic requirements to treat casualties
   j. (U) Began development of cold acclimatization protocols
   k. (U) Began development of prototype rapid dental diagnosis kit

2. (U) FY 1990 Program:

a. (U) Complete evaluation of blood enzymatically converted from type-B to type-O

b. (U) Begin evaluation of blood enzymatically converted from type-A to type-O

c. (U) Continue development of sutureless vascular anastomosis

d. (U) Continue assessment of a pourable, field-usable, hemostatic wound dressing

e. (U) Complete studies on prolonging the shelf life of frozen, thawed red blood cells

f. (U) Continue study of wound treatment with theater implantable antibiotic beads

g. (U) Continue development of cold acclimatization protocols

h. (U) Complete development of database to monitor the incidence of disease and non-battle injuries

i. (U) Complete adaptation of computer-assisted diagnosis programs for use in non-submarine environments

j. (U) Complete sea trials of the dental computer-assisted diagnostic program

3. (U) FY 1991 Planned Program:

a. (U) Begin evaluation of enzymatic conversion of Rh positive blood types to Rh negative blood types

b. (U) Continue evaluation of blood enzymatically converted from type-A to type-O

c. (U) Complete development of sutureless vascular anastomosis

d. (U) Complete assessment of a pourable, field-usable, hemostatic wound dressing

e. (U) Complete study of wound treatment with theater implantable antibiotic beads

f. (U) Complete studies on freeze-thaw effects on shelf life of medical materiel

g. (U) Complete studies to define casualty rates and medical logistic requirements to treat casualties

h. (U) Complete development of cold acclimatization protocols

i. (U) Complete development of prototype rapid dental diagnosis kit

5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: Naval Medical Research Institute, Bethesda, MD; Naval Aerospace Medical Research Laboratory, Pensacola, FL; Naval Health Research Center, San Diego, CA; Naval Submarine Medical Research Laboratory, Groton, CT; Naval Dental Research Institute, Great Lakes, IL; Contractors: Boston University, Boston, MA; New York Blood Center, New York, NY; Georgetown University, Washington, DC.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: NONE

2. (U) SCHEDULE CHANGES: NONE

3. (U) COST CHANGES: The FY 1991 reduction of -2,140 will result in a delay in evaluating enzymatic conversion of Rh positive blood types to Rh negative blood types and will delay completion of studies on freeze-thaw effects on shelf life of medical materiel.

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: This program is coordinated through the Armed Services Biomedical Research Evaluation and Management Committee. Additional coordination is provided by various reviews sponsored by the Under Secretary of Defense for Acquisition to ensure that the work is complementary to, rather than duplicative of, the programs of the other military departments and non-DOD research organizations.

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE:

1. Transition of electromagnetic radiation device for rewarming hypothermic casualties to Program Element 0604771N, Medical Development (Engineering), October 1990

2. Transition of device for thawing frozen blood products to Program Element 0604771N, Medical Development (Engineering), October 1991

3. Begin advanced development of diafiltration cell washing device, October 1991

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603706N Budget Activity: 2
Program Element Title: Medical Development (Advanced)
Project Number: M0096 Project Title: Fleet Health Standards

C. (U) DESCRIPTION: This project will improve the quality of combat personnel by developing valid techniques for medical selection, training and retention; and standards and procedures to protect personnel during exposure to Navy operational requirements. This will reduce attrition and injury, and enhance or maintain performance.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Completed an evaluation of pharmacologic intervention during sustained flight operations; began to develop operational models for predicting human performance in varied missions, job- tasks, and environments; began validation study of the performance-based medical standards/selection test battery for aviators and continue the study of low level lasers on visual search tasks and flight performance.

2. (U) FY 1990 Program: Complete the performance-based selection test battery for aviators; complete testing of bubble technology for neutron dosimetry; complete study of effect of low level lasers on visual search tasks and flight performance; initiate field studies to evaluate the efficacy of laboratory-based performance-enhancement countermeasures in sustained combat scenarios and cold environments.

3. (U) FY 1991 Plans: Complete testing bubble technology for measuring specific absorption rate of radiofrequency energy; complete assessment of performance enhancement/decrements in cold environments; continue field studies to evaluate the efficacy of laboratory-based performance-enhancement countermeasures in sustained ops; initiate studies to assess laser eye protection technologies using visual search tasks.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: Naval Medical Research Institute Toxicology Detachment, WPAFB, Dayton, OH; Naval Aerospace Medical Research Laboratory, Pensacola, FL; Naval Health Research Center, San Diego, CA.

F. (U) RELATED ACTIVITIES: This program is coordinated through the Armed Services Biomedical Research Evaluation and Management Committee and tri-service working groups in sustained ops, and aeromedical research.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603706N Budget Activity: 2
Program Element Title: Medical Development (Advanced)
Project Number: M2022 Project Title: Bone Marrow Registry

C. (U) DESCRIPTION: This project funds the establishment of a national registry of potential bone marrow donors. This registry provides potential donors for the thousands of personnel each year that are candidates for bone marrow transplantation but do not have tissue compatible relatives available to donate bone marrow. This registry also performs research to determine how perfect a match is necessary for transplantation to be successful in unrelated transplants.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) The management of the national bone marrow registry transitioned to the Department of Health and Human Services in FY 1989. Management of the current contracts was transferred to Health and Human Services, along with the appropriated funds to support the registry.

2. (U) FY 1990 Program: Not Applicable.

E. (U) WORK PERFORMED BY: Contractors: American Red Cross, Washington, DC; University of Washington, Seattle, WA; Blood Center of Southern Wisconsin, Milwaukee, WI.

F. (U) RELATED ACTIVITIES: This program supports the only national bone marrow donor registry. The Department of Health and Human Services assumed the management and support of the bone marrow donor registry during FY 1989.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603707N Budget Activity: 2
Program Element Title: Manpower & Personnel Systems
Project Number: R1770 Project Title: Manpower & Personnel Systems

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Manpower & Personnel Systems	3,167	3,029	3,200	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program responds to Congressional/DoD guidance to improve the use of Navy manpower and personnel resources through advanced technology. It applies math optimization, computer technology, manpower/personnel forecasting, and human performance measurement. These technologies are used to design and develop systems to improve personnel assignment and human performance, and to better project and manage personnel inventories.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Tested optimal assignment procedures for minimizing enroute training. Tested improved ways of forecasting PCS moves. Validated selection standards for electronics jobs.

2. (U) FY 1990 Program: Evaluate optimal assignment system for 50% of enlisteds. Validate selection standards for electrical jobs.

3. (U) FY 1991 Plans: Establish quality selection standards for major enlisted job categories. Test optimal assignment system using PCS and school constraints.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVPERSRANDCEN, San Diego, CA.CONTRACTORS: Systems Exploration Inc., San Diego, CA; B-K Dynamics, Rockville, MD; SYSCON Inc., Washington, DC; Resource Consultants Inc., Washington, DC; Maxima, San Antonio, TX.

E. (U) RELATED ACTIVITIES: 0602722A, Personnel and Training; 0602233N, Mission Support Technology; 0602703F, Personnel Utilization Technology; 0603731A, Manpower and Personnel; 0604703N, Personnel Training, Simulation, and Human Factors; 0603732M, Marine Corps Advanced Manpower Training Systems; and 0603704F, Manpower and Personnel Systems Technology.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603708N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Signal Processing

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0490	BEARTRAP	9,772	10,730	15,841	CONT.	CONT.
S0823	Acoustic Performance Prediction	5,937	6,625	9,044	CONT.	CONT.
X0821	Advanced Acoustic Processor	1,517	1,702	3,757	CONT.	CONT.
TOTAL		17,226	19,057	28,642	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Anti-Submarine Warfare (ASW) Signal Processing program provides for the [redacted] The program is responsive to requirements to improve air ASW systems to counter the existing and projected submarine threat.

(U) The BEARTRAP project is [redacted] To accomplish this BEARTRAP incorporates a [redacted]

(U) The Advanced Acoustic Processing project independently evaluates Anti-Submarine Warfare Signal Processing systems aboard tactical air, surface and subsurface platforms. This evaluation is used to reduce redundant development efforts and permits technology transfer among advanced development platform-related signal processing programs.

(U) The Acoustic Performance Prediction project develops computer based, on-board capabilities to provide acoustic system performance predictions and mode selection guidance for all tactical ASW Platforms based on in-situ measurements and environmental data bases. This capability is required as ASW sensor and weapon systems become more complex, since their optimal tactical applications are based on knowledge of the effects of current acoustic environmental conditions. This project enables the fleet to obtain the full performance potential of ASW systems by extending threat detection ranges and maximizing overall ASW platform survivability in all geographies areas, including the Arctic.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603708N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Signal Processing
PROJECT NUMBER: W0490 PROJECT TITLE: BEARTRAP

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0490	BEARTRAP	9,772	10,730	15,841	CONT.	CONT.

B. (U) DESCRIPTION: In the mission of
and developing special equipment to accomplish this against
Project BEARTRAP has had a major and significant impact upon anti-submarine warfare. This is a result of both the

into the ASW community. BEARTRAP consists of a combination of developmental and

P-3C aircraft, along with special ASW sensors, post mission processing, calibration equipment, and specially trained personnel. BEARTRAP, incorporating a rapid development capability, developed

either currently utilized by operational units or planned for future systems. BEARTRAP is in a unique position to
for Navy development and technology demonstration programs where sensor technology permits.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued ongoing

b. (U) Continued development of AQL acoustic submarine tracking and analysis equipment for ASWOC's (ASW Operational Centers). In addition,
The AQL system was certified.

c. (U) Developmental Advanced Acoustic Intercept Systems (AAIS) Receivers for ith

d. (U) Low cost AAIS systems developed for additional BEARTRAP capability. A roll-on/roll-off processing system was developed for use with

PROGRAM ELEMENT: 0603708N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Signal Processing
PROJECT NUMBER: W0490 PROJECT TITLE: BEARTRAP

e. (U) Development of special software is continuing for the P-3C UD III capability required by

f. (U)

was begun for , using digital MAD (magnetic anomoly detection) equipment.

2. (SNF) FY 1990 Program:

a. (U) Continue

b. (U) Initiate developmental efforts for for BEARTRAP aircraft, including linear and adaptive beamforming, broadband and non linear processing, multi dimensional displays, infrasonic propagation, real time direct target strength measurement, acoustic intercept and transient

c. (U) Initiate effort to provide processing improvements processing and broadband improvements to the AQL system. In addition, continue normal software and hardware developmental research for

d. (U) Complete developmental efforts for special UD III capability Develop special

Evaluate

e. (U) Investigate

f. (U) Provide specially screened and duplicated acoustic research data directly to Navy Laboratories at special requests.

3. (u) FY 1991 Plans:

a. (U) Continue continue development of improved

b. (U) Continue development efforts and initiate new processing and associated software for BEARTRAP aircraft. Continue developmental research in processing to the AQL system. In addition, continue normal software and hardware development for

c. (U) Evaluate

d. (U) Initiate redesign of BEARTRAP aircraft ASW capabilities to provide

e. (U) Develop advanced REGINA boxes for acoustic intercept.

4. (U) Program to Completion: This is a continuing program.

PROGRAM ELEMENT: 0603708N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Signal Processing
PROJECT NUMBER: W0490 PROJECT TITLE: BEARTRAP

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD; NSWC, White Oak, MD; NWSC, Crane, IN; NAC, Indianapolis, IN; and NOSC, San Diego, CA. CONTRACTORS: TRACOR, Austin, TX; G. P., TAURIO, Columbia, MD; METRON, Inc., Warminster, PA; Norden Systems, Melville, NY; Sparton Electronics Div., Jackson, MI; and Mitre, Mclean, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None
2. (U) Schedule changes: None
3. (U) Cost changes: Department increased FY 1991 +$1,035 for BEARTRAP reconfiguration,

F. (U) PROGRAM DOCUMENTATION:
NDCP W0-49-AS 6/20/80
NAPDD 076-095 4/15/86

G. (U) RELATED ACTIVITIES: PEs 0603529N (Advanced ASW Target); 0603553 (Surface ASW); 0604713N (Surface ASW Systems Improvement); 0603691N (MK 48 Advanced Capabilities); 0603610N (Advanced Lightweight Torpedo); 0603254N (Air ASW Adv Sensors); 0604261N (Acoustic Search Sensors); 0604221N (P-3C Mod Program); 0604212N (LAMPS); 0604229N (Carrier Inner zone ASW Helo); 0603792N (Advanced Technology Transition).

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEUDLE: This is a continuing program.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603708N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Signal Processing
PROJECT NUMBER: S0823 PROJECT TITLE: Acoustic Performance Prediction (APP)

C. (U) DESCRIPTION: APP develops on-board software capabilities that provide acoustic sensor performance predictions and tactical decision aids for all tactical ASW platforms using in-situ measurements and new/updated environmental data bases. APP enables the full performance potential of complex ASW systems by increasing their detection and tracking performance.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY-1989 Accomplishments:
   a. (U) Continued to improve/update data bases and acoustic models.
   b. (U) Evaluated aircraft laptop APP products at-sea.
   c. (U) Continued to develop APP prototype, address new ASW systems.
   d. (U) Developed APP products to support Acoustic Intercept System (AIS) and acoustic sensors in ASW weapons.
   e. (U) Developed SIMAS modifications to support DDG-51 combat systems.
2. (U) FY 1990 Program:
   a. (U) Update models, data bases and at-sea systems.
   b. (U) Develop products for
   c. (U) Continue development and conduct at-sea evaluation of next generation APP prototype including AIS, and weapons products.
   d. (U) Incorporate remote sensing data into APP.
3. (U) FY 1991 Plans:
   a. (U) Update models, data bases and at-sea systems.
   b. (U) Evaluate products at-sea.
   c. (U) Update next generation APP system based on at-sea results and incorporate ASW Tactical Decision Aides (ASWTDA) capability.
   d. (U)
   e. (U)
   f. (U) Develop/test APP products for ASW asset tactical employment guidance based on the in-situ environment.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NUSC Newport, RI; Naval Oceanographic Office, Bay St. Louis, MS; NOSC, San Diego, CA. CONTRACTORS: Analysis and Technology, North Stonington, CT; Sonalysts, Inc., Waterford, CT.

F. (U) RELATED ACTIVITIES: PEs 0604575N, AN/SQS-53C; 0604524N, Submarine Combat Systems Development; 0604713N, ASW Surface Sytems Improvements; 0603207N, Tactical Environment Support Systems; 0604503N, Submarine Sonar Development.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603708N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Signal Processing
PROJECT NUMBER: X0821 PROJECT TITLE: Advanced Acoustic Processing

C. (U) PROJECT DESCRIPTION: The Anti-Submarine Warfare Signal Processing program is responsive to fleet requirements for improved ASW capability to counter the existing and projected submarine threat. The Advanced Acoustic Processing project independently evaluates anti-submarine warfare acoustic signal and post processing systems aboard tactical air, surface and subsurface platforms. It is used to reduce redundant development efforts and permits technology transfer among advanced development, platform-related signal processing programs.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted testing of submarine and surface ship passive ASW systems.
   b. (U) Completed Phase I testing of SSTD AS/CAC.
   c. (U) Initiated testing of P-3C UPDATE IV post processing algorithms.
   d. (U) Evaluated training in air ASW signal processing systems.
   e. (U) Initiated evaluation of training tactical platforms.
   f. (U) Continued testing of _ _ sonobuoy systems.
2. (U) FY 1990 Program:
   a. (U) Continue testing of P-3C Update IV post processing algorithms.
   b. (U) Continue testing of SSTD algorithms.
   c. (U) Continue testing of submarine and surface ship passive ASW systems.
   d. (U) Continue testing of training.
   e. (U) Initiate testing of active sonars in surface ships.
   f. (U) Complete testing of sonobuoy systems.
3. (U) FY 1991 Plans:
   a. (U) Continue testing of P-3C Update IV.
   b. (U) Complete testing of submarine and surface ship passive ASW systems.
   c. (U) Continue testing of training.
   d. (U) Complete testing SSTD.
   e. (U) Continue testing active sonars in surface ships.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Weapons Center, White Oak Laboratory (Lead Laboratory). CONTRACTORS: TRW Systems, McLean, VA (Lead Contractor).

F. (U) RELATED ACTIVITIES: 0604503N, Submarine Sonar Development; 0604219N, Airborne Anti-Submarine Warfare Development; 0604524N, Submarine Advanced Combat System Development; 0604217N, S-3B; 0603504N, Advanced Submarine ASW Developments; 0603553N, Surface ASW; 0603254N, Air ASW.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603709N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Mammal Systems

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0214	Advanced Marine Biological Systems *	5,995	5,562	5,737	CONT.	CONT.

* Program title will be changed to Marine Mammal Systems (MMS).

B. (U) DESCRIPTION: This program funds training of marine mammals to determine military worth and optimum utility.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Continued EX 4 development, training of
b. (U) Continued with Targets of Opportunity (TOO) and Arctic Ops programs.
c. (U) EX 3 underwent development to correct identified deficiencies.
2. (U) FY 1990 Program:
a. (U) Continue dolphin training at
b. (U) Enhance and test
c. (U) Continue Arctic, TOO and Linear Chek programs.
d. (U) Begin
3. (U) FY 1991 Plans:
a. (U) Complete OPEVAL on EX 4.
b. (U) Milestone II for Enhance, TOO, Arctic Ops.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, Kailua, HI and San Diego, CA. CONTRACTORS: B-K Dynamics; SEACO, Kailua, HI.

E (U) RELATED ACTIVITIES: None

F. (U) OTHER APPROPRIATION FUNDS:

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY1991 ESTIMATE
OPN	1,987	1,680	1,380

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
PROGRAM ELEMENT: 0603711N Budget Activity: 4
PROGRAM ELEMENT TITLE: TACTICS DEVELOPMENT SUPPORT
PROJECT NUMBER: R0138 PROJECT TITLE: TACTICS DEVELOP. SUPPORT (TAC DEV SPT)

A. (U) RESOURCES:

Project Number	Title	FY 1989 Actual	FY 1990 Estimated	FY 1991 Estimated	To Complete	Total Program
R0138	TAC DEV SPT	6,017	6,161	6,621	Cont.	Cont.

B. (U) DESCRIPTION : This program provides funding for the Navy's system for collection, reconstruction and analysis of fleet operational data elements during exercise and real-world operational events; provides a central library of tactical information, lessons learned and proposed tactics, and reproduces and distributes Tactical Decision Aid (TDA) computer software.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
(a) Maintained 14 TIMS and 56 data collection systems in support of 105 fleet command for analysis of 203 fleet exercises, operation and projects.
(b) Performed 215 installations/removals of data collection systems in support of 43 fleet exercises.

2. (U) FY 1990 PLANS:
(a) Continue maintenance of TIMS and installation and removal of data collection systems in support of over 200 fleet exercises for more than 100 fleet commands.
(b) Upgrade, replace, and enhance TIMS hardware and software to improve fleet support.

3. (U) FY 1991 Plans: Same as FY 1990 Plans above.

4. (U) Program to Completion: This is a continuing Program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVTACSUPPACT, Silver Spring, MD. CONTRACTORS: United Information Management System, Inc., Silver Spring, MD; Summit Research Corp., Gaithersburg, MD.

E. (U) RELATED ACTIVITIES: Program Element 0605155N, "Fleet Tactical Development and Evaluation".

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: GENERIC LOGISTICS R&D TECH DEMO

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
T1816	SHARP	9,530	7,047	9,690	CONT	CONT
T1884	RAMP	11,285	8,208	0	0	52,603
T1910	IDSS	5,546	1,946	4,350	CONT	CONT
TOTAL		26,361	17,201	14,040	CONT	CONT

B. (U) DESCRIPTION: This is a coordinated program to apply advanced technology to logistics needs and problems to:

- Design weapon systems and their support to eliminate requirements for large logistics tails.

- Reduce the high cost of maintaining weapon systems and improve readiness.

- Assist program managers with technology to design, deliver, and support weapon systems within shortened development cycles.

- Reduce weapons systems repair downtime and develop innovative logistics support systems for contingency operations.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: GENERIC LOGISTICS R&D TECH DEMO
PROJECT NUMBER: T1816 PROJECT TITLE: STANDARD HARDWARE ACQUISITION AND RELIABILITY PROGRAM (SHARP)

C. (U) DESCRIPTION: This project funds development of multi-system advance electronic hardware standards to provide proven quality and reliability for new systems and existing systems modifications. SHARP specifies Standard Electronic Modules (SEM), Standard Power Supplies (SPS), Standard Enclosure Systems (SES), and Standard Battery Systems (SBS) to decrease system life cycle cost, to increase fleet readiness and operational availability, and to enhance Fleet modernization and supportability.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   - o Initiated development of 50 new SEM, 3 new SPS, 2 new SES, and 1 new SBS.
   - o Completed format SEM E development for application to programs such as the Enhanced Modular Signal Processor (EMSP).
2. (U) FY 1990 PROGRAM:
   - o Initiate development of 24 new SEM, and 1 new SES.
   - o Test and evaluate new lightweight materials for module frames and enclosures.
   - o Conduct module testability reviews.
   - o Specify, test, and evaluate new power supplies and components.
3. (U) FY 1991 PLANS:
   - o Initiate development of 25 new SEM, 1 new SPS, 1 new advanced lightweight avionics SES, and 2 new SBS.
   - o Test/evaluate critical fiber optic components.
4. (U) PROGRAM TO COMPLETION:
   - o Complete development of all current technology modules, power supplies, enclosures, and batteries.
   - o This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVAVIONICCEN,Indianapolis, IN and NAVPWNSUPPCEN, Crane, IN. CONTRACTORS: (Numerous small contracts).

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
PROGRAM ELEMENT: 0603712N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: GENERIC LOGISTICS R&D TECH DEMO
PROJECT NUMBER: T1884 PROJECT TITLE: RAPID ACQUISITION OF MANUFACTURED PARTS (RAMP)

C. (U) DESCRIPTION: This project funds the use of advanced computer integrated manufacturing technology to reduce cost and production lead time in manufacturing small batches of parts not available from commercial sources. Emerging technology is adapted to the production of parts on demand and to integrating the process into the Navy logistics system.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   - o Installed SMP and PWA workcells within the RTIF.
   - o Completed coding of SMP CIM integration software.
   - o demonstrated production of SMP spare parts in RTIF.
   - o Conducted test readiness review for SMP workcell.
   - o Performed system checkout test of SMP software and hardware.
2. (U) FY 1990 PROGRAM:
   - o Complete PWA equipment installation and conduct readiness review test.
   - o Complete software coding/integration and conduct detailed coding testing for PWA workcell.
   - o Conduct PWA workcell/RTIF installation readiness review and formal RTIF acceptance tests.
3. (U) FY 1991 PLANS: Not Applicable.
4. (U) PROGRAM TO COMPLETION: Not Applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVAVIONICCEN, Indianapolis, IN; NAVWPNSUPPCEN, Crane, IN; NIST, Germantown, MD; NOSC, San Diego, CA; NOSL Louisville,Ky. CONTRACTORS: South Carolina Research Authority, Charleston, SC.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS:

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN(PIF)	4,800	--	--	--	4,800
NIF	--	8,732	8,472	5,320	22,524
NSF	--	3,668	3,628	5,180	12,476
MCON	--	8,983	--	--	8,983
TOTAL	4,800	21,383	12,100	10,500	48,783

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
PROGRAM ELEMENT: 0603712N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: GENERIC LOGISTICS R&D TECH DEMO
PROJECT NUMBER: T1910 PROJECT TITLE: INTEGRATED DIAGNOSTIC SUPPORT SYSTEM (IDSS)

C. (U) DESCRIPTION: The purpose of this project is to provide an integrated set of design and support tools to reduce weapon system down time, to reduce the high cost of maintaining weapon systems and to increase fleet readiness. The development and demonstration of five software tools is involved which will identify weapon system design and testability problems and which will significantly improve shipboard trouble shooting of system failures.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 PROGRAM:
   - o Demonstrated WSTA on V-22 and MK78 MOD1 systems.
   - o Conducted WSTA Beta testing.
   - o Began development of Feedback Analyzer (FA) tool.
   - o Completed trade studies on Technical Information and Training Authoring (TIATA) tool candidates.
   - o Completed ADS tool.
   - o Began coding on ADA tool.
   - o Selected test unit for final IDSS demonstration.
2. (U) FY 1990 PROGRAM:
   - o Complete acceptance testing of ADS tool.
   - o Complete ADA tool through Prime Contractor Quality Assurance testing and demonstration.
   - o Develop user guidance documentation for ADA and ADA tools.
   - o Continue development of FA tool.
3. (U) FY 1991 PLANS:
   - o Complete development/integration of all IDSS tools.
   - o Incorporate the Air Force Authoring Presentation System (APS) software into IDSS TIATA framework.
   - o Prepare Item Unter Test (IUT) Test Bed.
   - o Develop necessary interfaces for final IDSS demonstration.
   - o Complete documentation of all IDSS tools and interface specifications.
4. (U) PROGRAM TO COMPLETION:
   - o Demonstrate IDSS on a major weapon system IUT.
   - o Ensure full institutionalization of IDSS in the weapon system design and acquisition process.
   - o This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVSWC Dahlgren, VA; FLTAC, Corona, CA CONTRACTORS: Harris Corp./GSSD, Syosset, NY; GAI Inc., Sparta, NJ

F. (U) RELATED ACTIVITIES: Sharing software with PE 0603106F (Log Sys Tech) project Integrated Maintenance Information System (IMIS).

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Ocean Engineering Technology Development

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0099	Deep Submergence Biomedical Development	5,775	6,086	6,627	CONT.	CONT.
S0396	Deep Depth Diving	1,758	1,560	1,408	1,919	11,105
S0397	Deep Ocean Technology	6,224	6,688	7,403	CONT.	CONT.
TOTAL		13,757	14,334	15,438	CONT.	CONT.

B. (U) DESCRIPTION: Developments in this program will enable the U.S. Navy to overcome deficiencies which constrain deep ocean operations in the areas of search, location, rescue, recovery, salvage, underwater construction, and protection of offshore assets. This program develops the medical technology, the diver life support equipment and the vehicles to permit manned and unmanned underwater operations to depths of 20,000 feet (98% of the ocean bottom).

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Ocean Engineering Technology Development
PROJECT NUMBER: M0099 PROJECT TITLE: Deep Submergence Biomedical Development

C. (U) DESCRIPTION: Develops biomedical technology to increase diver safety and effectiveness for current operations, and supports deeper, longer, safer dives.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Improved resistance criteria for unmanned tests of breathing gear.
b. (U) Recommended active supplemental heating requirements for divers.
c. (U) Reported results of high carbohydrate diets upon diver work capacity.
2. (U) FY 1990 Program:
a. (U) Report nitrogen/oxygen/helium utility for Deep Submergence Rescue.
b. (U) Recommend optimal acclimation regimens for very cold water diving.
c. (U) Issue manual of chamber atmosphere control, monitoring and decontamination, and new diver's air purity/temperature standard.
d. (U) Deliver decompression table model for an nitrogen/oxygen mixture.
3. (U) FY 1991 Plans:
a. (U) Issue definitive thermal/diet/fluid guidance for cold water dives.
b. (U) Develop comprehensive physiologic design criteria for breathing gear.
c. (U) Develop model of helium/oxygen saturation decompression
d. (U) Do human trials of protocols limiting brain injury from gas embolism.
4. (U) Program to Completion: This is a continuing program.
a. (U) Deliver comprehensive medical recommendations for submarine rescue.
b. (U) Report universal hearing conservation standard for manned diving.
c. (U) Develop comprehensive human oxygen toxicity risk model.
d. (U) Determine optimal recompression schedule for inner ear bends.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVMEDRSCHINSTITUTE, Bethesda, MD and NAVSUBMEDRSCHLAB, New London, CT. CONTRACTORS: University of PA, Philadelphia, PA; Duke University, Durham, NC; State University of NY, Buffalo, NY.

F. (U) RELATED ACTIVITIES: PE 1110011N, (Naval Special Warfare), scenario specific analysis of physiologic requirements and enhancement.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: US-France cooperation in Oceanography, 1969; MWDDEA-N-76-A-5816 US/Australia - Underwater Physiology, 1976; no US corporate, DOD or foreign financial commitments.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Ocean Engineering Technology Development
PROJECT NUMBER: S0396 PROJECT TITLE: Deep Depth Diving

C. (U) DESCRIPTION: This project develops deep depth diving life support equipment and diver tools to safely support Navy divers performing saturated diving to depths of 1,000 feet and one-man, one-atmosphere diving to depths of 2,000 feet.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed unmanned reliability testing of the Navy One Man, One Atmosphere Diving System (NOMOADS).
   b. (U) Initiated certification planning for the NOMOADS.
2. (U) FY 1990 Program:
   a. (U) Initiate reliability hydrostatic pressure testing of NOMOADS torso. Requires destructive testing for certification.
   b. (U) Conduct testing of NOMOADS joints.
   c. (U) Conduct feasibility study of roving submarine rescue chamber.
3. (U) FY 1991 Plans:
   a. (U) Complete certification testing of pressure housing.
   b. (U) Complete testing of NOMOADS joints.
   c. (U) Initiate manned, laboratory controlled testing (shallow).
   d. (U) Complete requirement documentation for roving submarine rescue chamber.
4. (U) Program to Completion:
   a. (U) Complete Navy certification of two NOMOADS systems and turn over to fleet operations.
   b. (U) Complete roving submarine rescue chamber development, certification, and approval for full procurement.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Center, Panama City, FL; David Taylor Research Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA.

F. (U) RELATED ACTIVITIES: PE 0603702N, Ocean Engineering Systems Development; PE 1110011N, Naval Special Warfare; PE 0204561N, Man-in-Sea Program. (OPN).

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Ocean Engineering Technology
PROJECT NUMBER: S0397 PROJECT TITLE: Deep Ocean Technology

C. (U) DESCRIPTION: The objective of this project is to identify and develop critical vehicle technologies required for the Navy to function effectively in the deep ocean environment to depths of 20,000 feet.
D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Completed at-sea test of the Advanced Tethered Vehicle (ATV) cable handling and recovery system.
b. (U) Initiated at-sea testing of ATV.
c. (U) Completed assembly of the untethered Advanced Unmanned Search System (AUSS) and debugged system.
2. (U) FY 1990 Program:
a. (U) Complete ATV long duration (greater than 24 hrs) 20,000 foot working dive.
b. (U) Initiate at-sea testing of AUSS (shallow unmanned, untethered, free swimming).
c. (U) Complete upgrade of AUSS search sensors.
d. (U) Conduct AUSS acoustic data link testing to 20,000 foot depth.
e. (U) Initiate design analysis of advanced manned submersible
f. (U) Initiate robotic work system and deep recovery device development for ATV system.
3. (U) FY 1991 Plans:
a. (U) Complete ATV deep ocean bottom work testing.
b. (U) Complete formal ATV fleet turnover.
c. (U) Conduct deep ocean (20,000 ft. depth) search testing with AUSS.
d. (U) Complete data suppression program to allow near real time acoustic (TV and sonar) transmission through water column for AUSS.
4. (U) Program to Completion: This is a continuing program.
E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Center, Panama City, FL; David Taylor Research Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA. CONTRACTORS: Rochester, INC., Tension Member Tech, EDO Western, and various other competitive contracts.
F. (U) RELATED ACTIVITIES: PE 0603702N Ocean Engineering Systems Development, DARPA UUV Program.
G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.
H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control (C^2) Systems (Adv)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1743	C^2 Processor	18,892	9,879	6,939	9,107	74,518
X1753	Link 11 Impv	13,025	12,908	19,926	Cont.	Cont.
	Total	31,917	22,787	26,865	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

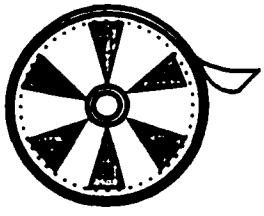
(U) This program element develops the Command and Control Processor (C^2P) and Link 11 Improvements (LEI). The C2P project uses Non-Developmental Item (NDI) acquisition of standard Navy computers (AN/UYK-43) and develops software programs to interface between tactical digital communication systems and selected shipboard processors. The processor will provide translation between TADILs A, C and J and isolate all tactical data link communications equipment, message standards and protocols from tactical information processors. This will provide a flexible capability for rapidly exchanging tactical information using a single universal database for translating various link formats while remaining completely independent of communications equipment and tactical data computing systems.

(U) The Link 11 Improvement Program is designed to improve existing Link 11 tactical data systems and the associated high speed, computer-to-computer digital radio communications. This effort will be conducted in three phases with Phase I providing near term improvements to the existing Link-11 equipment and software. Phase II includes cooperative efforts ongoing with NATO through the NATO Improved Link Eleven (NILE) Program Management Office located in Washington, D. C. for project definition. Phase III provides longer range architectural and communications protocol changes intended to take full advantage of the radio frequency spectrum and provide both increased data handling capacity and improved access time. These changes apply to Combat Direction System (CDS) equipped ships, submarines, aircraft and shore sites.

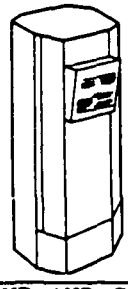
FY 1991 RTD&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1743 PROJECT TITLE: Command and Control Processor (C^2P)

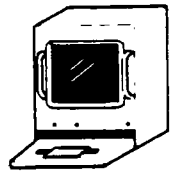
C2P COMPUTER PROGRAM



AN/UYK-43



USQ-69



POPULAR NAME: COMMAND AND CONTROL PROCESSOR (C^2P)

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES		MS II		IIIA & IIIB
ENGINEERING MILESTONES			FQR Version 0	FQR Version 1
T&E MILESTONES		TRR	OT IIA OPEVAL Version 0	OPEVAL Version 1
CONTRACT MILESTONES	REFORMAT CPIF			

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	11,487	4,472	2,240	3,635
SUPPORT CONTRACT	733	637	687	717
IN-HOUSE SUPPORT	559	464	507	526
GFE/ OTHER	6,113	4,306	3,505	4,229
TOTAL	18,892	9,879	6,939	9,107

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1743 PROJECT TITLE: Command and Control Processor (C^2P)

B. (U) DESCRIPTION:

(U) The Command and Control Processor will remove link translation and processing duties from the tactical data processor, thereby increasing track capacity and target insertion rates for the combat direction system. The C^2P will be a newly developed computer program hosted on Navy standard computers (AN/UYK-43) that will serve as the interface between tactical digital communication systems and selected shipboard processors, providing a rapid and flexible capability for exchanging tactical information. Where installed, the C^2P will isolate all tactical data link equipment, message standards and protocols from tactical information processors. The C^2P provides the interface between Links 4A, 11, Improved Link 11, 16, the Advanced Combat Direction System (ACDS), and AEGIS Command and Decision (C&D). The C^2P will extract information from Tactical Digital Information Links (TADILs), translate between TADILs, forward data between specific TADILs and provide the information derived from those links to on-board processors. Information received from shipboard processors will be formatted and provided to the appropriate link equipment for transmission. The C^2P program is being developed in two versions. Version 0 will support ACDS Block 0 and AEGIS Model 4 C&D ships. Version 1 will support ACDS Block 1 and AEGIS Model 5 C&D ships.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Acquired hardware (VAX) for Software Development Facility.
   b. (U) Continued software coding.
   c. (U) Started contractor developmental T&E (CDT&E).

2. (U) FY 1990 PROGRAMS:
   a. (U) Conduct initial Test Requirements Review (TRR)
   b. (U) Begin initial Government Acceptance Test
   c. (U) Continue software coding and CDT&E.
   d. (U) Conduct second Test Requirements Review (Version 0).
   e. (U) Conduct ship system integration testing (Version 0) at shore based test site.

3. (U) FY 1991 PLANS:
   a. (U) Conduct Technical Evaluation (Version 0) (DT-IIB).
   b. (U) Conduct Operational Evaluation (Version 0).
   c. (U) Complete software coding (Version 1).
   d. (U) Conduct Government Acceptance Tests (Version 1).
   e. (U) Conduct multi-ship integration testing (Version 1) at shore based test site.

FY 1991 RTD&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1743 PROJECT TITLE: Command and Control Processor (C^2P)

4. (U) PROGRAM TO COMPLETION:
   a. (U) Conduct Technical Evaluation Version 1.
   b. (U) Conduct Operational Evaluation Version 1.

D. (U) WORK PERFORMED BY: IN-HOUSE: FLTCOMBATDIRSSACT, San Diego, CA; NAVOCEANSYSCEN, San Diego, CA. CONTRACTORS: Hughes Aircraft Company, Fullerton, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:
(U) OR, December 1985
(U) NDCP, Feb 1988 (Revised Nov 1989)
(U) TEMP 357-2, Oct 89

G. (U) RELATED ACTIVITIES:

(U) PE 0205604N, Tactical Information System (JTIDS).
(U) PE 0604518N, CIC Conversion (ACDS).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands, Units/Cost)

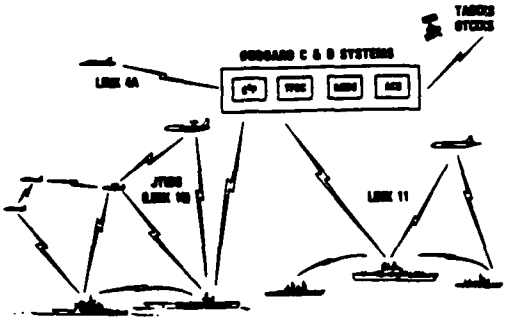
	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT					
OPN (BA2) #95	0	0	9/ 9,619	81/ 84,473	90/ 94,092
OPN (BA8) #302	0	0	1,791	9,942	11,733

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: None.

FY 1991 RTD&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1753 PROJECT TITLE: Link Eleven Improvement



POPULAR NAME: LINK ELEVEN IMPROVEMENT

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	SDR(HFAJ/ LEI)	MS O(Enhance TADIL J)		Cont.
ENGINEERING MILESTONES		MULTS Ver 1 Define CSD		Cont.
T&E MILESTONES			Comp OT of MULTS Ver 1	Cont.
CONTRACT MILESTONES		Award MULTS Compet. Contract		Cont.

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	4,164	2,484	3,000	Cont.
SUPPORT CONTRACT	1,574	2,167	2,967	Cont.
IN-HOUSE SUPPORT	4,979	1,480	11,107	Cont.
GFE/ OTHER	2,308	6,777	2,852	Cont.
TOTAL	13,025	12,908	19,926	Cont.

FY 1991 RTD&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1753 PROJECT TITLE: Link Eleven Improvement

B. (U) DESCRIPTION: (U) The Link 11 Improvement Program (LEIP) is made up of three efforts: near term improvements to the existing Link-11, technical support to the NATO efforts to develop a long range program for an improved Link-11 system, and a demonstration/validation of the LEIP design developed under a previous contract. LEIP improves existing computer-to-computer digital radio communications in HF, UHF and EHF bands among Combat Direction System (CDS) equipped ships, submarines, aircraft and shore sites. Near term improvements include training initiatives, upgraded interoperability testing capabilities, diagnostic upgrades, software enhancements for data terminal sets, OPSPEC upgrades for the TDS/CDS, a Link-11 SATCOM project initiative, and Mobile Universal Link Translator System (MULTS) which is a Link-11 translator between NATO NADGE Link-1, other Allied air defense links and U.S. Navy Link-11. Long range improvements (Enhanced TADIL J) are frequency band independent and include techniques to use a broad range of radio frequency spectrum over which to communicate data link information. These improvements will first focus on an improved waveform and then on mechanisms to improve connectivity between the CDS platforms. These data link improvements will allow more effective employment of fleet units by increasing the timeliness, accuracy, and content of tactical information transfer. In order to ensure interoperability with NATO navies, the U.S. is the lead nation for the NATO Improved Link Eleven (NILE) program which has the same objectives as Enhanced TADIL J. Multiple Unit Link Testing and Operation Training System (MULTOTS) improvements will provide increased interoperability testing and training capabilities.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Restructured the LEIP to reflect the termination of the high Frequency Anti-Jam (HFAJ) program.
b. (U) Completed a System Design Review (SDR) in June 89.
c. (U) Started evaluating initiatives for near term improvements to current Link-11.
d. (U) Leased NDI Mobile Data Link Translator (MDLT) to demonstrate MULTS concept.
e. (U) Completed writing additional MULTOTS software and conducted software tests.

FY 1991 RTD&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1753 PROJECT TITLE: Link Eleven Improvement

2. (U) FY 1990 PROGRAMS:
   a. (U) Develop and field MULTS prototype Version 1.
   b. (U) Complete Concept Exploration phase of Satellite Link-11 task.
   c. (U) Continue Link-11 Training initiatives.
   d. (U) Conduct a feasibility study of Implementation Planning Records (IPRs) submitted by fleet units for urgent Link-11 changes.
   e. (U) Implement upgrades to the AN/USQ-74 Data Terminal Set to improve its synchronization and link diagnostic capabilities.
   f. (U) Develop a specification for a Link-11 Diagnostic System.
   g. (U) Complete concept definition of NILE.
   h. (U) Conduct Milestone 0 review of Enhanced TADIL J.
   i. (U) Develop simultaneous link operation capability.

3. (U) FY 1991 PLANS:
   a. (U) Conduct operational testing and certification of MULTS prototype Version 1.
   b. (U) Field MULTS prototype Version 2.
   c. (U) Demonstrate Link-11 data transfer over UHF satellites.
   d. (U) Continue Link-11 training initiatives.
   e. (U) Commence implementation of selected IPRs.
   f. (U) Start procuring Link Diagnostic Systems.

4. (U) PROGRAM TO COMPLETION:
   a. (U) Field MULTS Versions 3, 4 and 5.
   b. (U) Field satellite Link-11 capability.
   c. (U) Field Link Diagnostic Systems.
   d. (U) Develop and field Link-11 changes to satisfy urgent IPRs.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRDEVCEN, Warminster, PA; NAVAIRTESTCEN, Patuxent River, MD; COMNAVAIRSYSCOM, Washington, DC; NAVELEXCEN, Portsmouth, VA; NAVOCEANSYSCEN, San Diego, CA; NRL, Washington, DC; NTISA, San Diego, CA; NAVELEXACT, St. Inigoes, MD; FLTCOMBATDIRSSACT Dam Neck, Virginia Beach, VA. CONTRACTORS: Joint Venture Team (Rockwell International/Marconi), Dallas, TX; MITRE Corp., Bedford, MA; Logicon Inc., San Diego, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET
(U) Impact of Changes:
1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

FY 1991 RTD&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603717N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Command and Control Systems (Adv)
PROJECT NUMBER: X1753 PROJECT TITLE: Link Eleven Improvement

F. (U) PROGRAM DOCUMENTATION:

1. (U) OR X1327 (LEIP), Feb 82
2. (U) DCP (HFAJ/LEI), Jan 87
3. (U) TEMP (HFAJ/LEI), Jan 86

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The NATO Improved Link Eleven (NILE) Program is in Project Definition under a Memorandum of Understanding (MOU) effective November 1987. Participating nations include: CA, FR, IT, GE, NE, SP, UK, US.

J. (U) TEST AND EVALUATION DATA: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603720N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Education and Training
PROJECT NUMBER: R1772 PROJECT TITLE: Education and Training

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1989 Actual	FY 1990 Estimate	FY1991 Estimate	To Complete	Total Program
Education & Training	5,279	5,222	5,983	Cont	Cont

B. (U) DESCRIPTION: This program responds to Congressional and DoD directives to improve training and meet critical needs through advanced technology. It applies automation and expert systems to training development, revision, delivery, and management. Technology areas include artificial intelligence, expert systems, performance training aids, automated performance testing and training evaluation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Applied curriculum/delivery technologies to counter low entry skills in initial technical training. Field tested surface battle management trainer.
2. (U) FY 1990 Program: Begin small extension of training materials development system to logistics information sources. Begin reduced implementation of advanced microcomputer training systems at fleet and reserve sites. Begin applying expert system technology to development of simulations for training.
3. (U) FY 1991 Plans: Apply artificial intelligence to logistics/training materials development. Apply new technologies to performance testing, tying training to new job requirements. Begin implementation of expert tools for training resource management.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NPRDC, San Diego, CA. CONTRACTORS: Instructional Science and Design, San Diego, CA.

E. (U) RELATED ACTIVITIES: Program Elements 0604722S, Education and Training Systems Development; 0603007A, Human Factors, Personnel and Training Technology; 0602233N, Mission Support Technology; 0604703N, Manpower, Personnel, Training, Simulation, and Human Factors; 0604215N, Support Equipment.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: ENVIRONMENTAL PROTECTION

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY1989 ACTUAL	FY1990 EST.	FY1991 EST.	TO COMP	TOTAL PROGRAM
S0400	ORDNANCE RECLAMATION	320	430	484	CONT.	CONT.
S0401	SHIPBOARD WASTE MANAGEMENT	4,417	8,856	9,188	CONT.	CONT.
Y0817	POLLUTION ABATE. ASHORE	1,335	1,401	1,581	CONT.	CONT.
T2042	PLASTIC SUBSTITUTION	0	0	307	CONT.	CONT.
	TOTAL	6,072	10,687	11,560		

B. (U) DESCRIPTION: The goal of this program is to develop 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 enacted for the protection of the environment and to improve the Navy's response to salvage-related pollution incidents. The projects support the Navy requirement to meet environmental standards outlined by the Environmental Protection Agency and the provisions of Executive Order 12088 of October 1978, and DOD Directive 6050.15 of 14 July 1985. The technology developed will permit the Navy to comply with present and future regulations in a cost-effective manner without impairing the military readiness of operational units. The program solicits technology from industry, evaluates breadboard units in the laboratory, and develops prototype equipment for technical and operational evaluation in Navy platforms and facilities. Duplication of effort within the Navy and Department of Defense is avoided through close liaison among the Navy system commands and with the Army, Air Force, Environmental Protection Agency, Departments of Commerce, Transportation and Interior, the U.S. Coast Guard, the Maritime Administration and the National Interagency Committee on Oil and Hazardous Materials. International cooperation and information exchange is achieved with allied nations through direct liaison with NATO-sponsored international symposia. Enhancement of program beginning in FY 1990 addresses issues related to discharges at sea. Legislation (Marine Plastic Pollution Research and Control Act of 1987) implements Annex V of MARPOL, which restricts discharge of all solid waste and prohibits disposal of plastics at sea. The Act requires that the Navy comply within 5 years and report progress to Congress within 3 years. Efforts starting in FY 1990 also address issues associated with ozone-depleting CFC substitution and recovery.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: ENVIRONMENTAL PROTECTION
PROJECT NUMBER: S0400 PROJECT TITLE: ORDNANCE RECLAMATION

C. (U) DESCRIPTION: The purpose of this project is to comply with environmental laws and standards and to provide economically and environmentally acceptable techniques for reclaiming ordnance and its energetic contents, or for disposing of those items for which reclamation is not economical, and to develop techniques and procedures that will minimize environmental effects of essential test explosions.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

Performed solvolytic breakdown and ingredient recovery on Shrike and Harpoon propellants at the one-pound level. Testing of the incinerator system at LANL with carcinogenic containing colored smoke composition was performed. Provided authoritative impact assessment, technology, and other environmental support as needed.

2. (U) FY 1990 PROGRAM:

Design and begin fabrication for 20kg pilot plant for PBX solvent extraction. Test solid propellants and new PBX's for sensitivity to water jets. Scale up solvolytic breakdown/ extraction of Shrike and Harpoon propellants at 5lb level. Prepare reconstituted propellant of explosive formulation. Continue data collection and documentation from all sources to provide authoritative response to Navy needs for environmental assessments of explosive testing.

3. (U) FY 1991 PLANS:

Continue fabrication and installation of 20kg solvent extraction pilot plant. Publish revised handbook on environmental effects of explosive testing. Monitor field tests of controlling sea turtles at East Coast Navy test sites such as Key West.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY:
IN-HOUSE: NSWC; NOSC; NWSC CONTRACTORS: Los Alamos National Labs; University of Missouri, Roloa, MO., El Dorado Engineering, Salt Lake City, Utah.

F. (U) RELATED ACTIVITIES: P.E. 0603609N Conventional Munitions

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: ENVIRONMENTAL PROTECTION
PROJECT NUMBER: S0401 PROJECT TITLE: SHIPBOARD WASTE MANAGEMENT

C. (U) DESCRIPTION: Project develops equipments and procedures for total shipboard waste problems; emphasis is on developing shipboard systems for compliance with national and international regulations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:

Completed TECHEVAL for Shipboard Vertical Trash Compactor (SVTC); designed and fabbed prototype Shipboard Solid Waste Pulper (SWP); completed shipboard plastic waste control demonstration; evaluated preproduction ion-exchange cartridges for mercury removal; completed Organotin (OT) harbor models, LABEVAL of Electrolytic Chlorinator System (ECS), high-flow In-Tank Oil-Water Separator (ITOWS), and bilge Oil Content Monitor (OCM); SHIPEVAL vacuum water closet; design/test composite small craft Oil-Water Separator (OWS). Completed laser sampling/detection for open sea salvage; LABEVAL Off-Ship Firefighting System (OFFS).

2. (U) FY 1990 PROGRAM:

Shock/vibration test SVTC; design/fabricate Plastic Waste Processor (PWP); LABEVAL SWP, develop graywater (GW) and blackwater (BW) ship treatment; evaluate medical waste processing (MWP), CFC recovery amd substitution technologies, and ITOWS; assess recycling shipboard plastic waste; prepare Uniform Industrial Process Instruction (UIPI) for removal of OT paints. LABEVAL laser detection system; SHIPEVAL OFFS.

3. (U) FY 1991 PLANS:

SHIPEVAL SWP, LABEVAL shipboard PWP and GW/BW systems; test MWP, CFC recovery/substitution concepts, CHT monitor/control system, and ITOWS; complete LABEVAL laser detection system.

4. (U) PROGRAM TO COMPLETION: This is a continuing program

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, NOSC; CONTRACTORS: SOMAT (Pomeroy, CA); International Dynetics (York,PA); Oak Ridge National Lab (Oak Ridge, TN); Johns Hopkins Univ. (Baltimore, MD).

F. (U) RELATED ACTIVITIES: NONE

G. (U) OTHER APPROPRIATION FUNDS: NONE

H. (U) INTERNATIONAL AGREEMENTS: NONE

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: ENVIRONMENTAL PROTECTION
PROJECT NUMBER: Y0817 PROJECT TITLE: POLLUTION ABATEMENT ASHORE

C. (U) DESCRIPTION: This project develops cost effective systems and equipment which permit shore establishments to comply with applicable federal, state, and local environmental laws and regulations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

Completed development of real time organotin analyzer and portable marine environmental quality assessment. Completed field testing of marine environmental quality survey capability.

2. (U) FY 1990 PROGRAM:

Develop fiber optic sensors (FOS) for toxic metals and organics, complete portable environmental test system, develop method to estimate AFFF levels in effluents, evaluate technologies to assess/control non-point source discharges, develop specifications for alkyds and epoxies, evaluate in-situ leak detectors for underground storage tanks, develop prototype monitor for lead in water, assess bio-monitoring requirements for standardized bio-monitoring protocols.

3. (U) FY 1991 PLANS:

Complete real-time FOS for organics, initiate dip-stick fluorescence sensor, initiate sediment dosing system to evaluate contaminated dredging sediment, complete evaluation of wetlands for controlling/mitigating non-point source run-off, develop specifications for acrylics and urethanes, develop NOx control technologies, complete sensor for underground tanks, complete bio-monitoring protocols/initiate preemptive monitoring.

4. (U) PROGRAM TO COMPLETION: This is a continuing program

E. (U) WORK PERFORMED AT: IN-HOUSE: NOSC, NCEL: CONTRACTORS: Univ. of Oklahoma (Norman, OK), DART (Oxnard, CA), Computer Science Corp. (San Diego, CA), San Diego State University (San Diego, CA)

F. (U) RELATED ACTIVITIES: P.E. 0602233N (Mission Support)

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: ENVIRONMENTAL PROTECTION
PROJECT NUMBER: T2042 PROJECT TITLE: PLASTIC REMOVAL IN MARINE ENVIRONMENT

C. (U) DESCRIPTION: The purpose of this project is to reduce plastic products used onboard ship. Annex V (Regulations for the Prevention of Pollution by Garbage from Ships) to the 1978 Protocol relating to the International Convention for the Prevention of Pollution from Ships was ratified by Congress and signed into law by the President on 29 December 1987 (Public law 100-200). Annex V prohibits the discharge of plastics from ships. The Navy has 5 years to comply and must report to Congress in 3 years. The Assistant Secretary of the Navy (Shipbuilding and Logistics) has committed the Navy to compliance with the provisions of Annex V, consistent with national security requirements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:
NOT APPLICABLE

2. (U) FY 1990 PROGRAM:
NOT APPLICABLE

3. (U) FY 1991 PLANS:
(U) Research and testing of alternative materials and processes to reduce the volume of plastic materials going on board Navy ships.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Natick Research and Development Center (Natick, MA), DTRC, Annapolis, MD. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: Not Applicable

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603724N Budget Activity: 4
Program Element Title: NAVY ENERGY PROGRAM (ADVANCED)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0829	Energy Conserv. (Adv)	3,943	2,501	3,179	Cont.	Cont.
R0838	Mobility Fuels (Adv)	4,458	4,006	4,362	Cont.	Cont.
	TOTAL	8,401	6,507	7,541	Cont.	Cont.

B. (U) DESCRIPTION: This program supports projects to evaluate, adapt, and develop energy related technologies for ship, aircraft, and land-based operations to: (a) increase fuel-related weapon systems capabilities such as range and time on station; (b) conserve energy and reduce energy costs; (c) develop a capability to use a wider variety of ship and aircraft fuels without affecting equipment performance or reliability; and (d) reduce Navy shore facilities dependence on petroleum fuels. Through 1985, the Navy Energy R&D Program had produced energy cost savings estimated at $127M per year (compared to 1975 consumption rates). As currently funded, savings of $130M per year by 1995 and $200M per year by 2000 are projected compared to 1985 using today's fuel prices.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603724N Budget Activity: 4
Program Element Title: NAVY ENERGY PROGRAM (ADVANCED)
Project Number: R0829 Project Title: Energy Conservation (Advanced)

C. (U) PROJECT DESCRIPTION: This project improves the energy efficiency of Navy ships, aircraft, and shore facilities and thereby contributes to improved fleet sustainability and performance. Major efforts include work to increase the efficiency of aircraft engines and auxiliaries, develop improved hull coating and auxiliary equipment for ships, and evaluate alternate energy sources for use at Navy shore facilities.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued development of advanced anti-fouling paints.
   b. (U) Developed efficient air conditioning and lighting for gas turbine ships.
   c. (U) Continued F404 and T406 aircraft engine improvement projects.
   d. (U) Assessed geothermal resources at naval facilities.
2. (U) FY 1990 Program:
   a. (U) Develop efficient auxiliary equipment for gas turbine ships.
   b. (U) Transition F404 and T406 efficiency improvements to NAVAIR.
   c. (U) Demonstrate Brush Seal Technology in Turbine of GE-27 engine.
   d. (U) Adapt closed loop Environmental Control System (ECS) technology to fighter/attack aircraft.
   e. (U) Continue assessment of geothermal reservoirs.
3. (U) FY 1991 Plans:
   a. (U) Continue GE-27 demonstration and closed loop ECS efforts.
   b. (U) Continue assessment of geothermal reservoirs.
   c. (U) Provide energy conservation input to Integrated Electric Drive program.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Annapolis, MD; NADC, Warminster, PA; NAPC, Trenton, NJ; NCEL, Port Hueneme, CA; NWC, China Lake, CA; NOSC, San Diego, CA. CONTRACTORS: General Electric Corp., Evandale, OH; Teledyne Inet, Torrance, CA; Lockheed, Burbank, CA.

F. (U) RELATED ACTIVITIES: Program Element 0604710N, Navy Energy Program (Engineering).

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603724N Budget Activity: 4
Program Element Title: NAVY ENERGY PROGRAM (ADVANCED)
Project Number: R0838 Project Title: Mobility Fuels (Advanced)

C. (U) DESCRIPTION: This project is designed to reduce the impact on Navy operations of degraded fuel quality, supply interruptions, and rapid changes in fuel cost. Recent trends in fuel quality have affected ship and aircraft performance and reliability. This project is developing: (1) a capability to operate on a wider variety of fuels (i.e., fuels with less tightly controlled properties and/or commercial grade fuels), without compromising system performance and reliability; and (2) revised military fuel specifications which will ensure the procurement of good quality fuels independent of the crude source or refinery process.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed testing of T700 (LAMPS) and F404 (F/A-18) engines and continued testing of ship gas turbine and high speed diesel engines to determine effects of fuel quality on performance and reliability.
2. (U) FY 1990 Program:
   a. (U) Determine appropriate freeze and pour point requirements for Navy fuels.
   b. (U) Complete ship diesel engine testing with broadened specification fuels.
3. (U) FY 1991 Plans:
   a. (U) Complete test work on current fleet aircraft engines and components most sensitive to fuel properties. Testing will utilize fuels with a wide range of specification properties to determine relationships between fuel property changes and engine reliability.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC Annapolis, MD; NAPC Trenton, NJ; NRL Washington, DC. CONTRACTORS: Allison Gas Turbine, Indianapolis, IN; General Electric Corporation, Lynn, MA; Pratt and Whitney, West Palm Beach, FL; Southwest Research Institute, San Antonio, TX; National Institute for Petroleum Research, Bartlesville, OK.

F. (U) RELATED ACTIVITIES: Program Element 0602233N, Mission Support Technology. This project is part of a joint service program and is coordinated with DOE, NASA and industry.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603725N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: FACILITIES IMPROVEMENT

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Y0095	NAV FAC SYS	1,707	1,000	1,022	CONT	CONT
Y1316	IMPROVED METHODS/ MAT'LS RPMA	700	0	0	CONT	CONT
Y1606	NAVAL CONT FORCES TECH/TOOLS	1,203	0	0	CONT	CONT
TOTAL		3,610	1,000	1,022	CONT	CONT

B. (U) DESCRIPTION: This program addresses pre-attack technology systems and components to increase the survivability of bases and offshore facilities to attack and to develop methods for the rapid post-attack repair of shore and offshore facilities to reduce operational downtime of supported critical functions, e.g., ASW, C3I, etc. Specifically, (a) Initial base vulnerability assessment models, test data reduction, and preliminary camouflage cover and deception (CCD) concepts to enhance statistical survivability at minimum cost will be completed for base repair operational evaluation; (b) Select equipments and techniques for Mobile Construction Battalions and Underwater Construction Teams UCT) will be demonstrated.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603725N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: FACILITIES IMPROVEMENT
PROJECT NUMBER: Y0995 PROJECT TITLE: NAVY FACILITIES SYSTEM

C. (U) DESCRIPTION: This project provides new facility concepts and products to support new generation fleet systems (ships, aircraft, weapons, etc.), and equipment, and procedures to assess the condition of the Navy's aging facilities

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   - o Initiated construction of full scale test structures to validate performance of missile test cells to support WALLEYE, TOMAHAWK, and STANDARD (R&D) Missiles;
   - o Completed development of lighting criteria for pier to meet security, safety, and productivity requirements;
   - o Phased out 6.3 work on jet engine test cells, facility designed maintenance, expert systems, and DDG-51 berthing piers.

2. (U) FY 1990 PROGRAM: Terminate construction of Missile Test Cell due to lack of funding. Complete preliminary base vulnerability models and CCD test data reduction.

3. (U) FY 1991 PLANS: Design vulnerability camouflage and deception concepts to be test demonstrated. Develop efficient and structurally safe magazines that will reduce time/manpower required when storing and retrieving large missiles.

4. (U) PROGRAM TO COMPLETION: Completes in FY 1991.

E. (U) WORK PERFORMED BY: IN-HOUSE: NCEL, Port Hueneme, CA; CONTRACTORS: Terminal Effects Research & Analysis, New Mexico Mining & Tech, Socorro, NM; Gustav Getter Assoc., New Rochelle, NY; Giannotti, Ventura, CA; Garjak Research Inc., San Diego, CA; Ammann & Whitney, New York, NY; and Nathan T. Hale Group, Alexandria, VA.

F. (U) RELATED ACTIVITIES: Products from Program Element 0602233N, Mission Support Tech; Program Element 0602234N, Systems Support Tech are systematically transitioned to this project.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands): Not Applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603729M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Advanced)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0077	Mine Warfare (Advanced)[a]	351	(1,846)	(1,155)	Continue	Continue
C0078	Combat Service Support (Advanced)	1,471	826	1,229	Continue	Continue
C0082	Aviation Support Material/Equipment	506	141	103	104	3,509
C1966	Surf Zone Container Handler[b]	385	845	(1,183)	(2,438)	(7,712)
C1967	Mine Clearing (Advanced)	5	[c]	[d]	Continue	Continue
C1968	Mine Detection System (Advanced)	5	[a]	[a]	Continue	Continue
C1969	Mine Neutralization Equipment[e]	5,279	(2,490)	(3,078)	Continue	Continue
C1983	Tactical Fuel Systems[b]	1,287	171	693	Continue	Continue
C2029	Directed Energy Countermeasures[f]	2,160	(3,290)[a]	(4,633)[a]	Continue	Continue
	TOTAL	**11,449**	**1,983**	**1,332**	**Continue**	**Continue**

a Funded and discussed in Program Element 0603612M, Marine Corps Mine/Countermeasures (Advanced).
b Funded in Program Element 0604717M, Marine Corps Combat Service Support (Engineering) in FY 1991 and outyears.
c Discussed in Program Element 0603612M, Marine Corps Mine/Countermeasures (Advanced).
d Funded in Program Element 0604612M, Marine Corps Mine/Countermeasures (Engineering).
e Funded and discussed in Program Element 0604612M, Marine Corps Mine/Countermeasures (Engineering) in FY 1990 and outyears.
f Funding contained in C1598 Nuclear/Biological/Chemical Equipment in FY 1988 in Program Element 0603635M, Marine Corps Ground Combat/Supporting Arms Systems (Advanced).

B. (U) DESCRIPTION: This Program Element permits the advanced development of Combat Logistics Support Equipment and specifically will develop automated aids for site selection, design, and estimation of construction and provide state of the art earthmoving and excavating construction equipment. This element also funds the advanced development of Marine Corps equipment needed for the supply, maintenance, motor transport, engineer, and service support of operating forces.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603729M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Advanced)
PROJECT NUMBER: C0078 PROJECT TITLE: Combat Service Support (Advanced)

C. (U) DESCRIPTION: This project provides for mobile earth moving equipment and a field fortification program.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Conducted DT for Enginering Support Tractor (EST).

b. (U) Terminated Rapid Excavator program.

c. (U) Terminated Amphibious Objective Area Land Management System.

2. (U) FY 1990 PROGRAM:

a. (U) Contract for EST engineering development prototype.

b. (U) Initiate start-up of Field Fortification program.

3. (U) FY 1991 PLANS:

a. (U) Continue development of Field Fortifications.

b. (U) Develop specifications and technical data for EST in preparation for OT.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCEL, Port Hueneme, CA. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None. (Pending POM Submission).

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603729M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Advanced)
PROJECT NUMBER: C0082 PROJECT TITLE: Aviation Support Material and Equipment

C. (U) DESCRIPTION: This project supports Marine Corps improvements in aviation operational capabilities.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued to develop interoperability of Radar Beacon Forward Air Control Tactical Data Communucations Central (RABFAC-TDCC) with aviation support applications to provide data link communications in many different battlefield conditions.

b. (U) Conducted flight demonstrations of the RABFAC-TDC with Navy and Marine aircrews at several facilities throughout CONUS. Continued to examine and evaluate the possibility of additional applications. Began initial procurement of PPN-19 modification kits. Initiated retrofit program.

2. (U) FY 1990 PROGRAM: Continue RABFAC-TDC development for aviation and assault support (Naval Gunfire) applications without reliance on voice communications. Conduct additional flight demonstrations. Continue with final procurement of modification kits for existing PPN-19 Beacon systems.

3. (U) FY 1991 PLANS: Conduct RABFAC-TDC OT of aviation and assault support platforms and continue with procurement of remaining modification kits.

4. (U) PROGRAM TO COMPLETION: Research and develop aviation associated equipment for emerging fleet requirements.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA. CONTRACTORS: Motorola, Inc., Tempe, AZ; Research Associates of Syracuse, Inc., Syracuse, NY.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603732M BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Advanced Manpower/Training Systems
PROJECT NUMBER: C0073 PROJECT TITLE: Human Resources Management/Forecasting

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0073	Human Resources	3,083	3,969	3,110	Continue	Continue

B. (U) DESCRIPTION: This program funds the advanced development of systems and equipment to improve the manpower readiness of the Fleet Marine Force and develops techniques and methods that advance the use and control of human resources in the Marine Corps.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed the Officer Assignment Decision Support System (OADSS) and began new phase of Joint Performance Measurement (JPM).

2. (U) FY 1990 PROGRAM: Two new programs are initiated: Joint Human Resource Studies (JHRS) to identify system vulnerability and Precise Personnel Assignment System (PREPAS) II to plan for incorporation of new technologies into manpower systems. Conduct JPM field testing.

3. (U) FY 1991 PLANS: Implement the Selective Reenlistment and Enlistment Bonus models; develop alternative corrective strategies for JHRS; formulate modernization proposals and estimate requirements for PREPAS II. The Reserve Program Module and Qualified Military Available are completed for Automated Recruit Management System.

4. (U) PROGRAM TO COMPLETION: This is a continuing program to model software for Marine Corps manpower planning in numerous discrete areas.

D. (U) WORK PERFORMED BY: IN-HOUSE: NPRDC, San Diego, CA. CONTRACTORS: Rehabilitation Group Inc., American Institutes for Research, Washington, DC, ATAC, Herndon, VA., and Computer Sciences Corporation, Falls Church, VA.

E. (U) RELATED ACTIVITIES: This program relates to all armed services' human resources management and forecasting; provides funding to develop Marine Corps-unique requirements and participate in Congressionally directed joint service efforts.

F. (U) OTHER APPROPRIATION FUNDS: Manpower Models are O&M,MC maintained.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603733N Budget Activity: 2
Program Element Title: Simulation and Training Device Technology
Project Number: W1773 Project Title: Simulation & Training Devices

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Simulation and Training Devices	6,298	973	5,042	Cont	Cont

B. (U) DESCRIPTION: This program demonstrates proof-of-concept, risk reduction, and cost effectiveness in simulators and training technology. It links exploratory development and engineering prototypes in aviation, surface and subsurface training systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Developed/demonstrated technology for advanced, deployable weapon-system part-task trainer for F/A-18; developed and demonstrated embedded radar trainer for SPA 25G technology, enabling large reduction in acquisition cost; and began universal threat environment generator technology demonstration to support joint-service acquisition.
2. (U) FY 1990 Program: Focus on technologies for full-mission rehearsal capability for deployable trainer.
3. (U) FY 1991 Plans: Continue work on deployable trainers, embedded training systems; expand tactical environment simulators to F-14/A-6; add suface component to crew coordination.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NTSC Orlando, FL. Contractors: Singer/Link, Binghampton, NY and Silver Springs, MD; General Electric, Syracuse, NY; Texas Instruments, Dallas, TX; Honeywell, Minneapolis, MN; American Airlines, Dallas, TX.

E. (U) RELATED ACTIVITIES: Program Elements 0602233N, Training Devices and Simulation; 0604703N, Personnel Training, Simulation & Human Factors; 0603216A, Synthetic Flight Simulator Development; and 0603227F, Personnel, Training and Simulation Technology; 0603701N Human Factors Engineering.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Advanced ASW Technology Demonstration
PROJECT NUMBER: X1933 PROJECT TITLE: Advanced ASW Technology Demonstration

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1933	Advanced ASW	146	37,276	16.351	CONT.	CONT.

B. (U) DESCRIPTION: Advanced ASW Technology Demonstration proves concepts through at-sea and Arctic field experiments and Advanced Collection Technologies (ACT) to support a cross-platform direct measurement program. This advanced sources for and ASW C³I and ASW Advanced Technology. The program provides specifications for engineering developments to field ASW passive and active systems capable of detecting the submarine threat nd to exploit the effects of the Arctic environment on ASW operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Planned for Processing and tasks in FY 1990.
2. (U) FY 1990 Program:
   a. (U) Continue in support of FDS and Passive Tactical Sensors; commence field tests.
   b. (U) Begin Direct Measurement Program (DMP) to sensors and processing.
   c. (U) Initiate Full Spectrum 6.3A technology demonstration for
   d. (U) Transition competing bender bar technology.
   e. (U) Support transition of sonar.
   f. (u) Model and test at-sea ASW C3 concepts needed to introduce into coordinated fleet operations.
3. (U) FY 1991 Plans:
   a. (u) Transition task element.
   b. (U) Commence integrated ASW technology validation.
   c. (u) Continue Advanced Collection Technology Program to
4. (U) Program to Completion: This is a continuing program.

PROGRAM ELEMENT: 0603747N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Advanced ASW Technology Demonstration
PROJECT NUMBER: X1933 PROJECT TITLE: Advanced ASW Technology Demonstration

D. (U) WORK PERFORMED BY: In-House: NOSC, San Diego, CA; NADC, Warminster, PA. Contractors: Hughes Aircraft Co., Fullerton, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (u) Technical Changes: Department adjustment of +11,330 is due to ASN restructure of project to reflect emerging requirement for Advanced Collection Technolgies _ _and requisite ASW C3 technologies.
2. (U) Schedule Changes: None
3. (U) Cost Changes: None.

F. (U) PROGRAM DOCUMENTATION:

NAPPD #053-98	7 Apr 1987
OP-95 Memo 951G2.51479-87	27 Jul 1987

G. (U) RELATED ACTIVIES: PE 060708N (Anti-Submarine Warfare Signal Processor); PE 0204311N (Undersea Surveillance Systems); PE 0204313N (Surveillance Towed Array Sensor System); PE 0603792 (Advanced Technology Transition); PE 0604261N (Air ASW).

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603763N BUDGET ACTIVITY: 4

PROGRAM ELEMENT TITLE: Warfare System Architecture and Engineering

PROJECT NUMBER: X1991 PROJECT TITLE: WSA&E

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1991	WSA&E	9,617	6,783	6,891	Cont.	Cont.

B. (U) DESCRIPTION: (U) WSA&E assesses warfighting value of programs for Navy functions (Sea Control, Power Projection); forces (Carrier Battle Force (CVBF)); Warfare Missions (AAW, ASW, ASUW, etc.); and Support Missions (C3, EW, Logistics, etc.). It assesses capability against future top-level requirements and proposes optimized (i.e. systems engineered) warfighting system options. Coordinates efforts to assure system/platform interoperability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued development of warfare system performance baselines.

b. (U) Continued development of Battle Force System Engineering Plan (BFSEP) for C3I.

c. (U) Conducted technological assessments.

d. (U) Developed warfare system level performance and interface specifications for selected force pervasive C3 systems.

e. (U) Developed current architecture descriptions and options for CVBF ASW, AAW, ASUW/STW and C3.

2. (U) FY 1990 PROGRAM:

a. (U) Continue development of warfare system performance baselines.

b. (U) Continue development of Battle Force System Engineering Plan (BFSEP) for C3I.

c. (U) Update systems descriptions previously incorporated in FY 89 BFSEP.

d. (U) Provide architecture performance requirements for specific acquisition programs, and evaluate force level requirements traceability during acquisition process.

e. (U) Develop current architecture descriptions, identify shortfalls and overlaps for some Sea Control related warfare and support missions in support of master planning and appraisal process.

3. (U) FY 1991 PLANS:

a. (U) Continue development of warfare systen performance baselines.

b. (U) Continue development of Battle Force System Engineering Plan (BFSEP) for C3I.

c. (U) Develop current architecture description, identify shortfalls and overlaps, and fiscally constrained options for some Power Projection warfare/support missions in support of master planning and appraisal process.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; NAVOCEANSYSCEN, San Diego, CA; NAVSWC, Dahlgren, VA; NAVAIRDEVCEN, Warminster, PA; NAVWPNCEN, China Lake. CONTRACTORS: Vitro, Silver Spring, MD; APL/JHU, Laurel, MD; TRIDENT, Fairfax, VA; MITRE, Reston, VA; SAIC, La Jolla, CA.

E. (U) RELATED ACTIVITIES: None

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Environmental Acoustic Support (AEAS)

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0120	AEAS Ocean Measurement and Modeling Project	13,502	13,434	14,925	CONT.	CONT.
R2017	Advanced Underwater Acoustic Modeling Project	2,912	17,511	2,503	CONT.	CONT.
TOTAL		16,414	30,945	17,428	CONT.	CONT.

B. (U) DESCRIPTION: The ASW Environmental Acoustic Support (AEAS) Program provides ocean environmental acoustic R&D to assess, enhance and predict the performance of current and proposed ASW surveillance, tactical and weapon systems. This effort is accomplished through at-sea experimentation, numerical model and data base development, fleet technical support and instrumentation development.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Environmental Acoustic Support (AEAS)
PROJECT NUMBER: R0120 PROJECT TITLE: AEAS Ocean Measurement and Modeling Project

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0120	AEAS Ocean Measurement and Modeling Project	13,502	13,434	14.925	CONT.	CONT.

B. (u) DESCRIPTION:

there is an urgent and continuing need to exploit the opportunities to enhance system performance through a better understanding of the ocean environment. This project provides environmental acoustic predictive capability and data essential to optimize the design, development and performance of under sea acoustic surveillance and tactical ASW systems, thus extending detection ranges, increasing the time to possible enemy counter-detection and enhancing ASW platform survivability. It conducts undersea environmental and acoustic measurements and develops computer prediction products, measurement instrumentation, data bases and analyses in support of ASW systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Planned for the first in a series of experiments on environmental acoustics.
   b. (U) Launched new experimental and modeling programs in support of shallow water ASW and acoustic ASW.
   c. (U) Completed delivery to the Fleet of range dependent prediction models and data bases.
   d. (U) Completed processing, analysis and reporting of Arctic environmental acoustic measurements made during FY 85-87 and developed Arctic tactical guidance publications.
   e. (u) Expanded level of support to
   f. (U) Conducted modest
   g. (u) Delivered prototype prediction and optimization system to the Fleet.
2. (U) FY 1990 Program:
   a. (u) Conduct first in a series of large, carefully controlled experiments to determine and explain the effect of the oceanic environment

PROGRAM ELEMENT: 0603785N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Environmental Acoustic Support (AEAS)
PROJECT NUMBER: R0120 PROJECT TITLE: AEAS Ocean Measurement and Modeling Project

ASW systems.

b. (U) Continue and expand comprehensive ocean measurement and numerical modeling program ASW systems.

c. (U) Conduct demonstration test of a prototype operational acoustic tomography system to evaluate its utility for real-time monitoring of mesoscale ocean features affecting ASW performance.

d. (U) Deliver a passive shallow water range dependent model for Fleet use.

e. (U) Complete publication of AEAS exercise products (descriptions of array and other system performance, tactical decision aids, etc.).

f. (U) Deliver improved sonar system performance prediction and optimization systems to Fleet.

g. (U) Deliver VLF ambient noise data base for patrol aircraft deployments, and expand modeling and measurement programs.

h. (U) Develop improved data bases and models for inclusion in SPARS. Begin development of interface between SPARS and advanced ASW surveillance work station. Initiate development of a performance prediction capability in SPARS.

i. (U) Publish results from FY 1988-89 shallow water exercises, and expand cooperative work with Canada.

j. (U) Complete development and deploy second unit of advanced digital ocean acoustic measurement and recording system.

k. (U) Test prototype digital acoustic measurement and recording system.

3. (U) FY 1991 Plans:

a. (U) Analyze results from FY 1990 open ocean experiments to influence Fixed Distributed System design/deployment decisions and sonar development.

b. (U) Conduct ocean experiment in high interest area in support of sonar development.

c. (U) Deliver a VLF passive range dependent performance prediction model, ambient noise model and acoustic bottom loss data base for use on patrol aircraft.

d. (U) Install performance prediction capability in SPARS.

e. (U) Complete publication of FY 1988-89 shallow water exercise products and tactical decision aids, and expand support of joint experiments with Canada.

f. (U) Conduct joint marginal ice zone experiment

PROGRAM ELEMENT: 0603785N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Environmental Acoustic Support (AEAS)
PROJECT NUMBER: R0120 PROJECT TITLE: AEAS Ocean Measurement and Modeling Project

g. (U) Conduct first in series of major shallow water ASW experiments.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Bay St. Louis, MS; NRL, Washington, DC; NUSC, New London, CT. CONTRACTORS: Applied Research Laboratories, University of Texas, Austin. TX; Planning Systems Inc., McLean, VA and Slidell, LA; Science Applications International Corp., McLean, VA; SYNTEK Engineering and Computer Systems. Inc., Rockville, MD and Bay St. Louis, MS; Datatape Corp., Pasadena, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: Not Applicable
2. (U) Schedule changes: Not Applicable
3. (U) Cost changes: Not Applicable

F. (U) PROGRAM DOCUMENTATION: NAPDD #018-006, 17 January 1986.

G. (U) RELATED ACTIVITIES: PE 0204311N, Undersea Surveillance Systems; PE 0603784N, Fixed Distributed System; and PE 0603792N, Advanced Technology Transition.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Environmental Acoustic Support (AEAS)
PROJECT NUMBER: R2017 PROJECT TITLE: Advanced Underwater Acoustic Modeling Project

C. (U) DESCRIPTION: This Project is focused on the development of a multi-sensor ASW system performance prediction capability in support of ASW systems currently being planned and developed for use in the 1990's.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Continued development of modeling capability.
b. (U) Continued evaluation of models based on Critical Sea Tests (CST) data.
c. (U) Evaluated range-dependent 3-D models.
2. (U) FY 1990 Program:
a. (U) Finalize development of modeling capability.
b. (U) Provide modeling and environmental acoustic measurement support to CST Program and test active model results with CST data.
c. (U) Test simulation of on acoustic performance prediction in
d. (U) Deliver range-dependent system design model.
3. (U) FY 1991 Plans:
a. (U) Deliver range-dependent model for Fleet use.
b. (U) Test model on and SQQ-89I experiments.
c. (U) Begin integration of oceanography and reverberation model into the 3-D transport model.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Bay St. Louis, MS; NRL, Washington, DC; NAVOCEANSYSCEN, San Diego, CA. CONTRACTORS: Science Applications International Corp., McLean, VA; Planning Systems Inc., McLean, VA and Slidell, LA; SYNTEK Engineering and Computer Systems, Rockville, MD and Bay St. Louis, MS.

F. (U) RELATED ACTIVITIES: PE 0603792N, Advanced Technolgy Transition; PE 0603747N, Advanced Anti-Submarine Warfare Technology; and PE 0603708N, Anti-Submarine Warfare Signal Processing.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603792N Budget Activity: 2
Program Element Title: Advanced Technology Transition

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY1991 Estimate	To Complete	Total Program
R1889	Advanced Technology Transition (ATD)	31,703	43,336	49,099	Cont.	Cont.
X1959	At Sea ASW Critical Experiments	24,107	24,214	2,044	0	75,181
TOTAL		55,810	67,550	51,143	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT:

1. (U) The Advanced Technology Transition Program Element addresses a vital issue within the Navy technology base - the transition of maturing technologies which best meet Navy needs. This is often difficult for high risk/high payoff technologies and also for those technologies which tend to have broad systems application. This program is a primary Navy vehicle for implementation of recommendations of the Packard Commission and 1987 Defense Science Board Study. The program provides transition of the Navy's most promising technological opportunities into 6.3B and 6.4 programs through risk-reducing Advanced Technology Demonstrations (ATD). It provides a linkage between Navy requirements and emerging technologies, promotes transition of the best maturing 6.2 concepts, and reduces systems development risk.

2. (U) The program element also supports Critical Sea Test (CST) effort to reduce uncertainty in the _system performance and design in the early phases of Navy commitment for system development. The program, through a series of extensive at-sea experiments, resolves critical _echnology issues (i.e., _ _which validate concepts supported by the ASW Master Plan and apply over all ASW and surveillance platforms. These system concepts are critical to counter the rapid advances in Soviet submarine quieting demonstrated in the_

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603792N Budget Activity: 2
Program Element Title: Advanced Technology Transition
Project Number: R1889 Project Title: Advanced Technology Transition

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R1889	Advanced Technology Demonstration	31,703	43,336	49,099	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Advanced Technology Transition project is designed to transition the best and most needed technologies into development programs. It supports the development of risk-reducing Advanced Technology Demonstrations (ATDs) of no more than three years in duration of systems or sub-systems with clear Navy need and very high payoff. A unique feature is the up-front development of a transition plan into a 6.3B or 6.4 program upon successful completion of each ATD. Progress toward transition is closely monitored through reviews and assessments. Sources of emerging technological opportunities include Navy and other services 6.2 projects, DARPA and DOE laboratory efforts. A special effort is made to take advantage of the $5 billion industry IR&D program through leverage of industry planning, active liaison with on-going efforts, and exploitation of its output. The Project is scheduled to grow until reaching a steady state level in FY 94.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY-1989 Accomplishments:

- o (U) Advanced Fiber Optics Technology - Demonstrated feasibility of an
- o (U) SEA RAY -
- o (U) TACTERM - at Pacific test range.
- o (U) Undersea Weapons Technology -
- o (U) All Optical Towed Array -
- o (U) Unified Network Technology - Tested multi-network simulator; fabricated anti-jam hardware, and HF/UHF sub-net brassboards
- o (U) Airborne Transient Processor -
- o (U) Fiber Optic MK 48 ADCAP - Completed Electro-optic interfaces.
- o (U) Ultra-Low-Noise Crossed Field Amplifier (CFA) - Built model CFA.
- o (U) Magnetic Acoustic Detection of Mines -
- o (U) Surveillance Infrared Search and Track (IRST) - Integrated High Altitude Remote Platform Surveillance System (HARPSS) IRST sensor head into a laboratory P-3 aircraft.
- o (U) Adaptive Monopulse Countermeasures - Integrated technologies.
- o (U) Quiet Weapon Launch - Completed system design.

Program Element: 0603792N Budget Activity: 2
Program Title: Advanced Technology Transition
Project Number: R1889

2. (U) FY 1990 Program:
- o (C) All Optical Towed Array -
- o (U) Unified Network Technology - Test mixed-media multi-network.
- o (U) Airborne Transient Processor Program -
- o (U) Fiber Optic Mk 48 ADCAP
- o (U) Ultra-Low-Noise CFA - Finalize Ultra-Low Noise design.
- o (U) Magnetic Acoustic Detection of Mines -
- o (U) Surveillance IRST - Fleet exercise demonstration.
- o (U) Adaptive Monopulse Countermeasures -
- o (U) Quiet Weapon Launch - Electromagnetic launcher fabrication.
- o (U) Programmable Automated Welding System for Complex Ship Structures - Refine smart weld controller/system configuration.
- o (U) Advanced Techniques/Products for Combat Wound Management - prepare antibiotic beads and advanced wound dressing for tests.
- o (U) Synthetic Red Blood Cells - Animal testing; human studies.
- o (U) Missileborne Integrated Neural Network Demonstration -
- o (U) Undersea Weapons Guidance and Control - Integrate hardware.
- o (U) Advanced ESM for Ship Defense -

3. (U) FY 1991 Plans:
- o (U) Ultra-Low-Noise CFA -
- o (U) Surveillance IRST -
- o (U) Adaptive Monopulse Countermeasures - System integration; at-sea tests.
- o (U) Quiet Weapon Launch - Laboratory in-water tests.
- o (U) Programmable Automated Welding System for Complex Ship Structures - Enhance complex weld controller/sensors.
- o (U) Advanced Techniques/Products for Combat Wound Management - Conduct large animal testing.
- o (U) Synthetic Red Blood Cells - Human hemoglobin production.
- o (U) Missileborne Integrated Neural Network Demonstration -
- o (U) Undersea Weapons Guidance and Control - In water demonstration.
- o (U) Advanced ESM for Ship Defense -
- o (U) Advanced Electronic Decoy for Defense Against Anti-Shipping Missiles Incorporating ECCM -
- o (U) High Performance Low Cost Planar Hydrophones - Fabricate prototype array components.
- o (U) SPOTLIGHT - Design
- o (U) Fluid Flight Control Demonstration - Design control for F/A-18.
- o (U) Quiet High Speed Surface Ship Propellers -
- o (U) Air/Surface ASW Weapon, High Energy Propulsion

4. (U) Program to Completion: This is a continuing program.

Program element: 0603792N Budget Activity: 2
Program Title: Advanced Technology Transition
Project Number: R1889

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Weapons Center, China Lake, CA; Naval Surface Weapon Center; Dahlgren, VA; Naval Underwater Systems Center, New London, CT; David Taylor Naval Research Center, Carderock, MD; Naval Research Laboratory, Washington DC; Naval Research and Development Activity, Bay St. Louis, MS; and various DOE Laboratory. CONTRACTORS: Litton, Westinghouse, Honeywell, Hughes, AT&T, Sunstrand, and Applied Research Lab (Penn State University), Owens-Corning Fiberglass, SAIC, TRACOR, Texas Instruments, Raytheon, Bendix, Gould Battery and Digital Signal Corporation.

E. (U) COMPARISON WITH REVISED FY 1990/1991 BIENNIAL PRESIDENT'S BUDGET SUBMISSION FOR FY 90:

1. (U) TECHNOLOGY CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION: Non-acquisition Program Definition Documents in place for all funded Advanced Technology Demonstration projects.

G. (U) RELATED ACTIVITIES: Navy and other DOD technology base (6.1 and 6.2) Program Elements, DARPA Advanced Prototyping efforts and industry IR&D are the primary sources of technology opportunities to be demonstrated as ATDs.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE:
FY 90: Transition - Advanced Fiber Optic Technology, SEA RAY, Undersea Weapons Technology, and TACTERM.
FY 91: Transition - Unified Network Technology, Airborne Transient Processor, Fiber Optic MK 48 ADCAP, Magnetic Acoustic Detection of Mines, and All Optical Towed Array.
FY 92: Transition - Surveillance IRST, Quiet Weapon Launcher, Ultra-Low-Noise CFA, and Adaptive Monopulse Countermeasures.
FY 93: Transition - Intelligent Welding System, Synthetic Red Blood Cells, Missileborne Integrated Neural Network Demonstration Undersea Weapons Guidance and Control, Advanced ESM for Ship Defense, Advanced Technologies/Products for Combat Wound Management.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603792N Budget Activity: 2
Program Element Title: Advanced Technology Transition
Project Number: X1959 Project Title: At Sea ASW Critical Experiments

C. (u) DESCRIPTION: The Critical Sea Test (CST) Program reduces risk in the

which validate concepts supported by the ASW Master Plan and applies to all ASW and surveillance platforms. These system concepts are critical to counter the advances in Soviet submarine quieting.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (u) Conduct
b. (u) Plan and execute

3. (U) FY 1990 Program:
a. (u) Plan and execute
c. (u) Complete data analysis for

4. (U) FY 1991 Plans:
a. (U) Complete analysis of

5. (U) Program to Completion: N/A.

E. (U) WORK PERFORMED BY: In-House: NRL, Washington, D.C.; NORDA, Bay St. Louis, LA; NAVOCEANSYSCEN, San Diego, CA; NAVCIVENGRLAB, Pt. Hueneme, CA; NAVAIRDEVCEN, Warminster, PA; and NUSC, New London, CT. Contractor: The Johns Hopkins University Applied Research Laboratory, Laurel, MD.

F. (U) RELATED ACTIVITIES: PE 0603785N, ASW Enviromental Acoustic Support(AEAS); PE 0603747N, Advanced ASW Technology Demonstration; PE 0204311N, Integrated Undersea Surveillance System (IUSS) Development.

G. (U) OTHER APPROPRIATION DATA: (Dollars in Thousands). This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: CST was conducted with the United Kingdom under IEP-B-85.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604203N Budget Activity: 4
Program Element Title: Standard Avionics Development

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0572	JT SRV/NAV STD AVCS	5,782	12,064	7,488	Cont.	Cont.
W1630	CAINS II	1,340	3,302	101	Cont.	Cont.
W0845	AN/AYK-14*	4,449				
	TOTAL	11,657	15,366	7,589	Cont.	Cont.

NOTE: * AN/AYK-14 transferred to P.E. 0604574N in FY 1990.

B. (U) DESCRIPTION: A growing concern in Naval Aviation is the proliferation of unique avionic equipment that increases with each new or modified aircraft. This proliferation of unique Contractor Furnished Equipment (CFE), due to non-availability of off-the-shelf Government Furnished Equipment (GFE), has resulted in a growing cost burden in the areas of development, procurement, logistics, and maintenance. This program develops common avionics for new programs and retrofit programs, if applicable. All acquisition approaches are followed for the least-cost solution to this need, including joint programs, GFE breakout of peculiar items for broad use, foreign and non-development item investigations (funded under those headings when appropriate) and, when practicable and cost effective, dedicated development efforts. These products have application to new architecture "integrated avionics" aircraft, and also older technology "black box" aircraft with major new efforts directed at bridging the gap between these technologies. This forward and retrofit application of common avionics technology is required to maximize aircraft capabilities at a minimum procurement and support cost. The program will specifically address in service out of production avionics with costly R&M deficiencies. This program also includes planning for the development of components/subsystems which have high reliability, which are easily maintained and which have low life cycle costs. An example of a past successful project under this program is the Standard Central Air Data Computer (SCADC) jointly developed with the Air Force and now in production to be the common system on Navy and Air Force aircraft. Using an integrated common module approach, the reliability of SCADC is 10 to 50 times greater than the 13 types of air data computers it replaces.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604203N Budget Activity: 4
Program Element Title: Standard Avionics Development
Project Number: W0572 Project Title: Joint Services/Navy Standard Avionics Components and Subsystems

C. (U) DESCRIPTION: Project provides for the design, development, test, evaluation and qualification of standard avionics for Navy and for other service use. Standard Attitude Heading and Reference System (SAHRS), which enters full production in FY90, will reduce obsolete attitude heading references and proliferation of new development efforts to meet requirements of T-45, F-14D and Army's OV-10. Also during FY90, specification formulation and acquisition planning will be initiated on similar efforts to identify future user needs and develop standard life cycle cost effective equipments such as Ground Proximity Warning Systems (GPWS), Standard Compass System (SCS), Standard Automatic Flight Control System (SAFCS), Solid State Barometric Altimeter (SSBA) and Downed Aircrewman Locator System (DALS).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued delivery of SAHRS FSED hardware.
   b. (U) Continued DAT of SAHRS.
   c. (U) SAHRS TECHEVAL and M/S IIIA for SAHRS (FY-89 Buy).
   d. (U) Specifications/acquisition planning for SCS with USAF.
   e. (U) Engineering studies/specifications (SAFCS, SSBA and DALS).
2. (U) FY 1990 Program:
   a. (U) Complete delivery/DAT of SAHRS hardware.
   b. (U) Complete TECHEVAL/OPEVAL and M/S IIIB on SAHRS.
   c. (U) Begin GPWS (TACAIR) digital map (Penetrate) flight demonstration; GPWS software integration STUDY.
   d. (U) Award FSED contracts for SCS, SSBA and DALS.
3. (U) FY 1991 Plans:
   a. (U) Perform qualification/integration testing for DALS, SCS, and SSBA.
   b. (U) Begin specification formulation for GPWS (HELO) with Army.
   c. (U) Perform GPWS (TACAIR) software integration.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD; NAC, Indianapolis, IN. CONTRACTOR: SAHRS: Kearfott/Astronautics Corp., Little Falls, NJ; Northrop Corp., Boston, MA; GPWS: Ferranti, London, England, TBD; DALS: Cubic Corporation, San Diego, CA; Rockwell Collins, Cedar Rapids, IA; SAFCS: G.E. SCS: TBD; LPI ALT: TBD; JIAWG: TBD.

F. (U) RELATED ACTIVITIES: A tri-service formal charter exists to promote joint development of standard avionics components and subsystems through the Joint Services Review Committee (JSRC) on Avionics Standardization.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APN/#3,8,25,22,14	Not Applicable			Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604203N Budget Activity: 4
Program Element Title: Standard Avionics Development
Project Number: W1630 Project Title: Carrier Aircraft Inertial Navigation System II

C. (U) DESCRIPTION: The Carrier Aircraft Inertial Navigation System II (CAINS II) project provides for the design, development, test, evaluation and qualification of the Navy's next generation standard CAINS. The primary goal of the CAINS II project is to improve fleet performance and reduce system operation and support costs through the application of Laser Gyro sensor technology to replace current aging conventional electromechanical sensor technology in CAINS. The CAINS II effort is directed toward the needs and requirements of all carrier-based fixed-wing aircraft involved in ASW, AAW, and Strike Warfare. CAINS II has been developed competitively by two contractors. Production will be competed between these two sources to minimize recurring costs to the Navy. The CAINS Covert Data Link (CCDL) Program provides a low probability of intercept data link to be used for transferring alignment data from the ships' inertial navigation system to aircraft being readied for flight on the carrier deck.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed OPEVAL of CAINS II.
   b. (U) Began CCDL specification formulation and acquisition planning.
   c. (U) Completed Milestone IIIA limited production for CAINS II.
2. (U) FY 1990 Program:
   a. (U) Obtain approval for full production (M/S IIIB) for CAINS II.
3. (U) FY 1991 Plans:
   a. (U) Package and store the CCDL data package for later use.
4. (U) Program to Completion: This is a continuing program.
   a. (U) Begin specification formulation/acquisition planning for Integrated Reference System (IRS).
   b. (U) Award FSD contract for IRS.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAC, Indianapolis, IN; NADC, Warminster, PA; NOSC, San Diego, CA; NATC, Patuxent River, MD; NSWC, Silver Spring, MD. CONTRACTOR: CAINS II: Litton Aerospace, Woodland Hills, CA; Kearfott/Astronautics Corporation, Little Falls, NJ.; CCDL: TBD.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APN/#3,6,8,10	Not Applicable				Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604208N Budget Activity: 6
Program Element Title: TRAINING RANGE INSTRUMENTATION SYSTEM DEV.

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0604	Training Range & Instrumentation Development	7,714	8,786	9,789	cont	cont

B. (U) DESCRIPTION: This program supports requirements for new and improved range instrumentation and systems to meet the needs of fleet training in areas such as: underwater tracking, telemetry, large area tracking, electronic warfare for surface crews, target control, and laser training.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Completed telemetry station integration design and system specifications. REWS TRS integration. Continued development of the LSTSS and LES-M for laser training.

2. (U) FY 1990 PLANS: Initiate development of the Large Area Underwater Tracking Range (LAUTR). Complete telemetry station subsystem hardware integration and software test. Develop the REWS EW Range Operations Center (EWROC) and upgrade the REWS/TRS multi-beam. Complete development and commence testing of the LES- M and LSTSS EDMs. Commence development of a new enhanced Weapons Impact Scoring Set (WISS) (Version 4) to replace current outdated/obsolete WISS. Initiate development of the Large Area Tracking Range (LATR).

3. (U) FY 1991 PLANS: Telemetry station software integration. Development test of the REWS EW Response Monitor (EWRM) subsystem. Complete development of the REWS EWROC and TRS multi-beam. Continue development of the LAUTR. Initiate development of the Multiple Laser Evaluator System (MLES). Complete testing and fleet evaluation of the LSTSS and LES-M EDMs. Continue development of the Version 4 WISS. Continue the development of the LATR.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: PMTC, Point Mugu, CA; NWC, China Lake, CA; NATC, Patuxent River, MD; NADC, Warminster, PA; Fleet Analysis Center, Corona, CA; NSWC, Dahlgren, VA; NUSC, Newport, RI. CONTRACTORS: SRI Int., Menlo Park, CA; Bunker Ramo, Westlake, CA; MITRE Corp., Washington, DC; Ford Aerospace, Sunnyvale, CA; RCA, Moorestown, NJ; SAIC MIRAPRO, Oxnard, CA.

E. (U) RELATED ACTIVITIES: PE 0204571N, Special Projects.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN	15,515	5,613	8,496	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604211N Budget Activity: 4
Program Element Title: IDENTIFICATION, FRIEND OR FOE SYSTEMS DEVELOPMENT

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0676	Improved ID Dev	4,789	6,188	11,551	Cont.	Cont.
W1253	Combat ID Sys	14,423	1,325	221	Cont.	Cont.
TOTAL		19,212	7,513	11,772	Cont.	Cont.

B. (U) DESCRIPTION: Reliable and secure positive identification systems are essential elements of battle management in the naval environment. In addition to distinguishing friend from foe for weapons employment, the Navy requires secure, jam-resistant Identification Friend or Foe (IFF) systems for battle group air defense management and air traffic control. The resolution of the identification problem is multi-faceted and includes information received from several sensor sources (both cooperative and non-cooperative systems). The Combat Identification System (CIS) project (W1253) covers the development of cooperative identification systems that will rely on improvements to MK XII IFF and non-cooperative target recognition systems via sensor integration techniques. The CIS Project (W1253) will also support the development of the Central IFF (CIFF) system commencing in FY 92, which will provide the vehicle to integrate both cooperative and noncooperative target recognition systems. The Improved Identification Development project (W0676) develops new Non-Cooperative Target Recognition (NCTR) techniques. This project has been restructured to allow rapid fielding of the Shipboard Advanced Radar Target ID System (SARTIS), an NCTR system, on selected ships and AUTO-ID, a multi-sensor integration project, for aircraft carriers and selected AAV ships.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604211N Budget Activity: 4
Program Element Title: IDENTIFICATION, FRIEND OR FOE SYSTEMS DEVELOPMENT
Project Number: W0676 Project Title: IMPROVED ID DEVELOPMENT

A. (U) RESOURCES: (Dollars in thousands)

PROJECT	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0676	4,789	6,188	11,551	Cont.	Cont.

B. (U) DESCRIPTION: This project provides for the development and integration of Non-Cooperative Target Recognition (NCTR) techniques and sensor correlation systems. Major efforts include development of the Shipboard Advanced Radar Target ID system (SARTIS), an NCTR device; development of AUTO-ID which correlates MK XII with kinematic and position data; AN/SLQ-20B, Central IFF, a multisensor ID fusion system (transitions to Project W1253 in FY 1992) ; and support of tri-service NCTR programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U)
   b. (U) Developed SARTIS ADM hardware design; improved algorithms on existing weapons systems and investigated other demonstrations.
   c. (U) Supported tri-service NCTR (TRITIP).
2. (U) FY 1990 Program:
   a. (u)
   b. (U) Assemble AUTO-ID prototypes for evaluation.
   c. (U) Begin CIFF/AUTO-ID integration.
   d. (U) Initiate SLQ-20B development.
   e. (U) Support tri-service NCTR (TRITIP).
3. (u) FY 1991 Plans:
   a. (u)
   b. (U) Procure SARTIS ADMs as part of Rapid Development Capability (RDC) program.
   c. (U) Support tri-service NCTR (TRITIP).
   d. (U) Continue SLQ-20B/antenna development.
   e. (U) Continue assembly of AUTO-ID prototypes; continue CIFF/AUTO-ID integration.
4. (U) Program to Completion:
   a. (U) Continue SARTIS/SLQ-20B/tri-service NCTR efforts until transition to production.
   b. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: COMNAVSEASYSCOM (PMS-400B), Wash., D.C., NRL, Washington, D.C.; NOSC, San Diego, C.A.; NADC, Warminster, P.A., NESEA, St. Indigoes, M.D. CONTRACTOR: Allied/Bendix Communications, Towson, MD; Scope, Inc., Reston, VA; JHU/APL, Laurel, MD.

PROGRAM ELEMENT: 0604211N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: IDENTIFICATION, FRIEND OR FOE SYSTEMS DEVELOPMENT
PROJECT NUMBER: W0676 PROJECT TITLE: IMPROVED ID DEVELOPMENT

E. (C) COMPARISON WITH REVISED 1990/1991 PRESIDENT'S BUDGET:

(1) (U) TECHNOLOGY CHANGES: None
(2) (U) SCHEDULE CHANGES: None
(3) (U) COST CHANGES: An increase of 5,078 results from Department program and budget adjustments. The increase allows for acquisition of and early development of AUTO-ID and SLQ-20B.

F. (U) PROGRAM DOCUMENTATION: O.R. (NCTR) 2/86; O.R. (CIFF) 9/86; TEMP (CIFF) 6/87.

G. (U) RELATED ACTIVITIES: Air Force P.E. 0603742F, Combat Identification Technology; Army P.E. 0603706A, IFF Development; Army P.E. 0604709A, IFF Equipment Development; P.E. 0603382N, Battle Group AAW Coordination.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN	FY 1989	FY 1990	FY 1991	To
OPN #113	Actual	Estimate	Estimate	Complete
		Not Applicable		Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE

SARTIS

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604211N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: IDENTIFICATION FRIEND OR FOE SYSTEMS
PROJECT NUMBER: W1253 PROJECT TITLE: COMBAT ID SYSTEM

A. (U) Resources (Dollars in Thousands)

Project Number	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1253	14,423	1,325	221	Cont.	Cont.

B. (U) DESCRIPTION: Although funding for the MK XV IFF system was deleted from the FY 1991 budget submission, the requirement for a NATO interoperable, secure, jam resistant question and answer ID system remains. Combat ID System (CIS) development will now focus on improvements to the MK XII IFF system and correlation of the MK XII inputs with non-cooperative target recognition data. In FY 1992, the project will also include Central IFF (CIFF), a multi-sensor correlator based on the combination of the AN/UPX-30 and AUTO-ID.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed MK XV IFF demonstration and validation phase.
   b. (U) Supported tri-service preparation for Milestone II (DAB II).
2. (U) FY 1990 Program:
   a. (U) Terminate MK XV program.
   b. (U) Develop plans for Combat ID System (CIS) based on improved MK XII IFF.
3. (U) FY 1991 Plans:
   a. (U) Continue planning for revised Combat ID System.
4. (U) Program to Completion:
   a. (U) Incorporate CIFF into restructured CIS program.
   b. (U) Continue restructured CIS development based on MK XII IFF, NCTR and CIFF.

D. (U) WORK PERFORMED BY: IN-HOUSE: COMNAVSEASYSCOM (PMS-400B) Washington, D.C.; NRL, Washington, D.C.; NOSC, San Diego, C.A.; NAC, Indianapolis, I.N.; NESEA, St. Inigoes, M.D.; NADC, Warminster, P.A.; NATC, Lexington Park, M.D. CONTRACTORS (FSED): Allied/Bendix Corporation, Towson, M.D.; Raytheon Corporation, Marlborough, M.A.; JHU/APL, Laurel, M.D.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

(1) TECHNICAL CHANGES : None
(2) SCHEDULE CHANGES: None
(3) COST CHANGES: FY 1991 reduction of -49,794 reflects a Department budget decision to terminate the MK XV IFF program.

PROGRAM ELEMENT: 0604211N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: IDENTIFICATION FRIEND OR FOE SYSTEMS
PROJECT NUMBER: W1253 PROJECT TITLE: COMBAT ID SYSTEM

F. (U) PROGRAM DOCUMENTATION: MROC 20-83 defined MK XV IFF requirement.

G. (U) RELATED ACTIVITIES: PE 0604725F, Combat ID Systems; PE 0604790A IFF Equipment. These program elements funded the MK XV core program and the Army and Air Force unique integration efforts.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1				
OPN #113	Not applicable			Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The MK XV project was covered by three Memoranda of Understanding. Applicability of these memoranda to a reduced Combat ID System development to be determined.

- o MOU with Italy for Cooperative FSED of MK XV IFF.
- o MOU for Cooperation in Development and Later Stages of the NATO ID System.
  - Signed by US, Canada, Belgium, Denmark, France, Germany, Italy, Spain, Turkey, United Kingdom, Netherlands.
  - US Signed 10 October 1986.
  - Covers data exchanges to assess potential for cooperative development.
- o MOU Concerning Activities Necessary for Cooperative Development of the NATO ID System (Q&A Component).
  - Signed by US, France, Germany, Italy, United Kingdom, Italy.
  - US signed 20 October 1987.
  - Covers cooperation in testing, use of common subcomponents, frequency allocation and other areas.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Light Airborne Multi-Purpose System MK III

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1707	LAMPS Improvement	1,913	114	21,627	CONT.	CONT.
W1902	PENGUIN	8,027	5,815	0	0	30,685
TOTAL		9,940	5,929	21,627	CONT.	CONT.

B. (U) DESCRIPTION: Light Airborne Multi-Purpose System (LAMPS) MK III is a computer integrated ship/helicopter system that greatly increases the effectiveness of surface combatants in anti-submarine and anti-surface warfare with secondary missions of search and rescue, medical evacuation, vertical replenishment and communications relay. For ASW, the LAMPS MK III is a remote platform for deployment of sonobuoys, torpedoes and processing of acoustic and non-acoustic sensor information. For anti-ship surveillance and targeting, LAMPS MK III serves as an elevated platform or radar and electronic support measures and will carry MK 2 Mod 7 Penguin missiles. The ship, through a directional data link provides sensor processing, command and control, and integrates all LAMPS information gained from sensors. The ship also provides Recovery Assist, Securing and Traversing System, visual landing aides, and maintenance/support facilities for the aircraft.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Light Airborne Multi-Purpose System MK III
PROJECT NUMBER: W1707 PROJECT TITLE: LAMPS Improvement

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1707	LAMPS	1,913	114	21,627	CONT.	CONT.

B. (U) DESCRIPTION: Block I Upgrade increases sonobuoy receiver channel capability from 31 to 99, thus increasing operational flexibility in a multi-platform anti-submarine warfare (ASW) environment; modifies the SH-60B armament system to accommodate the MK-50 torpedo increasing attack effectiveness; adds hardware and software provisions for the Global Positioning System (GPS) greatly enhancing the on board navigational accuracy of the SH-60B and significantly improving the effectiveness of all mission areas; and adds hardware and software provisions to accommodate the Penguin missile which provides the SH-60B an offensive surface warfare capability. A Flight Incident Recorder will also be added to aid in post mishap reconstruction. The Block II Upgrade will enter full scale engineering development and represents a major avionics modification to the SH-60B which will greatly enhance both primary mission areas of ASW and anti-surface warfare (ASUW). To enhance ASW effectiveness the Airborne Low Frequency Sonar (ALFS) and UYS-2 processor will be added to the existing acoustic suite. This addition is essential if the ASW effectiveness of LAMPS MK III is to be maintained. ASUW effectiveness will be improved with the addition of an Inverse Synthetic Aperture Radar (ISAR) which will permit stand-off classifi-cation of hostile threats. The final Block II effort will be aimed at improving platform interoperability by equipping SH-60B's with a tactical data transfer system which will permit rapid, secure transfer of mission information between air and surface units.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Continued development of the FIR.
   b. (U) Evaluated ALFS demonstration models.
   c. (U) Completed OT testing of 99 Channel receiver.
   d. (U) Completed OT testing of GPS.
   e. (U) Completed DT/OT testing of MK-50 Torpedo.
   f. (U) Continue DT testing of Penquin missile.
2. (U) FY 1990 Program:
   a. (U) Complete testing of FIR.
   b. (U) Complete Penguin missile.

PROGRAM ELEMENT: 0604212N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Light Airborne Multi-Purpose System MK III
PROJECT NUMBER: W1707 PROJECT TITLE: LAMPS Improvement

3. (U) FY 1991 Plans:

a. (U) Award competitive contract for Block II which will include integration of ALFS and UYS-2, development and integration of ISAR and tactical data transfer system, modify system controls, displays and software, develop logistics, support euqipment, and trainers, and provide testing support throughout the program.

b. (U) Support field activities for competitive proposal evaluations.

c. (U) Procure of ALFS GFE models.

d. (U) Procure of GFE UYS-2 processors.

e. (U) Complete Block I Upgrade FOT&E.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; NATC, Patuxent River, MD. CONTRACTORS: International Business Machines, Owego, NY; Sikorsky, Stratford, CT; Smiths Industries, Grand Rapids, MI.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET: None.

F. (U) PROGRAM DOCUMENTATION:

BLOCK I		FIR		BLOCK II	
TEMP	09/89	TOR	09/85	OR	06/88
		PMP	02/87	PMP	08/88
		TEMP	(02/90)	AP	08/90
				DOP	08/86
				TEMP	(04/91)

G. (U) RELATED ACTIVITIES: PE 0604610N MK 50 Torpedo Development (integration with SH-60B); PE 060477N Global Positioning System integration with SH-60B); PE 0604219N Airborne Low Frequency Sonar (integration with SH-60F).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
APN-1 #17, 18	109,200	187,000	144,400	CONT.	CONT.
APN-5 #44	200	600	45,100	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

PROGRAM ELEMENT: 0604212N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Light Airborne Multi-Purpose System MK III
PROJECT NUMBER: W1707 PROJECT TITLE: LAMPS Improvement

J. (U) MILESTONE SCHEDULE:

BLOCK I		FIR		BLOCK II	
PENGUIN					
FSED	01/85	FSED	06/88	RFP	3Q/90
M/SIIIB	3Q/90	M/SIIIB	3Q/90	FSED	2Q/91
				MS III	FY97

MK-50

99 Channel

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GPS

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1378	AH-1 ACFT	11,518	17,704	14,645	Cont.	Cont.
W2088	MLR ACFT	0	0	51,000	Cont.	Cont.
TOTAL		11,518	17,704	65,645	Cont.	Cont.

B. (U) DESCRIPTION: This program funds the upgrade and modernization of the AH-1 COBRA, and the development of the Medium Lift Requirement (MLR) aircraft, a replacement for the CH-46. Efforts on the COBRA will include the development of a night targeting system (NTS) to permit night or reduced visibilty operations, and development of a new improved wing tip station which will allow the simultaneous carriage of air-to-ground and air-to-air weapons without mission degradation. The MLR effort will develop a capability to deliver combat assault troops beyond current CH-46 distances, under extreme environmental and operational conditions, in a high threat environment.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT
Project Number: W1378 Project Title: AH-1 AIRCRAFT (COBRA)

B. (U) DESCRIPTION: The mission of the AH-1W attack helicopter is to provide close-in fire support and fire support coordination in aerial and ground escort operations during the ship-to-shore phase of amphibious operations and during subsequent operations ashore. Armed with an impressive array of weapons, the AH-1W is limited, however, in its ability to acquire and attack enemy targets at night or during conditions of reduced visibility. This system will incorporate targeting for TOW/TOW 2 missile system, Hellfire missile system, the turreted gun, laser range finder/designator, and day/night sensors with appropriate stabilization/target tracking capabilities. Beginning in FY 1991, FSD efforts will commence on a new wing tip station that will provide the AH-1 an air-to-air missile capability without losing an anti-armor missile station. Currently, the AH-1W cannot carry both Hellfire and Sidewinder/Sidearm missiles on the same stub wing.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Preliminary Design Review was held April 1989 and detail design efforts near completion.
   b. (U) Logistic documentation updated as required.
2. (U) FY 1990 Program:
   a. (U) Critical Design Review conducted November 1989.
   b. (U) Complete Night Targeting System (NTS) fabrication and test of prototype.
   c. (U) NTS aircraft integration of prototype scheduled.
   d. (U) Check-out and ground tests will be performed.
   e. (U) Begin engineering effort for aircraft NTS modification.
3. (U) FY 1991 Plans:
   a. (U) Complete NTS contractor testing.
   b. (U) DT-IIA, OT-IIA completed and DT-IIB begins.
   c. (U) Wing Tip station begins design and development efforts.
   d. (U) NTS modification buys initial kits and logistics.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA.; Pacific Missile Test Center, CA.; Naval Test Center, Patuxent River, MD.; Naval Aviation Depot, Pensacola, FL.; and Naval Aviation Depot, Jacksonville, FL. CONTRACTORS: Israel Aircraft Industries, Tamam Plant, Yahud Industrial Zone, Israel; Kollsman, Merrimack, New Hampshire; Bell Helicopter, Textron, Inc., Ft. Worth, TX.

E. (U) COMPARISON WITH AMENDED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: Departmental reduction of -$2,422K in FY 1991 funding reflects realignments and execution allocation changes. Some testing will be deferred accordingly.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT
Project Number: W1378 Project Title: AH-1 AIRCRAFT (COBRA)

F. (U) PROGRAM DOCUMENTATION: NTS Operational Requirement # 061-05-87 dated 26 Dec 1985. Memorandum of Understanding dated 4 Aug 87 between the United States Government and the Government of Israel. Acquisition Plan #17229 dated 3 August 1988. Test and Evaluation Master Plan # 1244 dated 27 April 1987. Wing Tip Operational Requirement #213-05-90 dated 19 April 1988.

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars In Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	TO Complete	TOTAL Program
APN-5 #46	0	43,931	25,879	Continuing	Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: As agreed to in the Memorandum of Understanding dated August 1986, the United States Government and the Government of Israel are jointly developing the Night Targeting System for integration of the AH-1W and the AH-1S respectively. Common development costs are to be shared on a two-thirds/one-third basis. Unique costs are to be the responsibility of the requiring country, as will the actual modification of the aircraft. There is no unnecessary duplication of effort within the Navy or the Department of Defense.

J. (U) MILESTONE SCHEDULE:

NIGHT TARGETING SYSTEM	DATE
Milestone IIA (ARB)	7/88
FSD Contract Award	9/88
Preliminary Design Review	4/89
Critical Design Review	11/89
Initial Flight Test	1/91
Trial Kit Procurement	11/90
DT/OT IIA Completed	7/91
Milestone IIIA (Limited Prod.)	10/91
DT/OT IIB Completed	5/92
Milestone IIIB (Full Prod.)	9/92

WING TIP STATION	
FSD contract award	4/91
Design reviews/aircraft integration begins	10/91
DT testing performed	4/92
OT testing completed	5/93
Milestone III (Full Prod.)	9/93

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT
Project Number: W2088 Project Title: MEDIUM LIFT REQUIREMENT (MLR)

B. (U) DESCRIPTION: The MLR is a replacement aircraft for the CH-46. The MLR's primary mission will be to provide assault transport of combat troops during amphibious operations and subsequent operations ashore. The aircraft will have the capability to operate at night, in adverse weather, in an NBC environment, over long distances in a high threat environment. The proposed configuration of this aircraft is unknown at this time. This program starts in FY 1991.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Not Applicable.
2. (U) FY 1990 Program: Not Applicable.
3. (U) FY 1991 Plans:
   a. (U) Conduct initial R&D and commence integration study.
   b. (U) Commence development and integration effort.
   c. (U) Award development contract.
4. (U) Program to Completion: This will be a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Systems Command, Washington, D.C. CONTRACTORS: TBD.

E. (U) COMPARISON WITH AMENDED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: None.

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: Production is planned for the outyears.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

MILESTONE I	MAR 91
MILESTONE II	TBD
MILESTONE III	TBD

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604214N

Budget Activity: 4

Program Element Title: AV-8B AIRCRAFT (ENGINEERING)

Project Number: W0652 Project Title: AV-8B

Popular Name: HARRIER

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		N ATTACK IOC 5/90		
Engineering Milestones	ASPJ EMC 6/89		ASPJ FLT TEST	
T&E Milestones	DEV TEST 408/OFP	FLT TEST 408/OFP/LERX		ANNUAL OFP UPDATE
Contract Milestones		1st PROD.DEL F402-RR-408		

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	24,694	20,551	22,061	1,302,951 86,725
Support Contract	400	1,279	1,000	44,988 4,625
In-House Support	10,643	4,176	6,203	119,969 17,346
GFE/ Other	1,309	1,200	1,440	29,994 6,940
Total	37,046	27,206	30,704	1,497,902 115,636

Program Element: 0604214N Budget Activity: 4
Program Element Title: AV-8B AIRCRAFT (ENGINEERING)
Project Number: W0652 Project Title: AV-8B

B. (U) DESCRIPTION: The AV-8B will meet the Marine Corps requirements for a light attack aircraft to provide responsive offensive airpower that can operate from austere forward sites in direct support of ground forces. The AV-8B is an improved vectored thrust aircraft based on the AV-8A concept and powered by the F402-RR-406 engine, with up to twice the range or payload of the AV-8A/C. It combines aerodynamic improvements with the Angle Rate Bombing System for increased weapon delivery accuracy, and a new stability augmentation system to reduce pilot workload, providing a more capable and reliable light attack aircraft. A two-seat training version is designated the TAV-8B, and an increased night attack capability for the AV-8B is being developed.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued development of corrections for deficiencies identified during TAV-8B flight testing.
   b. (U) Initiated development of corrections for deficiencies identified during Night Attack flight testing.
   c. (U) Continued on-going P3I projects.
   d. (U) Commenced altitude chamber and flight testing of F402-RR-408 upgrade engine.
   e. (U) Continued weapons integration/envelope expansion with upgraded AV-8B and AV-8B Night Attack system Operational Flight Program (OFP) software.
   f. (U) Completed ASPJ integration testing. (EMC Ground Tests Only)

2. (U) FY 1990 Programs:
   a. (U) Continue on-going P3I projects.
   b. (U) Continue weapons integration/envelope expansion with upgraded AV-8B and AV-8B Night Attack system OFP software.
   c. (U) Complete TAV-8B and Night Attack deficiency correction testing.
   d. (U) Complete F402-RR-408 engine testing.
   e. (U) Complete 100% LERX testing.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604214N Budget Activity: 4
Program Element Title: AV-8B AIRCRAFT (ENGINEERING)
Project Number: W0652 Project Title: AV-8B

3. (U) FY 1991 Plans:
   a. (U) Continue on-going P3I projects.
   b. (U) Continue weapons integration/envelope expansion with upgraded AV-8B and AV-8B Night Attack system OFP software.
   c. (U) Continue ASPJ integration testing. (Flight Tests)

4. (U) Program to Completion:
   a. (U) Continue on-going P3I projects.
   b. (U) Continue weapons integration/envelope expansion.
   c. (U) Provide AV-8B and AV-8B Night Attack system OFP software updates annually through FY-93.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Test Center, Patuxent River, MD; Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; Naval Avionics Center, Indianapolis, IN. CONTRACTOR: McDonnell Douglas Corporation, St. Louis, MO.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

OR	Rev 10/84
DCP	160 Rev 1/87
TEMP	195 Rev 5/89

G. (U) RELATED ACTIVITIES: Not Applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604214N Budget Activity: 4
Program Element Title: AV-8B AIRCRAFT (ENGINEERING)
Project Number: W0652 Project Title: AV-8B

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	To COMPLETE
APPN/P-1 APN-1/#6,7	563689	478423	526172	22,659

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- A Memorandum of Understanding between the Governments of the United States (USG) and the United Kingdom (UKG) entitled the "AV-8B/GR5 Agreement" was signed in 1981. The MOU arranged for the UKG to join the program and produce an aircraft substantially similar to the AV-8B. An extension of the signed MOU detailing AV-8B Night Attack cooperative development was signed in July 1987.

- Under the Agreement the USG and UKG fund their own program and share in the cost of changes common to AV-8B and GR5 aircraft. USG procures AV-8B aircraft from McDonnell Aircraft Company who subcontracts the aft fuselage from British Aerospace. The UKG procures its GR5 aircraft from British Aerospace who subcontracts the forward fuselage and the wing from McDonnell Aircraft Company.

- Development efforts for the AV-8B, TAV-8B and AV-8B Night Attack system are nearing completion. Production deliveries of the AV-8B began in FY-84, TAV-8B production deliveries began in FY87, and production deliveries of the AV-8B Night Attack System began in September 1989.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: Support Equipment

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	To Complete
W0601	A/C Handling and Service	0	1,296	4,712	Cont.	Cont.
W0852	Consolidated Automated Support System (CASS)	66,345	51,254	12,037	Cont.	Cont.
W1842	Aircraft Gas Turbine Facility	0	595	2,048	Cont.	Cont.
S1857	Calibration Standards	3,126	1,198	4,046	Cont.	Cont.
Total		69,471	54,343	22,843	Cont.	Cont.

B. (U) DESCRIPTION: CASS will design and develop modularly constructed automated test equipment with computer assisted, multi-functional capability based on standardized hardware and software elements. CAL Standards is a Navy-wide program to develop required field level calibration standards (hardware) in all major measurement technology areas. Aircraft Handling and Servicing Equipment is a naval aviation program to develop the common support equipment required to support new technology aircraft. Aircraft Gas Turbine Test Facility is a DOD joint program to develop a Standard Gas Turbine Test Facility to support future Navy and Air Force requirements.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0601 Project Title: ACFT HANDLING AND SERVICING EQUIPMENT

C. (U) DESCRIPTION: This project improves fleet readiness by application of new technology to DOD support equipment systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not Applicable.

2. (U) FY 1990 Programs: Apply new technology to propulsion test systems, handling equipment, non-destructive inspection equipment, and maintenance and servicing equipment for next generation aircraft. Some examples of specific development projects are:

a. (U) ENGINE TESTING CAPABILITY. The goal is to develop an advanced, Standardized Engine Test System (SETS) which will reduce current engine test times and improve testing results, thereby: (1) saving manpower and cost, and (2) leading to improved engine performance. The unit will be capable of efficiently testing all types of gas turbine engines.

b. (U) ENGINE STARTING CAPABILITY. The goal is to develop state-of-the-art jet engine starting equipment which will employ digital electronics and advanced mechanical interfaces to resolve problems with obsolescence issues and air flow capability of current units.

c. (U) AIRCRAFT BORESIGHTING EQUIPMENT. The goal is to build a DOD-common, modular system which will improve standardization and deployability over the DOD's current equipment, and which will produce more rapid results.

d. (U) LARGE AREA COMPOSITE INSPECTION SYSTEM (LACIS). The number of aircraft employing composite materials in their structures has increased enormously during recent years. LACIS will use automated scanning methods to provide the Navy with a field inspection capability and a field/depot interface not previously possible.

3. (U) FY 1991 Plans:
   a. Continue development of SETS.
   b. Continue development of jet engine start equipment.
   c. Continue development of aircraft boresight equipment.
   c. Continue development of LACIS.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Engineering Center, Lakehurst, N.J. and Naval Aviation Depots.

F. (U) RELATED ACTIVITIES: The individual projects encompassed in this program are a Navy lead responsibility. Some projects are a part of a coordinated Tri-Service effort endorsed, supported and directed by the Joint Logistics Commanders.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CONSOLIDATED AUTO SUPT SYS (CASS)

POPULAR NAME: CASS

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		IIIA 8/90	IIIB 4/91	
Engineering Milestones		FCA 3/90	PCA 4/91	
T&E Milestones		DTIIC 4/90 DTIIB 1/90 OTIIA 4/90 OTIIB 10/90		
Contract Milestones		LPO 8/90	FPO 6/91	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	62,300	46,751	10,265	CONTINUING
SUPPORT CONTRACT	824	785	200	CONTINUING
IN-HOUSE SUPPORT	3,117	3,568	1,330	CONTINUING
GPE/ OTHER	104	150	242	CONTINUING
TOTAL	66,345	51,254	12,037	CONTINUING

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CONSOLIDATED AUTO SUPT SYS

B. (U) DESCRIPTION: This project will design and develop modularly constructed automated test equipment with computer-assisted, multi-functional capability based on standardized hardware and software elements. It evolved in response to Fleet Commanders' expressed concerns regarding serious deficiencies in existing automatic test equipment and the recommendations of an extensive 1976 SECNAV Study report on test equipment. Program objectives are: (1) increase material readiness; (2) reduce life cycle costs through standardization of equipment and all logistics elements; (3) improve tester sustainability at depot and intermediate (including aircraft carriers) maintenance levels; (4) reduce proliferation of unique test equipment; and (5) provide Navy-wide test capability for existing and future avionic/electronic support requirements. With test stations that can be easily configured to satisfy different test requirements (i.e., electro-optical, radio frequency, laser, infrared, inertial navigation, etc.) and design provisions which permit modification to meet the demands of future technology, this tester system will increase repair facility throughput capability, reduce spare parts and personnel training requirements, and significantly reduce the space required for avionics testing in the critically space-limited Navy aircraft carriers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Conducted major reviews of contractor's design and development progress.
   b. (U) Fabrication, assembly and testing (FAT) and integration of preproduction units continued.
   c. (U) Development testing (DT-IIA) completed.
   d. (U) Integration of Support of Support (SOS) Test Program Sets completed.
   e. (U) Commenced integration of Operational Test Program Sets (OTPS).
   f. (U) Preparations for TECHEVAL (DT-IIC) and OPEVAL (OT-IIA) continued.
2. (U) FY 1990 PROGRAMS:
   a. (U) Fabrication, assembly and testing (FAT) and integration of preproduction units.
   b. (U) Integration of Operational Test Program Sets (OTPS).
   c. (U) Complete DT-IIB testing.
   d. (U) Deliver ILS maintenance plan.
   e. (U) Complete Functional Configuration Audit (FCA).
   f. (U) Complete TECHEVAL (DT-IIC) and PRE-OPEVAL (OT-IIA).
   g. (U) Obtain approval for and begin limited production.

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CONSOLIDATED AUTO SUPT SYS

3. (U) FY 1991 PLANS:

a. (U) Complete OPEVAL (OT-IIB).

b. (U) Complete certification of a dual competitive source for full production.

c. (U) Complete Physical Configuration Audit (PCA).

d. (U) Obtain approval for and begin full production.

e. (U) Commence Pre-planned Product Improvement (P3I) program. The reconfigurable CASS design architecture will accommodate changes in airwing mix or modifications to existing weapon systems thereby avoiding obsolescence and the need for new testers, and also allows for the incorporation of new technology without impact to application software which has already been developed.

4. (U) Program to Completion:

a. (U) Continue P3I program to support introduction of new technology and weapons systems.

b. (U) Conduct T&E as required, coincident with new weapon systems.

c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Engineering Center, Lakehurst, NJ; Naval Air Test Center, Patuxent River, MD; Metrology Engineering Center, Pomona, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Aviation Depot, Jacksonville, FL; and Naval Aviation Maintenance Office, Patuxent River, MD. CONTRACTOR: General Electric Co., Huntsville, AL.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: Due to difficulties in manufacturing to the General Electric Co. design, deliveries of subcontractor equipments were delayed and unavailable to meet the original test schedule. As a result, the T&E portion of the CASS program was delayed and restructured to minimize the schedule impact. TECHEVAL was subdivided with the first phase (DT-IIC) combined with a PRE-OPEVAL (OT-IIA) phase.

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CONSOLIDATED AUTO SUPT SYS

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

	Current	Updated
NDCP	4/86	9/90
TEMP	7/86	1/90

G. (U) RELATED ACTIVITIES: A Memorandum of Agreement (MOA) was executed between the Naval Air Systems Command (NAVAIR) and the Air Force System Command (AFSC), Eglin, in which the Navy will provide complete depot level repair for the AMRAAM on CASS. Also, the Navy is developing a Missile Test Station to provide common ATE support to various missile programs.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

APPROPRIATION/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APN-7					
#67 COMMON GRD EQ	-0-	168,975	173,542	1,265,483	1,608,000
(Quantity)		(99)	(97)	(597)	(775)
APN-6					
SPARES & REP PARTS	-0-	9,600	16,200	105,300	131,100
O&MN-7					
CENTRAL SUPP/MAINT	-0-	1,800	200	87,796	89,796
O&MN-8					
TRAINING, MED/OTH	-0-	1,734	1,029	4,821	7,504
MILCON					
PROJECT P-185	-0-	-0-	-0-	4,700	4,700

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: Not applicable for this submission.

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W1842 Project Title: A/C GAS TURBINE FACILITIES

C. (U) DESCRIPTION: This project conducts engineering development to support DOD standards for engine test facilities in an attempt to improve engine performance testing by minimizing aerodynamic and thermodynamic effects.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not Applicable.

2. (U) FY 1990 Programs: Commence development of configurations for turbojet/fan, turboshaft, turboprop engine test facilities; development of modular aspects of test facilities for configuration management and begin logistic support.

3. (U) FY 1991 Plans:
   a. (U) Complete configuration development.
   b. (U) Conduct analysis to assure facility configuration/suitability for conducting performance tests.
   c. (U) Complete development of modular testing facilities.

4. (U) Program to Completion:
   a. (U) Continue design verification.
   b. (U) Verify compatibility tests to assure proper mixed gas airflow and enthalpy characteristics.
   c. (U) Continue suitability and performance testing.
   d. (U) Scale model verification and compatibility testing.
   e. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Engineering Center, Lakehurst, N.J.; Naval Air Test Center, Patuxent River, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Ocean Systems Center, San Diego, CA.

F. (U) RELATED ACTIVITIES: This effort is coordinated with similar programs at Air Force Logistics Command.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: S1857 Project Title: CALIBRATION STANDARDS (CALSTD)

C. (U) DESCRIPTION: This project conducts the engineering development of new calibration standards (hardware) required to support/maintain advanced technology weapon systems and associated support equipment. It is required by SECNAVINST 4344.11C and was developed to remedy Navy Lead Service deficiencies as a part of a Joint Logistics Commanders directed effort.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
a. (U) Continue evaluation of Equipment Tolerancing System, National Bureau of Standards (NBS) funding.
b. (U) Complete the Imaging IR Standard, the Advanced Instrument Controller, A/C Voltage Standard (10 ppm).
c. (U) Begin Optical Time Domain Reflectometer, 3rd Generation Automated Pressure Calibrator and Low Level Vibration Measurement System.
2. (U) FY 1990 Programs:
a. (U) Continue Navy-wide technology assessment for metrology requirements, funding for Navy requirements at NBS, and 3rd Generation Automated Pressure Calibrator.
b. (U) Complete Equipment Tolerancing System, Optical Time Domain Reflectometer, Low Level Vibration Measurement System.
c. (U) Begin Accelerometer Calibration Standard.
3. (U) FY 1991 Plans:
a. (U) Continue funds for Navy lead service requirements at NBS, Joint Service Coordination, 3rd Generation Automated Pressure Calibrator and Accelerometer Standard.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: National Bureau of Standards, Washington, DC; Naval Research Laboratory, Washington, DC; Metrology Engineering Center, Pomona, CA; Navy Primary Standards Lab, San Diego, CA.

F. (U) RELATED ACTIVITIES: The individual projects encompassed in this program are a Navy lead responsibility as part of a coordinated Army and Air Force endorsed effort.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTION SUMMARY

PROGRAM ELEMENT: 0604218N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering
PROJECT NUMBER: X0532 PROJECT TITLE: Fleet Air Ocean Equipment

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X05322	Fleet Air Ocean Equipment	2,007	2,401	2,852	CONT.	CONT.

B. (U) DESCRIPTION: This program funds engineering development of sensors and communication interfaces, in addition to processing and display systems to measure, distribute, and display atmospheric/oceanographic parameters for optimum selection and employment of Naval weapon systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued build of two Shipboard Meteorological and Oceanographic Observing System (SMOOS) EDM systems.

b. (U) Completed Automated Surface Observing System (ASOS) site survey.

c. (U) Started NDI equipment evaluation for operational requirements for meteorological/oceanographic support systems.

2. (U) FY 1990 Program:

a. (U) Complete SMOOS EDM build and conduct TECHEVAL.

b. (U) Continue ASOS installation engineering and support planning.

c. (U) Develop system upgrades and evaluate NDI alternatives for meteorological/oceanographic support systems.

3. (U) FY 1991 Plans:

a. (U) Achieve Milestone III AFP of SMOOS.

b. (U) Start development of P3I for SMOOS sensors and TESS (3) connectivity with "small" combatants.

c. (U) Continue development of system upgrades and evaluation of NDI alternatives for meteorological/oceanographic support systems.

d. (U) Develop TESS(3) interfaces and provide engineering development ashore to distribute data from primary production centers to fleet oceanography centers.

e. (U) Develop Navy unique interfaces to ASOS to meet requirements for runway visual range measurements and multiple sensor displays.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN HOUSE: NADC, Warminster, PA; Naval Electronics Systems Engineering Center, Vallejo, CA; Naval Research Laboratory. CONTRACTORS: Lockheed, Austin TX.

E. (U) RELATED ACTIVITIES: PE 0603207N, Air/Ocean Tactical Applications.

F. (U) OTHER APPROPRIATION FUNDS : (Dollars in Thousands)

(APPN/P-1)	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U)OPN #201	0	3,336	9,790	CONT.	CONT.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604219N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Airborne ASW Development
PROJECT NUMBER: W0485 PROJECT TITLE: CV Helo Avionics Improvement

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0485	CV Helo Avionics	0	11,788	12,708	CONT.	CONT.

B. (U) DESCRIPTION: Program upgrades the primary sensor of current ASW helicopter platforms to maintain and improve ASW effectiveness against the projected quiet submarine threat. An operational requirement for an Airborne Low Frequency Sonar (ALFS) was established in June 1985 to counter this accelerated threat. This project provides a low frequency dipping sonar that has demonstrated capabilities typically 3 to 6 times (square miles of ocean searched) the existing capability. This capability will significantly increase carrier battle group inner zone submarine protection, providing improved survivability and operating flexibility. In addition to long range active sonar search,

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Not Applicable
2. (U) FY 1990 Program:
   a. (U) Conduct source selection.
   b. (U) Procure UYS-2.
   c. (U) Commence UYS-2 integration.
   d. (U) Award FSED contract and commence development.
   e. (U) Procure ALFS engineering development models (EDM's).
   f. (U) Commence system integration.
3. (U) FY 1991 Plans:
   a. (U) Procure UYS-2's.
   b. (U) Continue UYS-2 integration.
   c. (U) Commence software development.
   d. (U) Conduct preliminary design reviews.
   e. (U) Continue system integration.
   f. (U) Procure ALFS EDM's.
   g. (U) Prepare Test phase.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Continue Sonar FSED.
   b. (U) Complete aircraft integration work leading to DT-II.
   c. (U) Complete testing OT-II.

D. (U) WORK PERFORMED BY: IN-HOUSE: NATC, Patuxent River, MD; NADC, Warminster, PA; NAC, Indianapolis, IN. CONTRACTORS: TBD for development of sonar (complete in FY 1990). Sikorksy Aircraft Division, Stratford, CT (FY 1990 for aircraft integration).

PROGRAM ELEMENT: 0604219N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Airborne ASW Development
PROJECT NUMBER: W0485 PROJECT TITLE: CV Helo Avionics Improvement

E. (U) COMPARISON WITH REVISED FY 1990/91 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Scehdule changes: None.
3. (U) Cost changes: Department increased program +$4,103K in FY 1991 to fully fund ALFS development.

F. (U) PROGRAM DOCUMENTATION: OR 6/85, AP 11/89, TEMP (5/90).

G. (U) RELATED ACTIVITIES: PE 0604212 W1707 LAMPS Improvements.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1989	FY 1990	FY 1991	TO	TOTAL
APPN P-1	ACTUAL	ESTIMATE	ESTIMATE	COMPLETE	PROGRAM
APN-1 #19/20	NOT APPLICABLE			CONTINUING	CONTINUING

SOURCE: Exhibit P-1, 29 Dec 89, page N-3

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NONE

J. (U) TEST AND EVALUATION: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4-Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1152	P-3C Sensor Integration	4,875	3,177	11,635	CONT.	CONT.
W1588	UIV Avionics	130,408	138,028	34,197	40,723	493,150
W1926	P-7A (LRAACA)	64,393	198,935	234,892	428,282	927,806
TOTAL		199,676	340,140	280,724	CONT.	CONT.

B. (U) DESCRIPTION: This program provides upgrades to the P-3C's defensive and offensive systems to enhance it's surface and subsurface tracking, classification, and attack capability. The P-3C Sensor Integration (W1152) Project provides improved acoustic software to process more advanced active and passive sonobuoys and increase the operational capability of the P-3C Update III Acoustic System by taking advantage of the software programmability. The P-3 Update IV Avionics (W1588) Project upgrades the P-3 avionics suite by providing a substantial increase in flexibility through a distributed bus architecture that significantly increases processing power while accepting high data rate sensors. It provides work load sharing among crew stations, allows for ease of incorporating future sensors, and improves aircraft survivability in an increasing hostile environment through greater standoff targeting and classification ranges. The system improves early alert to a broad range of emerging threat sensors, and significantly increases the acoustic processing capacity of the aircraft by integrating the Enhanced Modular Signal Processor (EMSP) into the data bus system. The P-7A (Long Range Air ASW Capability Aircraft) (W1926) Project is a competitively procured derivative of a P-3 aircraft (competition included commerical aircraft) to replace the early generation P-3 aircraft which will reach the end of useful service life in the early 1990's. P-7A provides greater payload and range/on-station time with fewer personnel and lower operating and support costs. Specific improvements include incorporation of the P-3 Update IV Avionics upgrade and enhanced survivability and self defense.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1152 PROJECT TITLE: P-3C Sensor Integration

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1152	P-3C Sensor Integration	4,875	3,177	11,635	CONT.	CONT.

B. (U) DESCRIPTION: This project provides the P-3C UPDATE III, which will be in the Fleet beyond the turn of the century, with an improved acoustic system that will process more advanced active and passive sonobuoys and maintain pace with the emerging threat. Primarily a software upgrade, it will increase the operational capability of the P-3C UPDATE III Acoustic System by integrating the current hardware/software configuration with Passive Tracking Algorithm (PTA), a 32-channel half-bandwidth capability (Channel Expansion-CHEX), constant resolution (CR) modes, Digital Track (Post CHEX), and 99-channel on-line sonobuoy radio frequency monitor capability. It also will provide for integration of advanced sonobuoys and detection algorithms, which are contained in the modular software design airborne Air Common Acoustic Processing (ACAP), into upgraded P-3C UPDATE III Acoustic and Tactical Computers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Completed implementation and QA testing of UPDATE III CHEX software technical deficiency corrections.

b. (U) Completed UPDATE III CHEX software technical deficiency corrections and stability testing at NADC.

c. (U) Completed CHEX and ACAP release 4.0 Navy Developmental Testing (DT) at NATC resulting in a recommendation for operational testing and fleet release.

d. (U) Completed requirements definition for Post CHEX and ACAP 5.0 (constant resolution, digital track, SSQ-53D and ANODE).

e. (U) Initiated Post CHEX software implementation and coding using ACAP release 5.0.

f. (U) Initiated requirements definition for Tactical Surveillance Sonobuoy (TSS) integration.

2. (U) FY 1990 Program:

a. (U) CHEX and ACAP release 4.0 Operational Testing (OT) to be conducted Jan-Apr 1990.

b. (U) Integration of ACAP release 5.0 software into UPDATE III Acoustic System.

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1152 PROJECT TITLE: P-3C Sensor Integration

c. (U) Update III Post CHEX software integraton and QA.
d. (U) Digital Track integration testing.
e. (U) UPDATE III Acoustic system controller software implementation and testing for Post CHEX.
f. (U) Continue requirements and specification definition for Full Capability TSS system for UPDATE III Acoustic System integration.
g. (U) Integration of ACAP release 6.0 software into UPDATE III Acoustic System.

3. (U) FY 1991 Plans:
a. (U) Complete integration and QA of Post-CHEX software.
b. (U) Design and Implementation for full capability TSS system into Update III tactical computer.
c. (U) Continue Integration of full capability TSS system (ACAP release 6.0) software into UPDATE III Acoustic System hardware.
d. (U) UPDATE III Acoustic system controller software implementation and testing for full capability TSS system.
e. (U) UPDATE III Post-CHEX and ACAP release 5.0 software DT to be conducted Mar-May 1991.
f. (U) UPDATE III Post CHEX and ACAP release 5.0 software OT to be conducted Jul-Sep 1991.
g. (U) Develop requirements and specifications for Broadband processing.
h. (U) Develop requirements and specifications for Expendable Reliable Acoustic Path Sonobuoy (ERAPS).

4. (U) Program to Completion:
a. (U) Correction of Post CHEX deficiencies.
b. (U) Design and implementation of Broadband processing for UPDATE III Acoustic System controller software.
c. (U) Complete UPDATE III full capability TSS system and ACAP release 6.0 software Implementation and QA testing.
d. (U) Design and implementation of ERAPS (ACAP Release 7.0) software in the P-3C UPDATE III acoustic and tactical computers.
e. (U) UPDATE III full capability TSS system and ACAP release 6.0 software DT at NATC to be conducted.
f. (U) Develop requirements and specifications for AIR Deployable Active Receiver (ADAR) and Acoustic Intercept System (AIS).
g. (U) UPDATE III Full Capability TSS System and ACAP release 6.0 software OT.
h. (U) Continue integration of Advanced Sensors.
i. (U) Test and Evaluation for Advanced Sensor software.
j. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC Warminster, PA; NATC, Patuxent River, MD. CONTRACTORS: IBM, Manassas, VA; Computer Sciences Corporation, Warminster, PA; Pacer, Bedford, MA; UNISYS, St. Paul, MN.

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1152 PROJECT TITLE: P-3C Sensor Integration

E. (U) COMPARISON WITH REVISED BY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: NDCP 06/81; TEMP 12/84; AFP 01/86

G. (U) RELATED ACTIVITIES: PE 0604261N - Acoustic Search Sensors (Air Common Acoustic Processing) developing software and acoustic algorithms.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
APPN/P-1					
APN-5* #50	134,700	30,700	248,200	CONT.	CONT.
APN-6 #65	NOT APPLICABLE			CONT.	CONT.

* Funding for CHEX, Post-CHEX only.

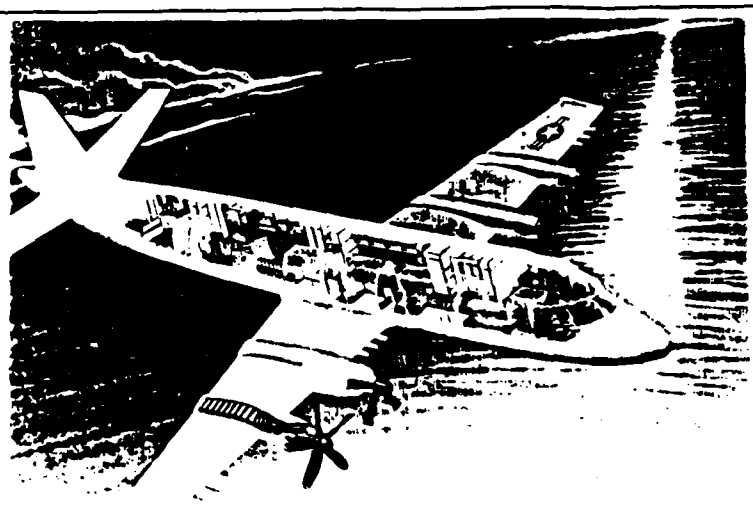
I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: NONE.

J. (U) MILESTONE SCHEDULE:

ACAP 5.0 SOFTWARE RELEASE	APR 1990
CHEX IOC	
ACAP 6.0 SOFTWARE RELEASE	SEP 1990
POST CHEX DT	MAR 1991
POST CHEX OT	JUL 1991
POST CHEX IOC	
Full TSS Adv Sensor TECHEVAL	JUL 1992
ACAP 7.0 Software Release	SEP 1992
Full TSS Adv Sensor OPEVAL	JAN 1993
TSS IOC	

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1926 PROJECT TITLE: P-7A (Long Range Air ASW Capable Aircraft)



POPULAR NAME: P-7A

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	MSII 12/88	DAB 4/90		MS IIIA 3Q/92 MS IIIB 3Q/93 MS IIIC 3Q/94
ENGINEERING MILESTONES	PDR 7/89	CDR 3/90		
T&E MILESTONES				DT II 2Q/92 OTII 2Q/92 TEVAL 1Q/93 OPEVAL 4Q/93
CONTRACT MILESTONES	FSED CONTR AWD 01/89			

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TOTAL COMPLETE
MAJOR CONTRACT	52,000	152,980	202,019	688,600 281,401
SUPPORT CONTRACT	2,156	2,223	2,780	16,852 9,483
IN-HOUSE SUPPORT	4,680	4,680	15,457	39,528 14,035
GFE/TRNR OTHER	5,557	39,052	14,636	182,826 123,363
TOTAL	64,393	198,935	234,892	927,806 428,282

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1926 PROJECT TITLE: P-7A (Long Range Air ASW Capable Aircraft)

B. (U) DESCRIPTION: The P-7A program will develop a P-3 derivative aircraft for the land based ASW mission to replace the significant number of P-3A and P-3B aircraft which will be retired in the 1990's. This project coincides with an increase in the capability of the Soviet submarine force and the Navy's development of improved tactics and sensors to effectively address this threat. The P-7A will provide greater payload and range/on-station time with fewer personnel and lover operating and support costs (versus existing P-3C capabilities). Specific improvements include incorporation of the P-3 UPDATE IV mission avionics and enhanced survivability and self defense.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Awarded studies Contract.
   b. (U) Milestone II.
   c. (U) FSED Contract Award.
   d. (U) Continued engineering design of prototype aircraft.
   e. (U) Conducted preliminary design reviev.
   f. (U) Placed order for GFE (Prototype Aircraft).
   g. (U) Contractor obtained vendor qualifications.
   h. (U) Contractor commenced component testing.
   i. (U) Commenced prototype fabrication/manufacture.
   j. (U) Commenced fabrication of static and fatigue test articles.
2. (U) FY 1990 Program:
   a. (U) Complete critical engineering design of prototype aircraft.
   b. (U) Conduct design reviews.
   c. (U) Contractor continue evaluation of vendor qualifications.
   d. (U) Contractor continue component testing.
   e. (U) Continue prototype aircraft #1 fabrication/manufacture.
3. (U) FY 1991 Plans:
   a. (U) Commence prototype aircraft number two fabrication manufacture.
   b. (U) Continue production readiness reviews.
   c. (U) Conduct prototype aircraft number one final assembly.
   d. (U) Conduct contractor ground and initial flight test of prototype aircraft number one.
4. (U) Program to Completion:
   a. (U) Conduct initial Development Testing.
   b. (U) Delivery of prototype aircraft #1 & #2 to Navy.
   c. (U) Award P-7A Trainer Contract for CPT/OFT/NAMT 2Q/FY93.
   d. (U) Conduct TECHEVAL/OPEVAL in FY 1993/1994.
   e. (U) Obtain Approval for Full Production in FY 1994.
   f. (U) Perform DT-III/BIS/OT-III - TBD.
   g. (U) Initial Operating Capability in

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1926 PROJECT TITLE: P-7A (Long Range Air ASW Capable Aircraft)

D. (U) WORK PERFORMED BY: IN-HOUSE: NATC, Patuxent River, MD. and NADC, Warminster, PA. CONTRACTORS: Lockheed Aeronautical Systems Company, Burbank, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None.
2. (U) Schedule changes: Due to contractor delays that may impact program schedule and milestones, a Defense Acquisition Board will be conducted in the spring of 1990 to review the program and rebaseline if necessary.
3. (U) Cost changes: Department adjustment increased the program +$3,293K in FY 91 to offset inflation.

F. (U) PROGRAM DOCUMENTATION: OR 11/87; DCP 12/88; TEMP 12/88.

G. (U) RELATED ACTIVITIES: P-7A will utilize the mission avionics being developed under PE 0604221N W1588 - UPDATE IV Avionics.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

PROCUREMENT	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
APN-1 APN #21	0	0	20,500	CONT.	CONT.
APN-6 APN #65	NOT APPLICABLE		0	CONT.	CONT.

Source Exhibit P-1 29 Dec 89 page N-4

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
a. (U) General and Harmonization MOU with Federal Republic of Germany signed 5 April 1989.
b. (U) Development MOU with Federal Republic of Germany (FRG) being negotiated. FRG commitment will be made when Development MOU is signed (est. February 90).

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1588 PROGRAM TITLE: P-3 Update IV Avionics

POPULAR NAME: UPDATE IV

A. (u) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES			MSIIIA 6/91	MSIIIB 3Q/92 MSIIIC 3Q/93
ENGINEERING MILESTONES				
T&E MILESTONES			DTIIA 5/91 OTIIA 5/91 DTIIB 12/91	OTIIB 3Q/92 TEVAL 4Q/92 OPEVAL 2Q/93 DTIII 3Q/93 OTIII TBD
CONTRACT MILESTONES		WST/IAT 3/90	ALPIP 6/91	ALRIP 3Q/92 AFRP 3Q/93 RFT 2Q/94

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR	92,609	81,648	2,480	273,111
CONTRACT				10,089
SUPPORT	4,427	4,584	2,456	80,541
CONTRACT				4,281
IN-HOUSE	7,071	7,500	7,602	39,022
SUPPORT				4,408
GFE/TRNR	26,301	44,296	21,659	100,476
OTHER				22,701
TOTAL	130,408	138,028	34,197	493,150
				40,723

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1588 PROGRAM TITLE: P-3 Update IV Avionics

B. (U) DESCRIPTION: This project upgrades the avionics (acoustic and non-acoustic) suite of the P-3 aircraft to provide the required capability necessary to combat the faster, quieter Soviet submarine. This capability is obtained by integrating existing and newly developed sensors into a distributed processing system architecture with upgraded displays and controls. The resulting configuration will decrease the existing operator workload and improve operational effectiveness by increasing ease of data handling and reliability. It will also significantly increase the acoustic processing capacity of the aircraft by integrating the Enhanced Modular Signal Processor (EMSP SEM-E) into the data bus system. This project includes first-article training devices for P-3 UPDATE IV avionics, part-task trainers and aircrew Weapons Systems Trainers (WST).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Installation of prototype system aboard flying test bed.
   b. (U) Delivery of software development laboratory and avionics integration laboratory to Navy.
   c. (U) Continue development of EMSP SEM-E.
2. (U) FY 1990 Program:
   a. (U) Contractor laboratory ground and flight test execution.
   b. (U) Continue development of EMSP SEM-E.
   c. (U) Continue installation of prototype system aboard flying test bed.
   d. (U) Conduct initial development & operational Navy test of weapon system for UPDATE IV avionics suite.
   e. (U) Award trainer contract for UPDATE IV (UIV) WST and Integrated Avionics Trainer (IAT).
   f. (U) Delivery of Patrol Avionics test laboratory to Navy.
3. (U) FY 1991 Plans:
   a. (U) Conduct DT/OT IIA.
   b. (U) Conduct Milestone IIIA. Approval for Limited Rate Initial Production (ALRIP), 6/91.
   c. (U) Continue development of UIV WST & IAT trainers.
4. (U) Program to Completion:
   a. (U) Conduct MSIIIB - 3Q/92.
   b. (U) Approval for ALRIP for UYS-2 SEM-E System - 3Q92.
   c. (U) Conduct TECHEVAL/OPEVAL- 4Q92/2Q93
   d. (U) Approval for Full Rate Production - 3Q/93.
   e. (U) UIV WST & IAT trainers are Ready For Training (RFT) - NAS Jacksonville - 2Q/94.
   f. ((U)

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD. CONTRACTORS: Boeing Aerospace Co., Seattle, WA.; Texas Instruments, Inc., Dallas, TX.; AT&T, Whippany, NJ; Trainer Acquisition TBD.

PROGRAM ELEMENT: 0604221N BUDGET ACTIVITY: 4 - Tactical Program
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: W1588 PROGRAM TITLE: P-3 Update IV Avionics

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None.
2. (U) Schedule changes: Due to contractor delays the program was formally restructured to revise the testing and milestone schedule. Improved testing plan does not impact production, and
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: TEMP 5/87; AP 6/87; NDCP 7/87; PCAD 12/89

G. (U) RELATED ACTIVITIES: UPDATE IV Avionics will be incorporated into P-7A (PE 0604221N W1926) and retrofitted into existing P-3C UPDATE I's and UPDATE II's. Prior to FY 1990 the UPDATE IV Trainer was included in Initial Trainer Acquisition PE 0604708N.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	FY 1992 ESTIMATE	TOTAL PROGRAM
	134,700	30,700	248,200	CONT.	CONT.
APN-6 #65	NOT APPLICABLE			CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
a. (U) General and Harmonization MOU with Federal Republic of Germany signed 5 April 1989.
b. (U) Development MOU with Federal Republic of Germany (FRG) being negotiated. FRG commitment will be made when Development MOU is signed (est. February 90).

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604230N Budget Activity: 5
PROGRAM ELEMENT TITLE: Warfare Support Systems

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1752	TESS ENG	2,537	2,774	2,390	Cont.	Cont.
X1779	ROTHR	12,565	17,419	11,215	Cont.	Cont.
TOTAL		15,102	20,193	13,605	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element develops shipboard and shore based Tactical Environmental Support Systems (TESS) that predict and assess atmospheric and oceanographic effects on tactical systems. Relocatable Over-the-Horizon Radar (ROTHR) develops a shore based, high frequency (HF), long range, relocatable radar to provide aircraft detection at extended ranges.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604230N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Warfare Support Systems
PROJECT NUMBER: X1752 PROJECT TITLE: Tactical Environmental Support System (TESS)

C. (U) DESCRIPTION: This project develops the Navy's computer-based tactical shore and shipboard capability used to predict and assess the impact of the atmospheric and oceanographic environment on the performance of weapon and sensor systems. Data will be ingested from atmospheric and oceanographic satellites, regional oceanographic centers, local observations, and shipboard data bases. Through shipboard command and control interfaces, the Battle Group commander will merge atmospheric and oceanographic information with other essential intelligence for optimum employment of available platforms, sensors, and weapon systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Built four Engineering Developmental Models (EDM).
   b. (U) Began applications software integration on EDM #1.
   c. (U) Conducted preliminary design review (PDR) and critical design review (CDR).
2. (U) FY 1990 Program:
   a. (U) Continue software development for tactical atmospheric and oceanographic applications.
   b. (U) Install EDM #3 at Naval Eastern Oceanography Center; conduct developmental testing.
   c. (U) Install EDM #4 aboard an aircraft carrier; conduct TECHEVAL and OPEVAL.
   d. (U) Continue development of applications software started above.
3. (U) FY 1991 Plans:
   a. (U) Achieve Milestone III approval for full rate production.
   b. (U) Continue development and integration of application software.
   c. (U) Commence P3I program to support energing shipboard interfaces.
4. (U) Program to Completion:
   a. (U) Continue development and integration of application software to support P3I.
   b. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL Monterey, CA; NAVELEXCEN Vallejo, CA. CONTRACTORS: Lockheed Corp., Austin, TX.

F. (U) RELATED ACTIVITIES: PE 0604218N, Air/Ocean Equipment Engineering; PE 0603207N, Air/Ocean Tactical Applications.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

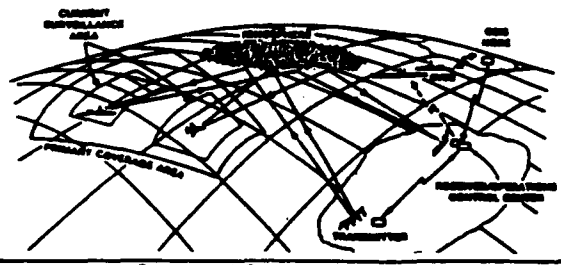
	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) APPN/P-1 OPN #207	0	0	19,346	11,286	30,632

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604230N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Warfare Support Systems
PROJECT NUMBER: X1779 PROJECT TITLE: Relocatable Over-the-Horizon Radar

ROTHR SYSTEM CONCEPT



POPULAR NAME: Relocatable Over-The-Horizon Radar (ROTHR)

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES		MS IIIA 10/89	Block Upgrade MS II 3/91 MS IIIB 6/91	Block Upgrade MS III 4Q94
ENGINEERING MILESTONES	SPT COMP 2/89			
T&E MILESTONES	OTIIA 11/88 DTIIB 02/89 OTIIB 05/89	DTIII 9/90	OTIII 12/91	Block Upgrade DTII 2Q94 OTII 3Q94
CONTRACT MILESTONES		ALP 10/89	AFP 6/91	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
MAJOR CONTRACT	9,719	11,934	6,908	Cont.
SUPPORT CONTRACT	200	1,650	1,035	Cont.
IN-HOUSE SUPPORT	2,646	3,835	3,272	Cont.
GFE/OTHER				
TOTAL	12,565	17,419	11,215	Cont.

UNCLASSIFIED

PROGRAM ELEMENT: 0604230N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Warfare Support System
PROJECT NUMBER: X1779 PROJECT TITLE: Relocatable Over-the-Horizon Radar

B. (U) DESCRIPTION: The Relocatable Over-the-Horizon Radar (ROTHR) is a tactical wide-area surveillance system that provides active surveillance in selected geographic areas. ROTHR systems provide long range detection, tracking and reporting of aircraft and ships that may present a threat to Navy Battle Groups, vital shipping and other US and allied tactical forces. ROTHR operates in the high frequency (HF) band and employs skywave propagation to maintain track-while-scan radar coverage of selected regions within the radar's primary coverage area, which is a 64 degree sector ranging from 500 to 1600 nm. ROTHR systems are relocatable to provide a capability to adjust to long-term changes in wide-area surveillance strategy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed contractor System Performance Tests (SPT).
   b. (U) Conducted operational assessment (OTIIA).
   c. (U) Completed TECHEVAL (DTIIB).
   d. (U) Conducted OPEVAL (OTIIB).
   e. (U) Initiated Deployment of the prototype system to first operational site at Amchitka, AK.

2. (U) FY 1990 PROGRAM:
   a. (U) Obtain approval for full production (AFP) (MS III).
   b. (U) Award Production contract.
   c. (U) Conduct DTIII to evaluate system relocatability, ship tracking, and correction of air OPEVAL deficiencies.
   d. (U) Complete development of the ROTHR Operations Control Center (OCC) tape replay training capability.
   e. (U) Initiate development of a ROTHR OCC computer stimulation subsystem.
   f. (U) Initiate design definition of a block upgrade to the ROTHR system to include: improved detection and tracking of small and maneuvering targets, implementation of a new function to correlate radar tracks with known air traffic, improved raid recognition, increased resistance to countermeasures, and improved direct data link to tactical forces.
   g. (U) Complete deployment of prototype and IOC.

3. (U) FY 1991 PLANS:
   a. (U) Conduct OTIII to evaluate relocatability, ship tracking and correction of OPEVAL deficiencies.
   b. (U) Continue development of the ROTHR OCC training system.
   c. (U) Initiate development of selected block upgrades to the ROTHR system.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604230N Budget Activity: 5
PROGRAM ELEMENT TITLE: Warfare Support System
PROJECT NUMBER: X1779 PROJECT TITLE: Relocatable Over-the-Horizon Radar

5. (U) PROGRAM TO COMPLETION:
a. (U) Complete development and testing of ROTHR OCC training systems.
b. (U) Complete development and operational testing of multiple block upgrades to the ROTHR system.
c. (U) This is a continuing program

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVELEXCEN, Portsmouth, VA; NAVOCEANSYSCEN, San Diego, CA. Contractors: Raytheon Company, Wayland, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
(Dollars in Thousands)

(U) IMPACT OF CHANGES:
1. (U) TECHNOLOGY CHANGES: NONE.
2. (U) SCHEDULE CHANGES: NONE.
3. (U) COST CHANGES: NONE.

F. (U) PROGRAM DOCUMENTATION:
MENS 1/81
DCP (UPDATED) 8/89
TEMP (UPDATED) 9/89

G. (U) RELATED ACTIVITIES:
PE 0604711N Command and Control Systems (ENG)
PE 0603717N Command and Control Systems (ADV)
PE 0102417F CONUS Over-the-Horizon Backscatter Radar.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) APPN/P-1					
OPN #121(332926)	161,255	86,557	79,615	521,500	950,200
Quantity	2	1	1	6	11

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: IEP AA-10 : Governmental information exchange agreement with Australia for Over-the-Horizon Radar performance and operational data.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)

A. (U) RESOURCES: (DOLLARS IN THOUSANDS)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0486	ASW Operations Center Upgrade	11,501	15,464	10,881	Cont.	Cont.
X0709	Navy Tactical Command System Afloat	2,222	0	9,088*	Cont.	Cont.
X1144	NCCS Ashore Nodes	1,718	0	4,207	Cont.	Cont.
X2009	OSIS Baseline Upgrade (OBU)	13,752	14,342	13,342	Cont.	Cont.
X2041	Operations Support System (OSS)	0	4,980	12,096	Cont.	Cont.
	Total	29,193	34,786	49,614	Cont.	Cont.

* (U) Because of the common interface requirements between the Afloat Correlation System (ACS) and the Electronic Warfare Coordination System Module (EWCM) developments and those of the Tactical Flag Command Center (TFCC), funding has been realigned from PE 0604230N projects X1847 ACS and X1979 EWCM to the Navy Tactical Command System - Afloat project X0709.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) This program develops and upgrades the Navy's command and control information management systems supporting commanders afloat and ashore. Included among these C2 systems are: the unified command centers of CINCPAC and CINCLANT, the Navy Command Center, the Fleet command centers of CINCLANTFLT, CINCPACFLT and CINCUSNAVEUR, the Submarine Operating Authority (SUBOPAUTH) command centers, the command centers supporting the Anti Submarine Warfare (ASW) Sector Commander, the Fleet Ocean Surveillance Information Centers (FOSIC) and Fleet Ocean Surveillance Information Facilities (FOSICS), the Coast Guard Maritime Defense Zone command centers supporting drug interdiction, and the Tactical Flag Command Centers (TFCC) afloat. These projects develop information processing and display systems for afloat and ashore commanders providing decision makers the ability to make rapid, informed tactical decisions. TCS develops systems which fuse tactical data between shipboard organic sensors, ashore and space-based non-organic sensors. TCS includes total system definition of each of the major afloat and ashore command centers and the integration of warfare systems within them. The functions provided by TCS are consistent with the Navy's Over-The-Horizon Detection, Classification, and Targeting Architecture.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X0486 PROJECT TITLE: Anti-Submarine Warfare Operations Center (ASWOC) C3 Upgrade

A. RESOURCES (Dollars in Thousands)

Popular Name	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ASWOC C3 Upgrade	11,501	15,464	10,881	Cont.	Cont.

B. (U) DESCRIPTION: The Antisubmarine Warfare Operations Centers (ASWOC) are nodes of the Navy Command and Control System (NCCS) ashore and provide the ASW Commander with the capability to plan and execute his assigned missions. The ASWOC system was established to support the data reduction of the mission tapes generated by the new computerized P-3C aircraft. The ASWOCs currently provide tactical equipment and facilities for mission planning, command and control, post-flight sensor analysis and mission reporting to naval forces afloat. The ASWOC C3 Upgrade will modernize message and data processing capabilities to support simultaneous aircraft missions, improve systems availability, interface with NCCS Ashore theater data bases, improve systems interoperability with U.S. and Allied Naval Operating Forces, and support new aircraft capabilities. This program assures the existing ASWOC baseline system remains interoperable with updated ASW aircraft.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Started the ASWOC Baseline software upgrade to support interoperability with the P-3C Update IV aircraft.

b. (U) Continued development of the ASWOC C3 Upgrade and conducted the Preliminary Design Review (PDR).

c. (U) Prepared Navy test plan and began C3 Upgrade training course planning.

d. (U) Continued independent verification and validation for C3 Upgrade software.

e. (U) Began integration of the Joint Operational Tactical System (JOTS) Desk Top Computer II (DTCII) workstation.

2. (U) FY 1990 PROGRAM:

a. (U) Revise the acquisition strategy for the ASWOC C3 Upgrade and define ASWOC Modernization architecture and P3I plan.

b. (U) Define ASWOC Modernization databases and database relationships. (e.g., Naval Warfare Tactical Data Base, local data bases, JOTS, etc.)

c. (U) Continue ASWOC software development supporting new generation ASW aircraft. (e.g., P-3 Update IV and S-3B)

d. (U) Commence integration of mission support aids into ASWOC architecture. (e.g., ASW Tactical Decision Aid, Tactical Receive Equipment)

e. (U) Continue software development to support preflight data insertion requirements for P-3C Update III Channel Expansion (CHEX).

f. (U) Continue integration of desk top computer-II (DTC-II) into ASWOC architecture. Integrate JOTS II into ASWOCs worldwide. Begin developing ASWOC/Integrated Undervater Surveillance System (IUSS) interface.

g. (U) Integrate fiber optic circuit exchange terminal into the ASWOC C2 and communications subsystem.

h. (U) Continue integrating automated message processing capability into ASWCO communications subsystem.

i. (U) Continue integrating communications remote control system for ASWOC tactical HF transceivers.

j. (U) Continue the development of a single transportable ASWOC transition system which supports the ASWOCs during new facility development.

k. (U) Integrate UYC-8 security filter into ASWOC architecture.

l. (U) Continue independent verification and validation of ASWOC Modernization software.

4. (U) FY 1991 PLANS:

a. (U) Select and integrate ASWOC database management software.

b. (U) Deliver and test initial ASWOC software supporting P-3C Update IV test and evaluation. Continue ASWOC software development providing full support of P-3 Update IV and S-3B aircraft.

c. (U) Continue integrating mission support aids into the ASWOC architecture.

d. (U) Install and test software supporting preflight data insertion requirements for P-3C Update III (CHEX) aircraft.

e. (U) Continue integrating DTC-II into ASWOC architecture. Continue ASWOC/IUSS interface development.

f. (U) Integrate advanced correlator tracker into ASWOC C2 subsystem.

g. (U) Continue integration and test of fiber optic circuit exchange terminal into ASWOC C2 and communications subsystem.

h. (U) Continue integration of automated message processing capability into ASWOC communications subsystem.

i. (U) Complete integration of ASWOC remote tactical HF tranceiver control system.

j. (U) Continue integration of UYC-8 security filter into ASWOC architecture.

k. (U) Complete ASWOC transition system development.

l. (U) Continue independent verification and validation of ASWOC Modernization software.

5. (U) PROGRAM TO COMPLETION:

a. (U) Complete ASWOC software supporting interoperability with P-3C Update IV and S-3B aircraft.

b. (U) Complete integration of mission support aids into the ASWOC architecture.

c. (U) Complete integration of DTC-II into ASWOC architecture. Complete ASWOC/IUSS interface development.

d. (U) Complete integration and test of fiber optic circuit exchange terminal into ASWOC C2 and communications subsystem.

e. (U) Complete integration of automated message processing capability into ASWOC communications subsystem.

f. (U) Complete independent verification and validation of ASWOC Modernization software.

g. (U) This is a continuing program.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X0486 PROJECT TITLE: Anti-Submarine Warfare Operations Center (ASWOC) C3 Upgrade

D. (U) WORK PERFORMED BY: IN HOUSE: NAVELEXSYSENGACT St. Inigoes, MD.; NAVOCEANSYSCEN San Diego, CA. CONTRACTOR: TRW Federal Systems Group, Fairfax, VA; Potomac Systems Engineering, Inc., Annandale, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: FY-90/FY-91 reduction of -$6,519 and -$9,000 reflects changed acquisition strategy.

F. (U) PROGRAM DOCUMENTATION:

Operational Requirement #117-094-86	August	1986
Acquisition Plan #84-22 (C3 Upgrade)	May	1986
ASWOC Upgrade TEMP #911-2	November	1988
ASW Master Plan	March	1989
Computer Resource Life Cycle Management Plan	July	1987

G. (U) RELATED ACTIVITIES:

PE 0603708N: ASW Signal Processor: The ASW Signal Processors aboard P-3 and S-3 type aircraft generate acoustic data tapes for analysis by the ASWOC Fast Time Analyzer System (FTAS).

PE 0603228N: Aircraft Carrier ASW Module (CV/ASWM): The CV/ASWM supports S-3 ASW aircraft aboard carriers. ASWOC supports P-3 and S-3 aircraft ashore.

PE 0604203N: Standard Avionics Development: ASWOC maintains interoperability with aircraft avionics systems and enhancements aboard P-3 and S-3 aircraft.

PE 0604217N: S-3 Weapon System Improvement: ASWOC maintains interoperability with S-3 weapon systems and future improvements.

PE 0604219N: Airborne ASW Developments: ASWOC maintains support for new airborne ASW capabilities developed for P-3 and S-3 aircraft.

PE 0604221N: P-3 Modernization: ASWOC maintains interoperability with, and fully supports P-3 system changes and enhancements.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT					
OPN/#119					
T4310, 4350, 4360 4370, 4371, 4380, 4381.	5,942	10,063	3,796	Cont.	Cont.
#78/WH046	2,942	659	3,168		

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

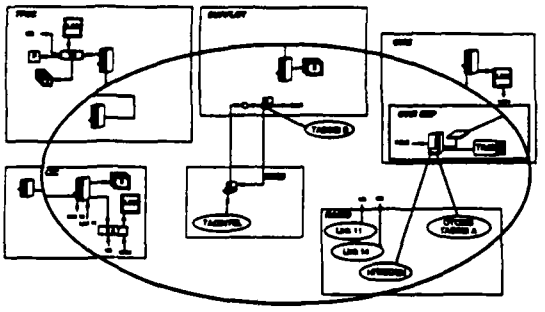
J. (U) MILESTONE SCHEDULE:

Preliminary Design Reviev	Oct 1988
Operational Test System #1	Aug 1991
Operational Test System #2	Apr 1992
Development Testing DT-II	1Q/FY93
Operational Testing OT-II	2Q/FY93
Milestone IIIA NPDM	3Q/FY93

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT TITLE: X0709 PROJECT TITLE: Navy Tactical Command System - Afloat

TFCC Increment II+



POPULAR NAME: NAVY TACTICAL COMMAND SYSTEM - AFLOAT

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
Program Milestones				MS III Increment III
Engineering Milestones	System Delivery			
T&E Milestones		FOT&E	DT/OT Sftw. Rel.	
Contract Milestones				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	1,337 (5,268)*	0 (6,224)*	4,819*	Continuing
Support Contract	0 (2,148)*	0 (529)*	1,012*	Continuing
In-House Support	917 (7,033)*	0 (1,542)*	3,207*	Continuing
GFE/ Other	0 (72)*	0 (30)*	50*	Continuing
Total	2,254	0	9,088*	Continuing

* Funding realigned from PE 0604230N Warfare Support Systems, projects X1847 Afloat Correlation System and X1979 Electronic Warfare Coordination Module.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X0709 PROJECT TITLE: Navy Tactical Command System - Afloat

B. (U) DESCRIPTION: The Navy Tactical Command System - Afloat provides the Officer in Tactical Command (OTC) and his staff with automated command and control decision capabilities. It develops the core battle force and battle group warfighting command and control system consisting of the Tactical Flag Command Center (TFCC) subsystem, the Afloat Correlation Subsystem (ACS), the Electronic Warfare Coordination Module subsystem and a SAFENET Fiber Optic Local Area Network (LAN). The tactical command system is a survivable, distributed system on CV/CVN, BB, LHA, LHD and LHA class ships. The system processes and displays integrated organic and non-organic all source information to provide the OTC information necessary to direct the battle force.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: (Accomplishments include those funded by PE 0604230N, projects X1979 and X1847)

a. (U) Completed initial installation and testing of TFCC enhanced software release.

b. (U) Completed developmental testing (DT) and operational testing (OT) of the TFCC information management system, operational tactical system and baseline correlation system software.

c. (U) Began prototype fiber optic l[illegible] area network twin data bus development.

d. (U) Continued land based test site upgrade with developmental software and hardware components.

e. (U) Continued development of the advanced correlator tracker operational developmental model.

f. (U) Began developing the TFCC interface to the Naval Warfare Tactical Data Base (NWTBD) developed by the Naval Intelligence Processing System (NIPS) program.

i. (U) Began enhanced conversion of baseline correlator and operational tactical system software to UNIX/C and ADA.

j. (U) Began developing tactical intelligence analysis support tools.

2. (U) FY 1990 PROGRAM: (Effort funded under PE 0604230N Project X1847)

a. (U) Complete upgrade and test of fiber optic local area network twin data bus.

b. (U) Complete enhanced conversion of baseline correlation software in UNIX/C and ADA.

c. (U) Conduct DT and OT of baseline correlation software.

c. (U) Conduct DT and OT of advanced correlation tracker operational developmental model.

d. (U) Integrate and test the advanced correlator operational developmental model in the land based test site.

3. (U) FY 1991 PLANS:

a. (U) Complete test and install the advanced correlator tracker.

b. (U) Complete development of the TFCC interface with the Naval Warfare Tactical Data Base (NWTDB) developed by the Naval Intelligence Processing System (NIPS) program.

c. (U) Complete development, integration and test of the operational tactical system software into TFCC.

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X0709 PROJECT TITLE: Navy Tactical Command System - Afloat

d. (U) Continue development tactical intelligence analysis support tools.

e. (U) Continue upgrade to the land based test site with new hardware and software components.

f. (U) Start design, development, integration and test of counter targeting and counter surveillance software into TFCC.

g. (U) Start design, development, integration and test of enhanced decision aid software for integration into TFCC.

h. (U) Start integrating countermeasures software into TFCC.

i. (U) Initiate design and development of multi-level secure network for integration with the TFCC.

5. (U) PROGRAM TO COMPLETION:

a. (U) Complete development of tactical intelligence analysis support tools.

b. (U) Continue upgrade to the land based test site with new hardware and software components.

c. (U) Complete development, integration and test of counter targeting and counter surveillance software into TFCC.

d. (U) Complete development, integration and test of enhanced decision aids into TFCC.

e. (U) Complete development of the TFCC multi-level secure network.

f. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN HOUSE: NAVOCEANSYSCEN, San Diego, CA. CONTRACTORS: UNISYS, Reston, VA; Martin-Marietta Aerospace and Naval Systems, Baltimore, MD; Science Applications International Corporation, McLean, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The +6,922 reflects the integration of the Afloat Correlation System (ACS) and the Electronic Warfare Coordination Module (EWCM) developments into the Tactical Flag Command Center (TFCC). Funding has been realigned from PE 0604230N projects X1847 ACS and X1979 EWCM to the Navy Tactical Command System - Afloat project X0709.

F. (U) PROGRAM DOCUMENTATION:

FDDS NDCP	MAR 1980	FDDS TEMP (240-2)	DEC 1987
ACS NDCP	SEP 1985	ACS TEMP (M848-4)	OCT 1985
EWCM NDCP	DEC 1986	EWCM TEMP (147)	NOV 1986
POST OR	AUG 1988	POST TEMP (1278)	NOV 1988
JOTS OR	MAY 1989	JOTS TEMP (240-10)	AUG 1989

G. (U) RELATED ACTIVITIES:

Program Element 0205670N, Tactical Intelligence Processing Support, Navy Intelligence Processing System (NIPS).

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
APPN/P-1					
OPN #94	6,893	16,112	20,877	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X1144 PROJECT TITLE: Navy Command and Control System (NCCS) Ashore Nodes

C. (U) DESCRIPTION: This project incrementally develops and upgrades three components of the NCCS ashore system: The Maritime Defense Zone (MDZ) C3 System, the Shore Targeting Terminal (STT) Improvement and the Force High Level Terminal (FHLT) Improvement. The MDZ C3 system is the command and control system supporting anti-drug enforcement for the Coast Guard; STT and FHLT support the ashore ASW Sector Commanders and Submarine Operating Authorities (SUBAUTH) respectively. The Navy Front End Processor (NFEP) project is the communications processor supporting all NCCS ashore nodes. Upgrades are required to support increased data transmission rates, improved submarine fire control systems, expanded interface requirements, and replacement of antiquated 1960s ADP systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued STT Improvement program. Conducted STT Critical Design Review (CDR).

b. (U) Designed, coded and tested the STT Block I Upgrade.

c. (U) Completed NFEP System Design.

2. (U) FY 1990 PROGRAM: Because of Congressional reductions, the program has been deferred to FY 1991.

3. (U) FY 1991 Plans:

a (U) Complete Demonstration-Validation Phase and obtain authority to enter STT Full Scale Engineering Development (FSED). Procure STT Operational Developmental Model (ODM).

b. (U) Install STT Block I Hardware/Software including new message processor at test site.

c. (U) Start FHLT incremental improvement program.

d. (U) Design and code STT Block II Upgrade.

e. (U) Complete FSED for NFEP software development and start testing.

f. (U) Test and Install STT Block II Upgrade.

g. (U) Continue FHLT Improvement Program.

4 (U) Program to completion:

a. (U) Conduct NFEP TECHEVAL and OPEVAL and provide multi-level secure access to NCCS Ashore Nodes via DDN (IOC 4Q FY 92).

b. (U) Phase in block upgrades for STT and FHLT using ADA language.

c. (U) This is a continuing program.

E. (U) Work Performed By:

(U) IN HOUSE: NAVOCEANSYSCEN San Diego, CA., NAVELEXSYSENGACT St. Inigoes, MD. CONTRACTORS: Booz, Allen and Hamilton Inc., Bethesda, MD; ATI, Reston, VA; Perdie Assc, Inc., Vienna VA.; PRC, McLean, VA., Unisys Corp., Lexington Park MD, CSC, San Diego, CA.

F. (U) Related Activities: PE 0603763, NCCS Systems Engineering and Integration (SE&I); PE 0604779N, JINTACCS.

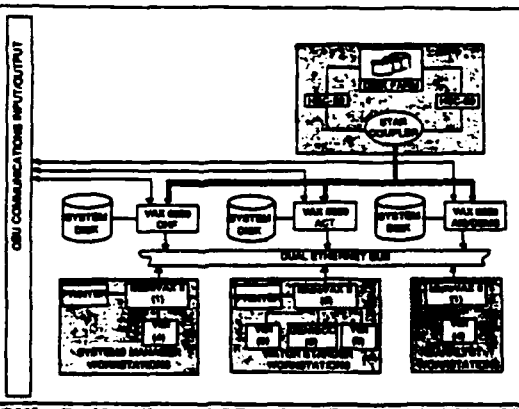
G. (U) Other Appropriation Funds: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT					
OPN #119 T4010	442	2,302	1,052	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT PROJECT: X2009 PROJECT TITLE: Ocean Surveillance Information System Baseline (OBU) Upgrade



POPULAR NAME: OSIS BASELINE UPGRADE (OBU).

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
Program Milestones		MSIIIA Phase I MSII Phase III	ARB NPDM	OBU Ph.III S/W Rel.
Engineering Milestones	Phase II PDR and CDR	IOC PHASE II	OPEVAL Phase II	
T&E Milestones	OT-IIA	DT-IIB	OT-IIB	
Contract Milestones				Award Phase III

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	11,463	8,697	4,256	Continuing
Support Contract	740	400	-0-	Continuing
In-House Support	1,299	4,945	8,873	Continuing
GFE/ Other	250	300	213	Continuing
Total	13,752	14,342	13,342	Continuing

UNCLASSIFIED

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X2009 PROJECT TITLE: Ocean Surveillance Information System Baseline (OBU) Upgrade

B. (U) DESCRIPTION: The Ocean Surveillance Information System (OSIS) Baseline Upgrade (OBU) development is a subsystem of the Navy Command and Control System (NCCS) ashore. OBU provides for the analysis of intelligence information from multiple sources to produce a comprehensive report of potential hostile activity. OSIS provides positional data and operational intelligence to commanders at all levels. It consists of three Fleet Ocean Surveillance Information Centers (FOSICs), two Fleet Ocean Surveillance Information Facilities (FOSIFs), a software support activity, and a training site. OBU functions encompass establishing and maintaining technical characteristics and performance data on hostile weapons platforms systems, collecting non-organic data from ashore and afloat sensors, developing an all-source tactical picture, and the analyzing intelligence information. The data derived from this process is disseminated as an OPINTEL product to the operating forces for tactical threat warnings and support of Over-the-Horizon-Targeting.

(U) OBU uses the Joint Logistics Commander's Guidance of March 1987 on Evolutionary Acquisition (EA) as the strategy for future software development. The EA concept includes a plan for incremental achievement of desired capability building on the core system provided by OBU Phases I and II. The OBU Phase III EA strategy will provide a mechanism for adding future capabilities including the incorporation of proven fleet initiated prototypes.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed OBU Phase I development and installation for all sites.
   b. (U) Began developing special intelligence processor interface.
   c. (U) Began developing information support group improvements.
   d. (U) Conducted contractor system performance tests for Phase II.
   e. (U) Conducted Phase I Operational Test (OT-IIA).
   f. (U) Started installing a ROTHR Interface Module (RIM) for test and evaluation.

2. (U) FY 1990 PROGRAM:
   a. (U) Continue OBU Phase II software development.
   b. (U) Achieve OBU Phase III full scale engineering developemt.
   c. (U) Correct OT-IIA deficiencies.
   d. (U) Start evaluating non-developmental item (NDI) software for incorporation into OBU Phase III.
   e. (U) Start developing Defense Data Network (DDN) and DoD Intelligence Information System (DODIIS) interfaces.
   f. (U) Start Force Over-the-Horizon Track Coordinator (FOTC)/Battle Group Data Base Management (BGDBM) development.
   h. (U) Continue developing OBU trusted port.
   i. (U) Conduct contractor system performance tests for OBU Phase II.
   j. (U) Begin RIM installations at operational sites.
   k. (U) Conduct Operational Assessment of OBU Release 1.2.9.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X2009 PROJECT TITLE: Ocean Surveillance Information System Baseline (OBU) Upgrade

3. (U) FY 1991 PLANS:
   a. (U) Complete OBU Phase II software development.
   b. (U) Complete OT-IIB OPEVAL on OBU Phase II Release 2.0. Provide deficiency correction and follow-on testing.
   c. (U) Complete deployment of RIM at operational sites.
   d. (U) Complete OBU Phase III FY 1991 software operational testing and software release.
   e. (U) Continue evaluating non-developmental items (NDI) software for incorporation into OBU Phase III. Select NDI software applications for OBU Phase III integration.
   f. (U) Complete DDN and DoD Intelligence Information System (DODIIS) interface developments.
   g. (U) Complete OBU trusted port development.
   h. (U) Complete FOTC/BGDBM development.
   j. (U) Incorporate RIM functionality into core OBU.
   k. (U) Develop capability to process ADDGRAF message formats.

4. (U) PROGRAM TO COMPLETION:
   a. (U) Continue OSIS Phase III evolutionary development.
   b. (U) Conduct DT and OT on incremental software releases.
   c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY:
IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NAVELEXSYSENGACT, St. Inigoes, MD.
CONTRACTOR: TRW, Inc., Merrifield, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

ROTHR NDCP (OSIS interface)	Dec 84
OBU DCP	Dec 87
OBU Acquisition Plan	May 88
OBU TEMP	Apr 89

G. (U) RELATED ACTIVITIES:
P.E. 0604230N: Project X1779, Relocatable Over-the-Horizon Radar (ROTHR).
P.E. 0604231N: Project X0486, ASW Operations Center Upgrade.
P.E. 0604231N: Project X2041, Operations Support System.

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
OPN BA2 #119 Correlation Upgrade	3,912	2,27[illegible]	3,478	Cont.	Cont.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X2009 PROJECT TITLE: Ocean Surveillance Information System Baseline (OBU) Upgrade

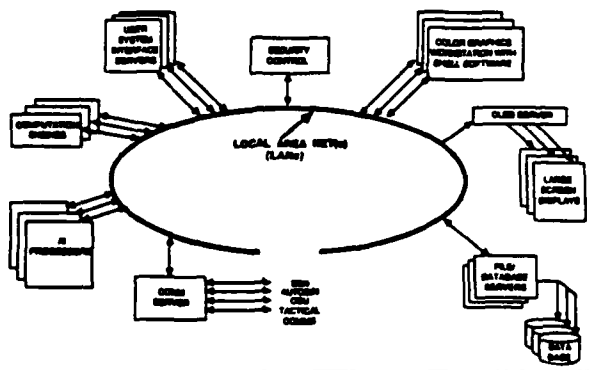
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: U.S. Navy has entered into agreements with the Royal and Royal Australian Navies for delivery of OBU under Foreign Military Sales (FMS) provisions.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X2041 PROJECT TITLE: Operations Support System (OSS)

OSS INCREMENT II ARCHITECTURE



POPULAR NAME: Operations Support System (OSS)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY1991	TO COMPLETE
PROGRAM MILESTONES		NPDM 10/89		NPDM 4QTR FY92/95
ENGINEERING MILESTONES			OSS INCR. I IOC	OSS INCR.II PDR, CDR
T&E MILESTONES			DT/OT	DT/OT
CONTRACT MILESTONES		INCR. I CONT. AWARD		INCR. II CONT. AWARD
BUDGET ($K)	FY 1988	FY 1990	FY1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	0	0	0	Continuing
SUPPORT CONTRACT	0	200	663	Continuing
IN-HOUSE SUPPORT	0	4,780	11,433	Continuing
GFE/ OTHER	0	0	0	Continuing
TOTAL	0	4,980	12,096	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X2041 PROJECT TITLE: Operations Support System (OSS)

B. (U) DESCRIPTION: The CNO, Fleet Commander in Chiefs (CINCs), and Navy Supported CINCs (USCINCLANT and USCINCPAC) require a single, integrated command and control system at the Fleet Command Centers (FCC) and the Navy Command Center (NCC) to receive, process, display and assess the readiness and disposition of own, neutral and potentially hostile forces. The Operations Support System (OSS) incrementally upgrades the information management systems which provide modernized access to WWMCCS and improved integrated command decision aids and displays.

(U) The OSS uses the Joint Logistics Commanders Guidance of March 1987 on Evolutionary Acquisition (EA) as the strategy for development. The EA concept includes a plan for incremental achievement of desired capability, early fielding of initial incremental operational capability and continual dialog and feedback among users, developers, supporters and testers. Increment I provides initial common baseline system by interfacing existing systems such as the Joint Operational Tactical System (JOTS), Fleet Command Center Battle Management Program (FCCBMP), and Operations Support Group Prototype (OSGP). Increment II will develop an integrated, logistically supportable, and cost effective single system, which includes OSIS Baseline Upgrade (OBU) interface, Navy WWMCCS Software Standardization (NWSS) replacement, current system functionality improvement, and multi-level security.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Not Applicable
2. (U) FY 1990 PROGRAM:
   a. (U) Start OSS Increment I integration and development.
   b. (U) Complete source selection for OSS system integrator, workstations/displays, decision aids modeling development and communications.
   c. (U) Award OSS system integrator contract.
   d. (U) Prepare OSS Type A Specification.
   e. (U) Initiate OSS functional description, interface design specification and security analysis document.
   f. (U) Begin Increment I integration of JOTS, OSGP, FCCBMP, and local area network.
   g. (U) Complete OSS Acquisition Plan development.
   h. (U) Begin integrating OSGP Plus software.
   i. (U) Initiate human resource engineering program to determine optimum man-machine interface.
   j. (U) Establish interim software support activity to maintain current OSS softwa configuration.
   k. (U) Develop software interface between C2 workstation and expert systems databases.
   l. (U) Transition FCCBMP test bed software products.
   m. (U) Establish NOSC OSS test bed.
   n. (U) Establish Navy Software Library for C3 systems.
   o. (U) Start OSS Increment II open architecture technical definition.
   p. (U) Complete source selection and award of OSS Increment II Architectural Analysis Contract.
   q. (U) Conduct OSS Increment II NWSS replacement analysis.
   r. (U) Continue JOTS II software upgrade development for DTC II.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Tactical Command Systems (TCS)
PROJECT NUMBER: X2041 PROJECT TITLE: Operations Support System (OSS)

3. (U) FY 1991 PLANS:
   a. (U) Continue OSS Increment I baseline development and integration.
   b. (U) Complete OSGP Plus software integration.
   c. (U) Evaluate FCCBMP test bed advanced technology products including Capabilities Assessment Expert System (CASES) application software.
   d. (U) Develop parallel processing capabilities to support CASES.
   e. (U) Conduct DT and Operational Testing of OSS Increment I release 1.0.
   f. (U) Design and conduct DT of the OSS Increment I distributed operating system.
   g. (U) Complete plan for transition of Navy WWMCCS Software Standardization (NWSS) functions into OSS. Commence re-hosting NWSS functions on the OSS system.
   h. (U) Perform OSS Increment II system definition, design and implementation planning.
   i. (U) Start developing OSS Increment II data base management system.
   h. (U) Complete JOTS II software development.

4. (U) PROGRAM TO COMPLETION:
   a. (U) Complete development of OSS Increment I baseline system.
   b. (U) Continue development of Increment II NWSS modular replacement.
   c. (U) Evaluate FCCBMP test bed advanced technology products for transition to OSS.
   d. (U) Continue Increment II integration, development and testing.
   e. (U) This is a continuing development.

D. (U) WORKED PERFORMED BY:
   IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA.; DARPA, Arlington, VA.
   CONTRACTORS: Pending source selection.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
   1. (U) TECHNICAL CHANGES: None.
   2. (U) SCHEDULE CHANGES: None.
   3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

Operational Requirement	Dec 87	OSS CRLCMP	Sep 89
OSS DCP	Sep 89	OSS PM Plan	Oct 89
OSS TEMP	Oct 89	OSS ILSP	Oct 89

G. (U) RELATED ACTIVITIES:
   PE 0604230N: Warfare Support Systems; Relocatable Over-the-Horizon Radar.
   PE 0604231N: Tactical Command Systems; OSIS Baseline Upgrade (OBU).
   PE 0303152N: WWMCCS ADP Modernization (WAM).

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

	FY 1988 ACTUAL	FY 1989 ESTIMATE	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT						
OPN #119 T4031	0	1,800	7,850	3,490	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.
J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604255N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Electronic Warfare Simulator Development

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0602	EW Environment Simulation (ECHO)	6,492**	20,486	26,604	Cont.	Cont.
W0672	Effectiveness of Navy EW Systems (ENEWS)	8,457	8,928	12,973	Cont.	Cont.
W1778	Closed Loop Test Capabilities	3,316	0*	0	0	0
	Total	18,265	29,414	39,577	Cont.	Cont.

* Consolidates with Project W0602
** $20M of FY 1989 funding transferred to OSD Program Element 0605134D. Of the $20M, a total of $17.4 was reallocated by OSD for Navy EW Simulator Development.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program consolidates the design, fabrication and integration of naval threat radar simulators under two projects for increased managerial emphasis and coordination. The ECHO project focuses on simulating integrated naval air defense threat radar system; the ENEWS project focuses on simulating anti-ship cruise missile and associated targeting platform radars. This effort provides realistic test resources to support developmental and operational test and evaluation of Electronic Warfare (EW) systems in accordance with Service requirements, and General Accounting Office and Congressional recommendations. The ECHO project supports T&E of airborne EW systems; the ENEWS project supports T&E of Navy surface EW systems. Closed loop simulator development is being transferred from W1778 to W0602 in FY 1990.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604255N Budget Activity: 6
PROGRAM ELEMENT TITLE: Electronic Warfare Simulator Development
PROJECT NUMBER: W0602 PROJECT TITLE: EW Environment Simulation (ECHO)

A. (U) RESOURCES: (Dollars in Thousands)

POPULAR NAME	FY 1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
ECHO Range	6,492	20,486	26,604	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project provides for the development of an Integrated Naval Air Defense Simulation (INADS) at the Electronic Warfare Threat Environment Simulation (EWTES) complex for flight test and evaluation of airborne EW equipments and tactics development at the Naval Weapons Center (NWC), China Lake, CA. EW systems component test and evaluation is conducted at the Electronic Combat Simulation and Evaluation Laboratory (ECSEL), Pacific Missile Test Center, Pt. Mugu, CA. and the Electronic Warfare Integrated Systems Test Laboratory (EWISTL), Naval Air Test Center, Patuxent River, MD. EWISTL provides secure, Test & Evaluation (T&E) quality, closed loop radar simulation capabilities for T&E of fully integrated, aircraft installed EW systems. This project directly supports HARM, ALR-67, ALQ-126B, ALQ-165, EA-6B ADVCAP, expendable jammers, and decoys as well as other EW systems which will IOC in the 1990s. It also provides for continued development of the Closed Loop Test Capability at the Naval Air Test Center (NATC), Patuxent River, MD. The Closed Loop Test development was funded under project W1778 prior to FY 1990. Navy requirements are coordinated through the Navy tri-center (NATC, PMTC, NWC) simulator development concept for mutual support, cost reduction, and increased test effectiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Continued development of one early warning acquisition radar simulation.
   b. (U) Completed integration of system and with range control instrumentation.
   c. (U) Continued engineering support of system simulation.
   d. (U) Continued antenna modifications to CGK.
   e. (U) Continued development of emitter simulators control system.
   f. (U) Continued EW simulation systems engineering investigations.
   g. (U) Commenced emitter validation/verification program.
   h. (U) Completed SATS integration with imulation.
   i. (U) Continued Tactical Data System Development for C^2 System #1.
   j. (U) Completed missile seeker simulation development and integration.
   k. (U) Continued RF background emitter generator for NATC.

2. (U) FY1990 PROGRAM:
   a. (U) Continue development of early warning acquisition radar.
   b. (U) Continue engineering support of system simulation.

c. (U) Continue antenna modifications to CGR.
d. (U) Continue development of emitter simulator control system.
e. (U) Continue EW simulation systems engineering investigations.
f. (U) Complete Tactical Data System Development for C^2 System #1.
g. (U) Continue RF background generator at NATC.
h. (U) Commence emitter validation/verification program.

3. (U) FY1991 PLANS:
a. (U) Continue development of early warning acquisition radar.
b. (U) Continue engineering support of _____ system simulation.
c. (U) Continue antenna modifications to CGR.
d. (U) Complete development of emitter simulator control system.
e. (U) Continue EW simulation systems engineering investigations.
f. (U) Complete RF background generator at NATC.
g. (U) Commence emitter validation/verification program.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Air Test Center, Patuxent River, MD. Major Contractors: RCA, Moorestown, NJ, a division of GE; Electronic Warfare Associates, Ridgecrest, CA; General Dynamics, Pomona, CA; General Dynamics, Fort Worth, TX; EG&G, Ridgecrest, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION: NAPDD 052-098.

G. (U) RELATED ACTIVITIES: Navy requirements coordinated under the Test and Training Resources Policy Board, established in FY88 to prioritize requirements and prevent unnecessary duplication. Navy efforts are coordinated with Army and Air Force requirements through the Joint Executive Committee on Air Defense Threat Simulations (EXCOM), the CROSSBOW-S committee, and the Joint Coordinating Committee on Electronic Defense Systems.

H. (U) OTHER APPROPRIATION FUNDS: This is a Non-acquisition program.

	(Dollars in Thousands)			
APPN/P-I	FY 1989	FY 1990	FY 1991	TO COMPLETE
MILCON				
P-342	5,400	0	0	0
P-454	0	0	16,500	0

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

1. (U) _____ purchased from Signal Corporation, Netherlands with USAF contract assistance.

a. (U) U.S. Navy RDT&E funding $7.3M FY86 through FY88.

b. (U) _____ operational FY 1988.

J. (U) MILESTONE SCHEDULE: Completions.

1. (U)	_____ missile seeker	
2. (U)	CGR Antenna upgrade	
3. (U)	_____ arget tracker	
4. (U)	EW Acquisition Radar	4Q/92
5. (U)	_____	4Q/88
6. (U)	_____ IR Seeker Simulation	4Q/89
7. (U)	Emitter Simulator control system	2Q/91
8. (U)	RF Background generator for NATC	4Q/91

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604255N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Electronic Warfare Simulator Development
PROJECT NUMBER: W0672 PROJECT TITLE: Effectiveness of Navy Electronic Warfare Systems (ENEWS)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0672	ENEWS	8,457	8,928	12,973	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Provides realistic developmental and operational test and evaluation of Electronic Warfare (EW) systems in accordance with Service requirements, and General Accounting Office and Congressional recommendations. The ENEWS program provides computer facilities, simulation laboratories, and flyable simulators at the Naval Research Laboratory, Washington, DC. Simulation capabilities are used to aid in the development of anti-ship missile defense, support EW testing, and provide realistic simulations of Soviet and third world anti-ship missiles and associated threat launch platforms.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Continued development of Interactive Scenario Generator.
   b. (U) Continued development of simulator.
   c. (U) Upgraded various threat missile simulators based on new intelligence information.
   d. (U) Developed upgrades to the AN/ALQ-170(V)1 & (V)2 simulators.
   e. (U) Completed lab and flight verification of simulator.

3. (U) FY 1990 PROGRAM:
   a. (U) Initiate simulation development
   b. (U) Initiate development of
   c. (U) Flight validate simulator.

4. (U) FY 1991 PLANS:
   a. (U) Complete Outer-Air Battle total engagement scenario.
   b. (U) Complete full engagement expendable countermeasures model.
   c. (U) Lab test advanced simulator.
   d. (U) Lab test Communications Countermeasures (CCM) variant of
   e. (U) Continue development of missile simulator.
   f. (U) Continue development of advanced seeker.

5. (U) PROGRAM TO COMPLETION:
   a. (U) Develop C^3CM effectiveness model.
   b. (U) Complete development of automatic television tracker.
   c. (U) Incorporate AN/ALQ-170 intelligence updates.
   d. (U) Continue development of missile simulator.
   e. (U) Continue development of advanced target discrimination simulator.

f. (U) Complete EP-3B aircraft instrumentation.
g. (U) Develop modular seeker for use with the Central Target Simulator (CTS)
h. (U) Expend CTS capabilities to handle real-time large-scale simulations.
i. (U) Modify simulator to simulate threat upgrade.
j. (U) Initiate development of IR simulator variant of
k. (U) Continue upgrades/modifications of simulator.
l. (U) Initiate development of advanced IR seeker.
m. (U) Develop simulator.
n. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: Naval Research Laboratory, Washington, DC.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: NAPDD 049-098

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

	IOC
1. (U) Digital Simulators	
a. (U) Counter targeting simulation model	2Q/89
b. (U) Inner defense zone model	4Q/93
c. (U) ESM system models	3Q/94
2. (U) Flyable Simulators	
a. (U) Advanced RF seeker	4Q/89
b. (U) New technology IR seeker	4Q/90
c. (U) RF/IR hybrid seeker	3Q/91
d. (U) Free World Seeker	1Q/90
e. (U) Targeting radar simulator	1Q/91

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0609	Aerial Target Systems Dev.	23,434	7,781	7,637	Cont.	Cont.
W0610	Weapons System T&E Targets Dev. & Proc.	36,349	16,290	4,700	Cont.	Cont.
W0611	Supersonic Low Altitude Target	22,135	26,951	40,515	63,764	323,354
S0612	Seaborne Target Development	1,430	980	1,087	Cont.	Cont.
TOTAL		83,348	52,002	53,939	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This element develops Aerial and Surface Targets and associated augmentation and auxiliary systems necessary to duplicate or simulate threat characteristics in support of weapons systems performance test and evaluation and Fleet training. Included within this Program Element are QF-4S development, BQM-74 upgrade, (W0609); procurement of AQM-37C, MQM-8, QF-4, and BQM-34 targets for Navy weapons systems test and evaluation (W0610); development and procurement of the AQM-127 SLAT (W0611); and continued development of surface towed targets, improved target control system and an anti-radiation missile target (S0612).

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0609 Project Title: AERIAL TARGET SYSTEMS DEVELOPMENT

C. (U) PROJECT DESCRIPTION: Aerial Target Systems and associated augmentation and auxiliary systems are developed in response to the need for AAW and ASUW systems required to defend Fleet surface and air units in a hostile environment. The threat envelope covered extends from the surface to 100K feet for speeds in the low subsonic range to MACH 4.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Awarded Contract For BQM-74C upgrade (BQM-74 PI).
   b. (U) Initiated FSED of QF-4S FSAT at Naval Aviation Depots North Island and Cherry Point.
   c. (U) Began testing integration of the TDU-34A target system in the A-6 aircraft.
   d. (U) Continued development of ULQ-21 ECM modules.
   e. (U) Continued development of USQ-104 Scorer.
   f. (U) Completed BQM-126A target TECHEVAL.
   g. (U) Continued development of various threat related emitters.
   h. (U) Completed OPEVAL on Navy Standard Tow Target System (NSTTS) and received approval for limited production.
2. (U) FY 1990 Program:
   a. (U) Complete BQM-74C upgrade.
   b. (U) Continue QF-4S FSED.
   c. (U) Continue development of ULQ-21 ECM modules/ECM decoys.
   d. (U) Initiate development of advanced command/control transponder.
   e. (U) Initiate development of standard target processor.
   f. (U) Continue development of USQ-104 scorer.
   h. (U) Begin S-3 integration testing with NSTTS.
3. (U) FY 1991 Plans:
   a. (U) Continue FSED on QF-4S.
   b. (U) Continue development of advanced command/control transponder.
   c. (U) Continue development of ULQ-21 ECM modules/ECM decoys.
4. (U) Program to Completion: This is a continuing effort.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Point Mugu, CA; Naval Aviation Depots, Cherry Point, NC and North Island, CA. CONTRACTORS: Beech Aircraft, Wichita, KS; Northrop, Ventura, CA; Motorola, Scottsdale, AZ; Southwest Aerospace, Santa Ana, CA; Marquardt, Van Nuys, CA.

F. (U) RELATED ACTIVITIES: Systems currently in test and evaluation: AIM-7M, AIM-54C, AMRAAM, Standard Missile II, Rolling Airframe Missile, SEASPARROW, and AEGIS.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN # 25	109,200	124,400	142,400	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0610 Project Title: WPN SYSTEM T&E TARGETS DEV/PROC

C. (U) DESCRIPTION OF PROJECT: Test and evaluation of Naval Weapons Systems requires targets which closely replicate current and projected threats to Fleet units in the AAW and ASUW environments. This replication must include characteristics related to size, performance envelope, and electomagnetic and infrared signatures. As threats change, changes must be made to keep the targets as threat representative as possible. This is done in response to changes in the requirements of the developers of naval weapons systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed conversion of 10 aircraft into QF-4N targets, procured 14 shipsets of installation kits and 7 sets of drone peculiar equipment.
   b. (U) Continued BQM-34S procurement (2nd increment funding).
   c. (U) Procured 20 MQM-8G(ER) Extended Range VANDALs and 12 MQM-8G VANDALs.
   d. (U) Continued studies for programmable RCS equipment, SCINT and GLINT and awarded Instrumentation Radar contract.
   e. Exercised option for 25 DSQ-37 scorers.
   f. Procured various ULQ-21 ECM set modules.

2. (U) FY 1990 Program
   a. (U) Complete conversion of 4 aircraft into QF-4N targets.
   b. (U) Continue BQM-34S procurement (final increment).
   c. (U) Continue (2nd increment) 20 MQM-8G VANDALs.
   d. (U) Procure 75 DSQ-37 scorers.

3. (U) FY 1991 Plans:
   a. (U) Procure 11 Firing Error Indicator (FEI) scorers and 3 test sets.
   b. (U) Continue procurement (2nd increment) for programmable radar augmentation.
   c. (U) Initiate development of AQM-37 booster.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA; Naval Aviation Depots, Cherry Point, NC and North Island, San Diego, CA CONTRACTORS: Allied Bendix, Mishawaka, IN; Teledyne Ryan Aeronautical, San Diego, CA.

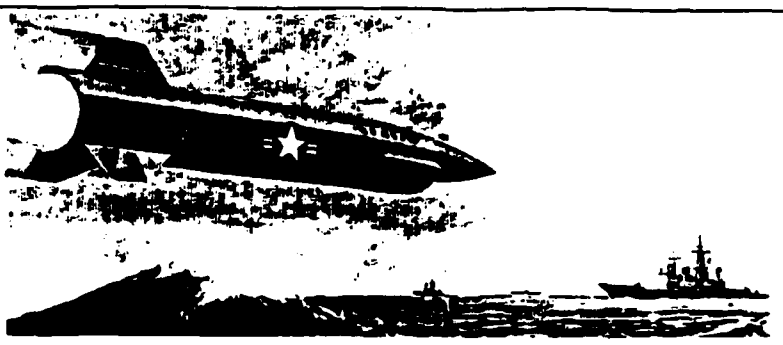
F. (U) RELATED ACTIVITIES: Systems currently in test and evaluation: AIM-7M, AIM-54C, AMRAAM, Standard Missile II, Rolling Airframe Missile, SEASPARROW, and AEGIS.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0611 Project Title: SUPERSONIC LOW ALTITUDE TARGET (SLAT)



POPULAR NAME: SLAT

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				MS-IIC 10/91 MS-III 1/93
Engineering Milestones			PCA 5/91	FCA 6/93
T&E Milestones	DT IIB	DT-IIB	DT-IIC DT-IID	OPEVAL 1-2092
Contract Milestones				LRIP 12/91

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	11,710	20,760	20,000	352,780
Support Contract	350	350	350	2,528
In-House Support	10,075	5,841	20,165	78,282
GFE/ Other				
TOTAL	22,135	26,951	40,515	433,590 63,764

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0611: Project Title: SUPERSONIC LOW ALTITUDE TARGET (SLAT)

B. (U) PROJECT DESCRIPTION: This project provides for the development and procurement of a low altitude supersonic target which simulates the anti-ship cruise missile threat. The target weighs 2,500 pounds and is capable of flying at a minimum altitude of less than 30 feet at 2.5 MACH. It is air launched at subsonic speeds and has a 55 nautical mile range until fuel burnout.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Independent review of program conducted in March 1989.
   a. (U) Flight test suspended until November 1990.
   b. (U) Stop work order issued to Martin April 1989.
   c. (U) Revised guidance and control concept defined.
   d. (U) Program restructure reviewed and approved on 13 SEP 1989.

2. (U) FY 1990 Program:
   a. (U) Complete Guidance and Control changes.
   b. (U) Qualify modified Inertial Measurement Unit (IMU).
   c. (U) Validate and verify software modifications.
   d. (U) Update range integration documentation.
   e. (U) Commence captive carry range integration flights.
   f. (U) Initiate site activation at Atlantic Fleet Weapons Training Facility (AFTWF), Roosevelt Roads, PR.

3. (U) FY 1991 Plans:
   a. (U) Resume flight test at Point Magu Missile Test Center (PMTC) (eight flights).
   b. (U) Commence TECHEVAL (eight flights) at PMTC and AFTWF.
   c. (U) Conduct MS-IIC review of test results and authorize award of low rate initial production (LRIP) contract for 30 T&E targets.
   d. (U) Commence incremental Physical Configuration Audit (PCA).

4. (U) Program to Completion:
   a. (U) Complete TECHEVAL.
   b. (U) Conduct OPEVAL (ten flights).
   c. (U) Conduct Final Configuration Audit (FCA).
   d. (U) Conduct MS-III review and award first production lot contract.
   e. (U) IOC for T&E (first LRIP delivery) - 1Q94.
   f. (U) IOC for fleet training (first production delivery) - 1Q95.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Point Mugu, CA. CONTRACTOR: Martin Marietta, Orlando, FL.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNICAL CHANGES: Range integration problems resulted in definition of modified guidance and control concept.
2. (U) SCHEDULE CHANGES: Program has been rebaselined to incorporate and test improved guidance and control concept.
3. (U) COST CHANGES: $26,571 reduction in FY91 funds is a result of deferring LRIP procurement and Technical Data Package from FY 91 into FY 92.

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0611: Project Title: SUPERSONIC LOW ALTITUDE TARGET (SLAT)

F. (U) PROGRAM DOCUMENTATION:

NDCP 8/84
TEMP 9/85

G. (U) RELATED ACTIVITIES: Systems currently in test and evaluation: AEGIS, Standard Missile II, New Threat Upgrade. Proposed systems: Arleigh Burke (DDG-51), Standard Missile II Block Upgrades.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: S0612: Project Title: SURFACE TARGETS DEVELOPMENT

C. (U) PROJECT DESCRIPTION: This project develops required surface target systems and their related target augmentation/auxiliary systems in support of air-to-surface and surface-to-surface weapons test and evaluation and fleet training.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued ARME development.
   b. (U) Completed Digital Control System development.
   c. (U) Continued STRS development.
   d. (U) Continued Command and Control Augmentation Development.

2. (U) FY 1990 Program:
   a. (U) Complete SEPTAR Improved Control System.
   b. (U) Continue Command and Control Augmentation development.
   c. (U) Commence Ship Simulator Platform (SSP).
   d. (U) Continue ARME development.
   e. (U) Continue STRS.

3. (U) FY 1991 Plans:
   a. (U) Continue Command and Control Augmentation development.
   b. (U) Continue Ship Simulator Platform.
   c. (U) Commence Weapons Systems/Emitter Interface.
   d. (U) Complete ARME.
   e. (U) Continue STRS.

4. (U) Program to Completion: This is a continuing effort.

E. (U) WORK PERFORMED BY: IN-HOUSE: PACMISTESTCEN, Pt. Mugu, CA.

F. (U) RELATED ACTIVITIES: Over-the-Horizon Air Weapons Systems.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN/line 242	2,532	3,713	4,909	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604260N Budget Activity: 4
Program Element: CH/MH-53E
Project Number: W1109 Project Title: CH/MH-53E

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1109	C/MH-53E	8,369	7,835	19,928	Cont.	Cont.

B. (U) DESCRIPTION: This project provides for the development of an upgrade to the H-53E's T64-GE-416 engine. The recoverability of the aircraft with a single engine failure under tow was the top unsuitability deficiency cited in the MH-53E OPEVAL report. This project provides for the development of an improved Main Gearbox (MGB) FOR THE H-53E. Improvements to the Main Gearbox include enhanced reliability and maintainability (increase time between scheduled removal from 1,250 hours to 2,050 hours). This project also provided for the development required to integrate a Global Positioning System (GPS) into the MH-53E. This project provided for an infrared Helicopter Night Vision System (HNVS). The present USMC/NAVY helicopter ability to perform amphibious warfare and tactical minesweeping operations is severely restricted by the lack of a night/low visibility capability. This project will allow transport and minesweeping helicopters to operate at low altitude and at near daylight airspeeds at night and during periods of reduced visibility. Additionally, this project provides funding for development of a Composite Main Rotor Blade (CMRB).

C. (U) Program Accomplishments and Plans:

1. (U) FY 1989 Accomplishments:
   a. (U) Commence HNVS TECHEVAL.
   b. (U) Continue development and ground testing of upgraded engine.
   c. (U) Specification and source selection development for GPS integration.
2. (U) FY 1990 Programs:
   a. (U) Commence HNVS OPEVAL
   b. (U) Commence GPS integration effort.
   c. (U) Main Gearbox contract award and fabrication test.
3. (U) FY 1991 Plans:
   a. (U) Complete HNVS OPEVAL and Milestone III production decision.
   b. (U) Development and kit fabrication/installation of GPS into CH-53E/MH-53E.
   c. (U) Main Gearbox prototype design.
   d. (U) Commence Upgrade Engine airframe integration
   e. (U) CMRB development contract award
   f. (U) CMRB prototype design fabrication test.

4. (U) Program to Completion:
   a. (U) This is a continuing program.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604260N Budget Activity: 4
Program Element: CH/MH-53E
Project Number: W1109 Project Title: CH/MH-53E

D. (U) Work Performed BY: IN-HOUSE: NAC Indianapolis, IN; NATC Patuxent River, MD CONTRACTOR: Sikorsky Aircraft, Stratford, CT; General Electric Corp., Lynn, MA.

E. (U) Comparison With Revised FY 1990/1991 President's Budget:

1. (U) TECHNOLOGY CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANG Increase of 10,284 is for the development requirement to integrate GPS into the CH-53E/MH-53E.

F. (U) PROGRAM DOCUMENTATION:

1. GPS: DCP No. 133 Rev B 5/79; TEMP 9/87
2. HNVS: OR 0930AW 4/77; TEMP approved 11/85, revised 8/88
3. Engine/MGB: NPDM 11/86

G. (U) Related Activities: Program Element 060777N Global Positioning System (GPS).

H. (U) OTHER APPROPRIATION FUNDS: Production is planned for the outyears.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: N/A

J. (U) MILESTONE SCHEDULE:

1. (U) HNVS: Commence TECHEVAL 9/89, OPEVAL 1/90; FRP 7/90.
2. (U) GPS: Award integration contract 6/90; Commence TECHEVAL 4/92, OPEVAL 9/92; FRP 3/93.
3. (U) Engine: Award airframe integration contract (SIKORSKY) 4/90; Flight Test 4/92 Main Gearbox Award reliability improvement contract 3/90.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0478	Expendable, Reliable Acoustic Path Sonobuoy	8,124	6,546	6,908	6,947	30,000
W0480	ASW Sensors and Processing	853	3,618	1,637	CONT.	CONT.
W1624	Broadband Acoustic Systems	8,014	0	0	N/A	N/A
W2000	Air Deployable Active Receiver	0	0	11,720	CONT.	CONT.
W2001	Tactical Surveillance Sonobuoy	17,776	23,195	15,424	CONT.	CONT.
	TOTAL	34,767	33,359	35,689	CONT.	CONT.

B. (u) DESCRIPTION: This program provides for the engineering development of air acoustic search sensors to: (1) ensure a submarine prosecution capability is maintained against the mid-1990/2005 threats; (2) develop those sensors identified in the Navy's ASW Master Plan; (3) develop exploitation of and promotion of competition by use of incentive contracting; (4) plan logistics support; (5) develop advanced aircraft avionics and software to process the mid-1990/2005 sensors.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)
PROJECT NUMBER: W0478 PROJECT TITLE: Expendable Reliable Acoustic Path Sonobuoy (ERAPS)

C. (U) DESCRIPTION: The Expendable Reliable Acoustic Path Sonobuoy (ERAPS), AN/SSQ-75 Sonobuoy, is an active localization sensor for use by anti-submarine warfare aircraft. It is designed to use the Reliable Acoustic Path (RAP) propagation mode to provide air anti-submarine warfare forces the option to conduct active (small area) search and rapid localization of submarines. Detection ranges will be significantly greater than those experienced with today's active sonobuoys. The sonobuoy is deployed at selectable depths to Detection is gained by a low frequency, high power transmitted pulse and a volumetric receiving array. Range, bearing and doppler are obtained.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Completed System Design Review.
   b. (U) Continued contractor engineering tests.
2. (U) FY 1990 Program:
   a. (U) Complete contractor engineering tests.
   b. (U) Complete Preliminary Design Review.
   c. (U) Initiate contractor demonstration tests.
3. (U) FY 1991 Plans:
   a. (U) Complete Critical Design Review.
   b. (U) Complete contractor demonstration tests and initiate Navy demonstration tests.
4. (U) Program to Completion:
   a. (U) Initiate low rate initial production following DT/OT-IIA.
   b. (U) Complete TECHEVAL and OPEVAL.
   c. (U) Initiate full rate production.

E. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NAC, Indianapolis, IN; NWSC, Crane, IN; NATC, Patuxent River, MD., NSWC, White Oak, MD. CONTRACTORS: ERAPSCO (MAGNAVOX/SPARTON).

F. (U) RELATED ACTIVITIES: PE 0604217N S-3 Weapon System Improvement Program (host platform); PE 0604212N P-3 Modernization (host platform)

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E; NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)
PROJECT NUMBER: W2000 PROJECT TITLE: Air Deployable Acoustic Receiver (ADAR)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2000	Air Deployable Active Receiver	0	0	11,720	CONT.	CONT.

B. (U) DESCRIPTION: The ADAR sonobuoy is an air launched acoustic receiver utilized by ASW aircraft to receive pulses from ship and air deployed low frequency active sources. The ADAR system will provide long range bistatic/ multistatic detection and localization of quiet, slow-moving submarines. The sonobuoy will also be capable of functioning in a passive mode to track high speed targets. Intended mission areas include contact redetection, barrier protection, screening operations, and area search and surveillance. This project was previously titled Horizontal Line Array (HLA).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments: Effort executed under PE 0603254N.
2. (U) FY 1990 Program: Effort executed under PE 0603254N.
3. (U) FY 1991 Plans:
   a. (U) Participate in Critical Sea Test/Low Frequency Active tests.
   b. (U) Complete ADAR system specifications.
   c. (U) Complete Milestone II.
   d. (U) Award FSED contract.
   e. (U) Begin S-3B/ADAR integration studies.
4. (U) Program to completion:
   a. (U) Continue with full scale development, including sonobuoy and processor software design and tests.
   b. (U) Complete S-3B/ADAR design and integration.
   c. (U) Complete air/ship interfaces, and S-3B integration requirements.
   d. (U) Complete TECHEVAL and OPEVAL leading to full rate production in 1996.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NAC, Indianapolis, IN; NWSC, Crane, IN; NATC, Patuxent River, MD. CONTRACTOR: TBD.

E. (u) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (u) Cost changes:

PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)
PROJECT NUMBER: W2000 PROJECT TITLE: Air Deployable Acoustic Receiver (ADAR)

F. (U) PROGRAM DOCUMENTATION:

OR	11/85 (HLA)
AP	(1/90)
PCAD	2/89 (ADAR)
TEMP	(6/91)

G. (U) RELATED ACTIVITIES: PE 0603254N, Air Anti-Submarine Warfare (advanced development for HLA and ADAR); PE 0603708N, Advanced Acoustic Processing (detection algorithm development); PE 0604221N, P-3 Modernization (host platform); PE 0604217N, S-3 Weapon System Improvement Program (host platform).

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

MS II	3/91
TECHEVAL	12/94 - 4/95
OPEAVL	6-9/95
MS III	11/95

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)
PROJECT NUMBER: W2001 PROJECT TITLE: Tactical Surveillance Sonobuoy (TSS)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2001	Tactical Surveillance Sonobuoy	17,776	23,195	15,424	CONT.	CONT.

B. (U) DESCRIPTION: The Tactical Surveillance Sonobuoy (TSS) baseline system is designed for large area search. System consists of an expendable A-sized sonobuoy with trigger-controlled data storage capability, faster than real-time play-back mode, a minimum 5-day in-water life, and associated avionics software modifications. The data storage/playback capability is used to provide a "force multiplier effect" which allows one aircraft to cover significantly larger areas than can be monitored with real-time sonobuoys. Enhanced Tactical Surveillance Sonobuoy (ETSS) will increase TSS systems gain through array and/or in-buoy trigger modifications to maintain performance against the quieter threat of the 1990s.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Initiated processor software development.
   b. (U) Initiated platform display prototype development.
   c. (U) Continued contractor engineering tests.
   d. (U) Initiated design of DT/OT-IIA platform.
2. (U) FY 1990 Program:
   a. (U) Complete contractor engineering tests.
   b. (U) Conduct contractor demonstration tests.
   c. (U) Complete processor software development.
   d. (U) Complete critical design review.
   e. (U) Complete design and check out of DT/OT-IIA platform.
   f. (U) Complete prototype display and DT/OT-IIB platform interface specifications.
   g. (U) Complete Navy development tests.
   h. (U) Procure arrays for ETSS design test.
3. (U) FY 1991 Plans:
   a. (U) Complete DT/OT-IIA in support of low rate initial production.
   b. (U) Complete ETSS systems design tests.
   c. (U) Initiate ETSS FSED and award contract(s).
4. (U) Program to completion:
   a. (U) Complete DT/OT-IIB (TECHEVAL/OPEVAL).
   b. (U) Complete ETSS development and initial operational testing.

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PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)
PROJECT NUMBER: W2001 PROJECT TITLE: Tactical Surveillance Sonobuoy (TSS)

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NAC Indianapolis, IN; NWSC, Crane, IN; NATC, Patuxent River, MD. CONTRACTORS: Magnavox, Ft. Wayne, IN: Hazeltine, Braintree, MA./Sippican, Marion, MA (joint venture).

E. (u) COMPARISON WITH REVISED FY 1990/1991 PRESIDENTS' BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (u) Cost changes: Department decreased program -$6,132K; ETSS

F. (U) PROGRAM DOCUMENTATION:

	TSS	ETSS
TOR	6/85	6/85
DOP	12/85	12/85
OR	2/86	2/86
AP	8/86	TBD
TEMP	2/88	TBD

G. (U) RELATED ACTIVITIES: PE 0603708N, Advanced Acoustic Processing (detection algorithm development); PE 0604217N, S-3 Weapon System Improvement Program (host platform); PE 0604211N, P-3 Modernization (host platform); PE 0603228N, CV-ASW Module; PE 0604231N, ASWOC C3 Upgrade.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	MS II	DT-IIA	OT-IIA	MSIIIA (ALRIP)
TSS	9/87	9/90-2/91	12/90-2/91	7/91
ETSS	10/91	N/A	N/A	N/A

	TECHEVAL (DT-IIB)	OPEVAL (OT-IIB)	MSIIIB (AFRP)
TSS	12/91-5/92	7/92-9/92	1/93
ETSS	12/96-5/96	7/96-9/96	1/97

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Acoustic Search Sensors (Engineering)
PROJECT NUMBER: W0480 PROJECT TITLE: ASW Sensors and Processing

C. (U) DESCRIPTION: Provide improved air ASW mission effectiveness through engineering development of hardware and software associated with acoustic systems, sensors, processing, post-processing, data recording, and display of air ASW platforms. Key objectives: improved detection, classification, localization and tracking; increased capacity and flexibility to handle multi-sensor data. The project will develop sonobuoy systems to improve airborne detection, localization/attack capability against the advanced new threat, and examine long range tactical sensors to provide ASW aircraft a balanced capability to detect both narrowband and broadband submarine acoustic signatures.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Dopple Enhancement - Investigate alternative solutions for improved low doppler detection for eventual incorporation as an ECP into the AN/SSQ-62 DICASS sonobuoy or into the Active Adjunct Sonobuoy (AAS) program. Cancelled algorithm for DE.
2. (U) FY 1990 Program:
a. (U) Acoustic Intercept System (AIS) - Complete acquisition documentation. Award FSED contract for the AIS processor development. Commence systems integration.
3. (U) FY 1991 Plans:
a. (U) AIS - Initiate hardware development test. Complete design and development testing.
4. (U) Program to completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NOSC, San Diego, CA; and NATC, Patuxent River, MD. CONTRACTOR: Magnavox, Fort Wayne, IN, (DE).

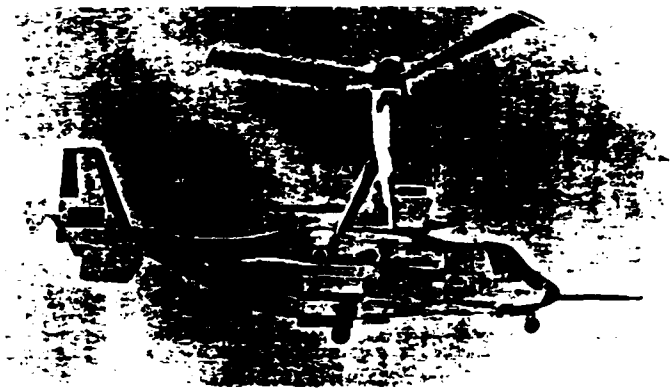
F. (U) RELATED ACTIVITIES: PE 0603254N, Air anti-Submarine Warfare (advanced development); PE 0604221N, P-3 Modernization (host platform); PE 0604217N, S-3 Weapon System Improvement Program (host platform).

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604262N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: V-22 OSPREY
PROJECT NUMBER: W1425 PROJECT TITLE: V-22



POPULAR NAME: V-22 Osprey

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				
Engineering Milestones				
T&E Milestones		DT-IIA/12/90 DT-II/5/90		
Contract Milestones	Prod. Long lead funding			

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Totat to complete
Major Contract	262,210	207,100	0	2,055,287
Support Contract	5,435	6,471	0	30,066
In-House Support	30,905	39,815	0	149,681
GFE/GFSE Other	2,706	1,614	0	25,832
TOTAL	301,256	255,000	0	2,260,866

PROGRAM ELEMENT: 0604262N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: V-22 OSPREY
PROJECT NUMBER: W1425 PROJECT TITLE: V-22

B. BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEMS CAPABILITIES:

The V-22 program was designed to provide an aircraft to meet the amphibious/vertical assualt needs of the Marine Corps, the Combat Search and Rescue needs of the Navy, and the Special Operations needs of the Air Force. The V-22 will replace the CH-46 in the Marine Corps, the HH-3A in the Navy, and supplement H-53, H-60 and C-130 in the Air Force. The V-22 will be capable of flying over 2100 nautical miles without refueling, giving the Services the advantage of a VSTOL aircraft that can rapidly self-deploy to any location in the world.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) First flight of aircraft #1 occurred 19 March 1989
First flight of aircraft #2 occurred 9 August 1989

b. (U) Aircraft #1 and #2 are in flight test and have completed a combined total of 58 flights accumulating 43.9 flight hours.

2. (U) FY 1990 Progarms: Continue V-22 flight test program. DT-IIA, DT-IIB and DT-IIB/OT-IIA shipboard compatability testing is scheduled.

3. (U) FY 1991 Plans: Not applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center (Avionics Engineering) Warminster, PA; Naval Air Test Center (Operational Testing) Patuxent River, MD; Naval Avionics Center (Avionics Software) Indianapolis, IN. CONTRACTORS: Bell-Boeing (Air Vehicle) Fort Worth, TX; Allison Gas Turbine Division, General Motors Corp., Indianapolis, IN (Engines).

PROGRAM ELEMENT: 0604262N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: V-22 OSPREY
PROJECT NUMBER: W1425 PROJECT TITLE: V-22

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable

2. (U) SCHEDULE CHANGES: Not Applicable

3. (U) COST CHANGES: Funding for the V-22 Program was not included in the FY 1991 amended budget.

F. (U) PROGRAM DOCUMENTATION:

JSOR	8/85
DCP	5/86
JTP/NTP	12/86
TEMP. M960 REV 1	3/89
ACQ PLAN	3/89

G. (U) RELATED ACTIVITIES: P.E. 0603256N, V-22A/ASW VARIANT, examined application of tilt-rotor technology to the ASW mission (FY 1988).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APN/P-1					
APN-1/#6,#14,#15	333,924	0	0	0	333,924

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Technical discussions are underway for a multi-national, multi-aircraft Night Attack system (AV-8, F/A-18 and V-22). The Navy is scheduled to have the lead for this program.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Amended Budget Congressional Data Sheet.

FY-1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604264N Budget Activity: 4
Program Element Title: AVIATION PERSONAL LIFE SUPPORT SYSTEM
Program Number: W0606 Project Title: AIRCREW SYSTEMS DEVELOPMENT

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0606	ALSS	16,465	20,892	20,891	Cont.	Cont.

B. (U) DESCRIPTION: This program provides engineering development, evaluation, fleet introduction and support of aircrew clothing and devices which enhance mission performance; protects from natural and generated stresses and hazards; and integrates with in-flight escape and rescue provisions. Program includes the adaptation of non-development items (NDI), joint service developments, NATO/ allied cooperative ventures, and integration with existing Navy ALSS, aircraft and maintenance/logistics processes. Subprojects: Inflight systems; escape/ crash safety systems; rescue and survival systems; special mission equipment; mission specific equipment. Acronyms: (OBOGS) On Board Oxygen Generating System, (DSGS) Dual Service G Suit, (STRIP) Survival Technology and Restraint Improvement Program, (SOA) state-of-the-art survival equipment, (PAESS) passenger anti-exposure survival system, (LEP) laser eye protection, (NAERP) Naval Aircrew Eye/Respiratory protection, T/R Helmet-TACAIR/Rotary Wing Helmet, (AILSS) Advanced Integrated Life Support Systems, (ATCS) Advanced Technology Crew Station, (AODS) Aircrew Oxygen Delivery System, (SCOWS) Solid Chemical Oxygen Walkaround System, (SCOES) Solid Chemical Oxygen Emergency System, (AISAP) Aircrew Integrated Survival Armor Protection System, (21st H) 21st Century Helmet.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Inflight Systems.
      (1) OBOGS: Prepare contracts for new monitors.
      (2) DSGS: Complete DT.
   b. (U) Escape and Crash Safety Systems.
      (1) NACES: Continue sled testing.
      (2) STRIP: Continue program development.
   c. (U) Survival and Rescue Systems.
      (1) PRC-112: No R&D Expended, Program accelerated, Navy Production decision Dec 88 OPN funded.
      (2) SOA: Prepare ECPs, for CAT I-III items.
      (3) PAESS: Initiate DT; TEMP approval.
   d. (U) Special Mission Equipment.
      (1) LEP: DT-II/OT-II; initiated IOC Procurement.
      (2) NAERP: Receive test articles; begin DT.
   e. (U) Mission Specific Equipment.
      (1) T-HELMET: Prepare solicitations; conduct DT.
      (2) R-HELMET: Prepare TEMP, initiate DT, prepare RFP, evaluate proposals.
      (3) AISAP: TEMP approval; contract awarded.
2. (U) FY 1990 Program:
   a. (U) Inflight Systems:
      (1) OBOGS: Complete Development Tests, Award contract for new monitor development.

(2) DSGS: Monitor USAF contract.
(3) AILSS: Initiate development.
(4) ATCS: Develop crew station design guidelines.
(5) SCOES: Initiate development.

b. (U) Escape and Crash Safety:
(1) NACES: Technology transfer for 2nd sourcing, complete testing, OPEVAL.
(2) STRIP: Execute contract; initiate DT.

c. (U) Survival and Rescue Systems:
(1) SOA: Prepare ECPs; initiate competition.
(2) PAESS: Evaluate low cost alternatives.

d. (U) Special Mission Equipment:
(1) LEP: AFRP, IOC, FOT&E deficiency correction.
(2) NAERP: Complete DT; complete TECHEVAL P-3C/AV-8B, begin OPEVAL AV-8B.

e. (U) Mission Specific Equipment:
(1) T-HELMET: Conduct DT/TECHEVAL; staff ECP.
(2) R-HELMET: Conduct DT/TECHEVAL, down select, initiate OPEVAL.
(3) AISAP: Continue Advanced Development.

3. (U) FY 1991 Plans:

a. (U) Inflght Systems:
(1) OBOGS: Complete Monitor TECHEVAL, multi-man concentrator DT.
(2) AILSS: Continue development.
(3) ATCS: DT of proposed designs.
(4) SCOWS: Initiate development.
(5) SCOES: Complete development tests,

b. (U) Escape and Rescue Systems:
(1) NACES: Establish 2nd sourcing; IOC T-45/F-14D/ F-18C/D.
(2) STRIP: Restraint systems evaluation.

c. (U) Survival and Rescue Systems:
(1) SOA: Prepare ECPs; complete DT-I; initiate DT-II.
(2) PAESS: Complete TECHEVAL.

d. (U) Special Mission Equipment:
(1) LEP: Initiate DT of follow-on systems.
(2) NAERP: Complete AV-8B P-3C OPEVAL; ALRIP conduct DT-III other aircraft, AFRP.

e. (U) Mission Specific Equipment:
(1) T-HELMET: IOC.
(2) R-HELMET: Complete OPEVAL, AFRP, IOC.
(3) 21ST-H: Milestone II; initiate development.
(4) AISAP: Complete TECHEVAL, Initiate OPEVAL.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Ordnance Station, Indian Head, MD; Naval Air Test Center, Patuxent River, MD; Naval Weapons Center, China Lake, CA; Naval Aviation Depot, Norfolk, VA; OPTEVFOR, Norfolk, VA; Naval Avionics Center, Indianapolis, IN. CONTRACTORS: Martin Baker Aircraft Company, Ltd., Middlesex, England; Grumman Aerospace Corporation, Bethpage, NY; McDonnell Aircraft Company, St. Louis, MO; Douglas Aircraft Company, Long Beach, CA; Boeing Advance Systems Company, Seattle, WA. American Optical, Southbridge, MA.

Program Element: 0604264N Budget Activity: 4
Program Element Title: AIRCREW SYSTEMS DEVELOPMENT
Program Number: W0606 Project Title: AIRCREW SYSTEMS DEVELOPMENT

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET
1. (U) Technical Changes: Not applicable.
2. (U) Schedule Change: Not applicable.
3. (U) Cost Changes: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

	OR	TEMP		OR	TEMP
NACES	12/83	12/89	PAESS	8/86	In Review
OBOGS		5/83	R-HELMET	1/88	In Review
NAERP	11/86	6/89			
LEP	6/86	7/89	AISAP	3/88	In Prep

G. (U) RELATED ACTIVITIES: P.E. 0602112N, Aircraft Technology; P.E. 0602233N, Mission Support Technology; P.E. 0603216N, Aircrew Systems Technology. Related Air Force efforts, support by P.E. 0604706F, Life Support Equipment, and Army efforts, supported by P.E. 0604713A, Combat Feeding, Clothing and Equipment. Coordinated through the OSD sponsored Tri-Service Life Support RDT&E Steering Committee.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1				
OPN/#208	5,138	6,399	4,566	Cont.
OPN/#299	300	6,193	126	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

	II	IIIA	IIIB		II	IIIA	IIIB
NACES	3Q/85	1Q/90	3Q/90	T-HELMET			2Q/91
NAERP	3Q/88	1Q/91	4Q/91	LEP	3Q/88	2Q/90	4Q/90
PAESS			4Q/92	R-HELMET		3Q/91	3Q/92
AISAP (Interim)			4Q/90	AISAP (Final)			3Q/93

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604268N Budget Activity: 4
Program Element Title: A/C ENGINE COMP IMP PROGRAM
Project Number: W1355 Project Title: A/C ENGINE COMP IMP PROGRAM

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1355	Engine CIP	39,482	35,719	41,884	Cont.	Cont.

B. (U) DESCRIPTION: Aircraft Engine Component Improvement Program (CIP) provides engineering support for all in-service Navy aircraft engines, transmissions, propellers, starters, auxiliary power units, electrical generating systems, fuel systems and fuels and lubricants. Historically, aircraft systems experience changes in missions, tactics, and environments to meet changing threats. These changes inevitably result in unforeseen problems, which if not resolved will result in either safety or readiness degradation. Development programs, while geared to resolve as many problems as possible before deployment, simply cannot duplicate actual operations nor account for the vast array of variables such as environment and mission changes. Therefore, it is essential to conduct continuing engineering efforts on these systems. The highest priority of CIP is to address all safety of flight issues. Another CIP objective is to ensure engines maintain required performance under new conditions. History also shows an active CIP is an effective way to reduce the cost of engine ownership and improve system operational readiness (OR) by improving durability, operability, reliability and maintainability, repairability, and sustainability as service time accumulates. This CIP maturation process starts after engine development and Navy acceptance of the first production aircraft with the engine. CIP continues over the engine's life, gradually decreasing to a minimum level sufficient to keep older inventory operational. CIP addresses usage and life not covered by engine warranties. This program is conducted on a tri-service basis and has Foreign Military Sales (FMS) contributions as well. Typically, CIP efforts reduce operation and maintenance costs by an average factor of sixteen to one.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Provided continuing engineering support for thirteen of the sixteen engines in the Navy operational inventory.

b. (U) Provided numerous engineering solutions to problems discovered in fleet operations including many in the "safety of flight" category.

c. (U) Conducted Lov Cycle Fatigue analysis programs on J52, T58, T64, and T400 engines.

d. (U) Developed 146 repair procedures and redesigned 461 parts to avoid depot line stoppages and provide needed parts to the field which will save over $22.5 million in estimated life cycle costs over the next ten years.

Program Element: 0604268N Budget Activity: 4
Program Element Title: A/C ENGINE COMP IMP PROGRAM
Project Number: W1355 Project Title: A/C ENGINE COMP IMP PROGRAM

2. (U) FY 1990 Program: CIP work is continuing on engines in the Navy operational inventory to reduce in-flight aborts, engine related safety incidents, not-mission-capable rates, scheduled and unscheduled engine removals, maintenance man-hours, and all safety of flight problems.

3. (U) FY 1991 Plans:

a. (U) Continue effort on each engine to reduce in-flight aborts, aircraft safety incidents, not-mission-capable rates, scheduled and unscheduled engine removals, maintenance man-hours, and overall costs.

b. (U) Effort will begin on the F405 engine on the T-45A aircraft and an enhanced performance engine for the AV-8B aircraft.

4. (U) Program To Completion: A continuing program is conducted for each in-service engine from completion of qualification until inventory phase out.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAPC, Trenton, NJ; NATC, Patuxent River, MD; NADC, Warminster, PA; and NWSC, Crane, IN. CONTRACTORS: Allison Gas Turbine Division, Indianapolis, IN; General Electric Company, Lynn, MA and Evendale, OH; Garrett Turbine Engine Co., Phoenix, AZ; Pratt and Whitney Aircraft Group, West Palm Beach, FL; and Rolls Royce, London, England.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION: Acquisition Plan No. A42-48-0-50 Revision B approved 13 August 1987.

G. (U) RELATED ACTIVITIES: CIP is a tri-service program which includes cost sharing with commercial and foreign users, where applicable. Each service administers the engine contract for engines they developed with the other services as members, therefore, eliminating unnecessary duplication of effort.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Work tasks under the 13 - 16 CIP contracts are established and managed individually to resolve fleet problems and reduce cost of ownership.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT: CONSOLIDATED EW PROGRAM

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0066	C/NCOMM ECM	323	1,502	2,513	307	8,888
C1928	TERPES	7,488	**	**	**	**
C1961	MEWSS	2,557	890	1,274	Cont.	Cont.
R1742	EW TECH DEV	972	897	913	Cont.	Cont.
R1882	DVAL	2,154	928	1,007	Cont.	Cont.
S0954	SURFACE EW	59,284	43,516	47,939	Cont.	Cont.
W0556	EW CNT RES	17,251	13,059	11,543*	Cont.	Cont.
W0619	ASPJ	8,081	5,318	5,098	0	259,223
W0638	TACAIR EW	63,275	52,391	67,560	Cont.	Cont.
X1794	C^3CM	0	2,295	4,696	Cont.	Cont.
X1795	CMAS	6,508	4,034	4,146	Cont.	Cont.
TOTAL		167,893	124,830	146,689	Cont.	Cont.

* Note: EA-6B P3I and PCM will move from Project W0638 to this Project to consolidate EA-6B efforts.

** Note: PE/Project: 0604270N/C1928 transfers to PE/Project: 0206625M/C1928 in FY 1990.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This element includes development of electronic warfare systems for USN/USMC tactical aircraft, USMC helicopters, surface combatants, data-link vulnerability assessments, USMC communications and non-communications jammers, and development and testing of electronic warfare devices for emergency contingencies.

RY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: C0066 PROJECT TITLE: COMMUNICATIONS/NON-COMMUNICATIONS ELECTRONIC COUNTERMEASURES (COMM/NON-COMM ECM)

C. (U) DESCRIPTION: The goal of this program is to satisfy the continuing requirement for COMM/NON COMM ECM systems which will provide the Marine Corps the ability to jam/deceive enemy transmitters. A standoff comm jammer is required for the Very High Frequency (VHF) and Ultra High Frequency (UHF) as a replacement for the currently fielded AN/ULQ-19 jammer. A similar requirement exists for a system capable of jamming High Frequency (HF) communications.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed Milestone III and obtained production decision for a joint VHF/UHF CECM.
   b. (U) Conducted source selection of a joint HF CECM jammer.

3. (U) FY 1990 PLANS:
   a. (U) Select Non Developmental Item (NDI) joint HF CECM system.
   b. (U) Conduct cooperative Follow-on Test and Evaluation (FOT&E) of operational joint VHF/UHF CECM system.

4. (U) FY 1991 PLANS:
   a. (U) Test joint HF CECM system.
   b. (U) Obtain production decision on joint HF CECM system.

5. (U) PROGRAM TO COMPLETION:
   a. (U) Procure HF CECM system.

E. (U) WORK PERFORMED BY: IN-HOUSE: Joint Electronic Warfare Center (JEWC), San Antonio, TX; Naval Avionics Center, Indianapolis, IN. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATIONS FUNDS: Procurement justification material does not contain this level of detail.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: C1961 PROJECT TITLE: MOBILE ELECTRONIC WARFARE SUPPORT SYSTEM (MEWSS)

C. (U) DESCRIPTION: This project funds a suite of Electronic Countermeasures (ECM) and Electronic Warfare Support Measures (ESM) equipment for installation in a Light Armored Vehicle (LAV). The system is designed to detect enemy emissions, determine Line of Bearing (LOB) and degrade enemy tactical radio communications during amphibious assaults and subsequent mechanized operations ashore.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Achieved IOC of Phase I.
   b. (U) Completed Phase II planning.

3. (U) FY 1990 PLANS:
   a. (U) Provide automated operator functions to support netted jamming, direction finding (DF) and a data link which will support multi-service communications.
   b. (U) Award Phase II system development contract including production options.
   c. (U) Expand the frequency ranges of all equipment.
   d. (U) Increase jammer power and replace current power distribution system.

4. (U) FY 1991 PLANS:
   a. (U) Incorporate frequency hopping capability into the intercept, DF and jamming sub-systems.
   b. (U) Add mobile DF capability.
   c. (U) Add a self location capability to the system.

5. (U) PROGRAM TO COMPLETION:
   a. (U) Obtain Milestone III approval for production of Phase II.
   b. (U) Produce twelve P3I packages and update existing systems.
   c. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: None. CONTRACTORS: TBD by competition.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: Procurement justification material does not contain this level of detail.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: R1742 PROJECT TITLE: EW DEVELOPMENT AND TESTING (EWD&T)

C. (U) PROJECT DESCRIPTION: Establishes a standing research group for developing and testing low cost, high payoff EW systems.

D. (U/NF) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Developed and tested a microwave decoy capable of replicating signatures for deception of radars.

3. (U) FY 1990 PLANS:
a. (U) Develop and test a small ship ASMD EW system to enhance the effectiveness of offboard radar countermeaures. System to be based upon long range detection of and will include a computer controlled jammer to assist in decoy distraction.

4. (u) FY 1991 PLANS:
a. (u) Develop and test a podded countertargeting jammer suitable for fighter/attack aircraft in the outer air battle.

5. (u) PROGRAM TO COMPLETION:
a. (u) Investigate and develop methods to counter the Electro/Optic threat using
b. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: Naval Research Laboratory, Washington, D.C.; Pacific Missile Test Center, Pt Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Ordnance Laboratory, Crane, IN.

F. (U) RELATED ACTIVITIES: None

G. (U) OTHER APPROPRITIONS FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: R1882 PROJECT TITLE: DATALINK EVALUATION ANALYSIS (DVAL)

C. (U) DESCRIPTION: DVAL evaluates the anti-jam capabilities of developmental Navy electromagnetically dependent systems and identifies methods for reducing signal vulnerabilities to hostile exploitation. This information is used during development to take corrective action and after fleet introduction for use in developing countermeasure tactics.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Developed preliminary EHF SATCOM, IFF, and SLC Susceptibility Reports.
   b. (U) Developed JTIDS susceptibility pre-test planning document.
   c. (U) Develop GPS assessibility/feasibility pre-test planning document.

2. (U) FY 1990 PROGRAM:
   a. (U) Continue development of JTIDS, IFF, Remotely Piloted Vehicle (RPV) Susceptibility Reports.
   b. (U) Complete EHF SATCOM, and GPS Susceptibility Reports.
   c. (U) Conduct review of other Navy data link programs and prioritize for future analyses.
   d. (U) Begin analysis of Common High Bandwidth Data Link (CHBDL) for BGPHES and ATARS programs.

3. (U) FY 1991 PLANS:

   a. (U) Continue development of JTIDS, IFF, and RPV Susceptibility Reports.
   b. (U) Continue preliminary analysis of CHBDL.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: Naval Research Laboratory, Washington D.C., Naval Air Test Center, Patuxent River, MD. Contractors: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD., Georgia Tech Research Institute, Atlanta, GA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: S0954 PROJECT TITLE: SHIPBOARD EW IMPROVEMENTS

A. (U) RESOURCES: (Dollars in Thousands)

Popular Name	FY-89 Actual	FY-90 Estimate	FY-91 Estimate	To Complete	Total Program
Shipboard EW Improvements	59,284	43,516	47,939	Cont.	Cont.

B. (u) DESCRIPTION: This project consists of six major efforts: (1) Onboard EW Improvements consisting of AN/SLQ-32 Improvements for Over-the-Horizon Detection (OTH-D), Countertargeting Countermeasures, Improved Anti-ship Missile Deception Electronic Countermeasures (ASM/DECM), AN/SLQ-32 modification for installation on aircraft carriers (CV/CVN), Advanced Integrated EW (AIEW), Shipboard Automatic Decoy Integration/DECM Decoy Integration (SADI/DDI), EW Control System (EWCS)/Rapid ASMD Integrated Defense System (RAIDS), and Advanced Integrated EW (AIEW); (2) NULKA - Ship Launched Electronic Decoy; (3) OUTLAW BANDIT; (4) Radar Cross Section/Infrared (RCS/IR) Signature Measurement; (5) Active Electronic Buoy; and (6) IR Distraction Decoy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Conducted OT&E SLQ-32 High Band (Band 3) Counter-targeting and EMI improvements.
   b. (U) Avarded FSED contracts for Phase E program for SLQ-32.
   c. (U) Conducted DT and commenced integration of CV/CVN SLQ-32(V)4.
   d. (U) Continued SLQ-32 ADCAP FSED.
   e. (U) Continued engineering development of NULKA payload/vehicle.
   f. (U) Completed OPEVAL for AEB.
   g. (U) Commenced development of IR distraction decoy.
   h. (U) Developed Outlaw Bandit EDM.
   i. (U) Initiated FSED for SLQ-32(V)4 upgrade.

3. (U) FY 1990 PLANS:
   a. (U) Continue Phase E FSED for SLQ-32.
   b. (U) Complete SLQ-32 ADCAP factory testing.
   c. (U) Conduct OT and continue integration of improvements in SLQ-32(V)4.
   d. (U) Complete EWCS/RAIDS architecture design and software development; conduct RAIDS at-sea test.
   e. (U) Conduct AIEW Industry Concept study.
   f. (U) Initiate EDM testing of the NULKA system.
   g. (U) Continue radar cross section measurements.
   h. (U) Conduct Outlaw Bandit DT/OT.
   i. (U) Continue development of IR distraction decoy.

4. (U) FY 1991 Plans:
   a. (U) Continue Phase E FSED for SLQ-32.
   b. (U) Conduct at-sea test of SLQ-32 ADCAP with DDI.

c. (U) Continue integration of improvements into SLQ-32(V)4.
d. (U) Complete Phase I of EWCS/RAIDS.
e. (U) Continue DT testing of NULKA system.
f. (U) Continue Radar Cross Section Measurements.
g. (U) Continue Outlaw Bandit program; conduct DT/OT.
h. (U) Commence testing IR distraction decoy.
i. (U) Investigate safer/more reliable IR decoy fuel.
j. (U) Commence testing of a non-developmental Shipboard Light Weight EW System (SLEWS).

5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NRL, Washington, DC; NSWC, Dahlgren, VA and White Oak, MD; NSWC, Crane, IN; NOSC, San Diego,CA Contractors: Raytheon Co., Goleta, CA: ARGO Systems, Inc., Sunnyvale, CA; S.T. Research Corp., Newington, VA; Sippican, Inc., Marion, MA; AWA, Australia; Dalmo Victor, Belmont, CA; Norden Systems, Inc., Melville, NY; Hughes Aircraft, Fullerton, Ca.; Varian Assoc., Palo Alto, CA., EATON-AIL, Westlake, CA: Teledyne MEC, Palo Alto, CA; HRB Singer, Inc., Lanham, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None

2. (U) SCHEDULE CHANGES: The department adjustment of +4,078 in FY 91 restores development of a generic counter monopulse technique to be incorporated into an advanced shipboard EW system.

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:

1. (U) Phase E RFP in process.
2. (U) DDI TEMP - Jun 84; Update in process.
3. (U) SLQ-32 TEMP - May 85. Drafting TEMPs for each upgrade phase.
4. (U) (U) SLQ-32(V)4 TEMP for CV/CVN - In development.
5. (U) EWCS TOR - Sep 85; RAIDS OR Mar 89.
6. (U) NULKA TEMP - Joint TEMP signed by USN Oct 88.
7. (U) AEB TEMP- Nov 88.
8. (U) OUTLAW BANDIT OR Jan 87.

G. (U) RELATED ACTIVITIES: PE 0604270N X1794 and X1795.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

(U) Procurement	FY-89 ACTUAL	FY-90 ESTIMATE	FY-91 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
SLQ-32(231200)	60,739	78,005	79,150	Cont.	Cont.
WLR-1H(232000)	4,084	0	0		
Launcher(553000)	5,181	8,925	6,252	Cont.	Cont.
Expend (565500)	14,618	32,696	54,317	Cont.	Cont.

I. (u) INTERNATIONAL COOPERATIVE AGREEMENTS: Project NULKA is a _____ to develop an advanced electronic warfare decoy system to protect surface ships against _____ ASMs. The U.S. share of the common work is 78%, _____ U.S. is responsible for developing the electronic payload. _____ is responsible for developing the rocket motor, flight control systems, launcher and for final system integration.

(u) U.S. R&D Funding (dollars in millions)

FY-87	FY-88	FY-89	FY-90	FY-91
10.4	13.9	20.4	18.0	13.6

J. (u) MILESTONE SCHEDULE:

1. (U) SLQ-32 Phase E block upgrade FSED
2. (U) SLQ-32 high band and EMI improvement OT&E
3. (U) SLQ-32 CV/CVN OT&E
4. (U) SLQ-32 low band OT&E
5. (U) IR Distraction Decoy
   Advanced Demonstration Model(ADM).
6. (U) AEB
   (Milestone IIIB pending platform sponsor procurement funding.)
7. (U) DDI/SADI DT-IIIE/OT-IIIB at-sea test
8. (U) SLQ-32 Advanced Capability-DDI DT/OT
   at-sea test
9. (U) NULKA - DT-II
   OT
10. (U) RAIDS at-sea test

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: W0556 PROJECT TITLE: EW COUNTER RESPONSE

POPULAR NAME: EA-6B ADVANCED CAPABILITY (ADVCAP)

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	EA-6B HARM BLK III/IV DEV	1ST FLIGHT	IIIA IIIA	N/A
ENGINEERING MILESTONES	RELIABILITY MAINT. DEMO	PHASE II SOFTWARE DEV		N/A
T&E MILESTONES		DT	OT IIA	N/A
CONTRACT MILESTONES			LIMITED PRODUCTION	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	TO COMPLETE
MAJOR CONTRACT	7,954	4,970	5,500	CONT.
SUPPORT CONTRACT	461	350	350	CONT.
IN-HOUSE SUPPORT	8,836	7,739	5,693	CONT.
GFE/ OTHER	0	0	0	0
TOTAL	17,251	13,059	11,543	CONT.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: W0556 PROJECT TITLE: EW COUNTER RESPONSE

B. (U) DESCRIPTION: The EA-6B Weapon System is designed for airborne jamming of enemy landbased, shipborne and airborne command, control and communications (C3) systems; radars associated with early warning, target acquisition, surveillance, anti-aircraft artillery; and air-to-surface, surface-to-surface and surface-to-air missiles. In this capacity it will support carrier based tactical aircraft and battle group operations in dense radar-controlled environments. The efforts under this program element provide for the electronic countermeasure response to these advanced threat weapon systems and C3 networks which are expanding in frequency, density and technical complexity. This program element funds the continuing development and/or integration of all Electronic Warfare (EW) systems for the EA-6B Electronic Countermeasures Support aircraft and includes enhancements to the air vehicle to accommodate these EW improvements. Major efforts include the development and integration into the EA-6B of a new Advanced Capability (ADVCAP) Receiver Processor Group (RPG), a communications and radar countermeasures set (AN/ALQ-149), a Communications/Radar Exciter (C/RE) and a Band 2/3 Transmitter.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS
   a. (U) Delivered all seven ALQ-149 EDMs
   b. (U) Delivered two RPG EDMS.
   c. (U) Continued reliability development and weapon replaceable assembly (WRA) maintainability demonstration for the RPG and ALQ-149.
   d. (U) Commenced RPG and ALQ-149 system integration, logistic support development.
   e. (U) Conducted OPEVAL of HARM control panel.
   f. (U) Commenced HARM BLOCK III/IV integration.

2. (U) FY 1990 PLANS:
   a. (U) Deliver final EA-6B ADVCAP RPG EDMs.
   b. (U) Conduct reliability development and weapon replaceable assembly maintainability demonstration for both the RPG and ALQ-149.
   c. (U) Continue software development, system integration, logistics support development, and test aircraft final assembly for the RPG and ALQ-149.
   d. (U) Commence C/RE Full Scale Engineering Development (FSED).
   e. (U) Deliver three Band 2/3 Transmitters EDMs.
   f. (U) Conduct Milestone IIIB review on HARM control panel.
   g. (U) Conduct contractor flight tests in support of the RPG and ALQ-149.
   h. (U) Commence DT and OT for operational assessment in support of low rate initial production decision (Milestone IIIA) for both the RPG and ALQ-149.
   i. (U) Conduct reliability, maintainability and EMI testing on the Band 2/3 Tramsmitter.
   j. (U) Begin TECHEVAL on the Band 2/3 Transmitter.
   k. (U) Complete production HARM BLOCK III/IV integration.
   l. (U) Conduct contractor and Navy developmental testing on HARM Block III/IV.

4. (U) FY 1991 PLANS:

a. (U) Complete operational assessment in support of low rate initial production (LRIP) (Milestone IIIA decision) for both the RPG and ALQ-149.

b. (U) Continue integration of RPG and ALQ-149 on EA-6B.

c. (U) Continue software development and logistics support development for the RPG and ALQ-149.

d. (U) Continue C/RE FSED, system integration, laboratory integration and test.

e. (U) Conduct reliability, maintainability and EMI testing on the C/RE.

f. (U) Complete TECHEVAL of Band 2/3 Transmitter.

g. (U) Conduct OPEVAL of Band 2/3 transmitter for Full Rate Production decision.

h. (U) Complete Navy developmental and operational flight testing on HARM block III/IV.

5. (U) PROGRAM TO COMPLETION: This is a continuing project. EA-6B P3I and PCM programs will move from Project W0638 to this project to consolidate EA-6B efforts.

D. (U) WORK PERFORMED BY: IN-HOUSE: Pacific Missile Test Center, Point Mugu, CA.; Naval Air Test Center, Patuxent River, MD; Naval Weapon Center, Chine Lake, CA; Naval Research Laboratory, Washington, D.C.; Naval Air Propulsion Center, Trenton, NJ; Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; and Naval Weapons Support Center, Crane, IN. CONTRACTOR: Grumman Aerospace Corporation, Bethpage, NY; Eaton Corporation, Deer Park, NY; Raytheon Corporation, Goleta, CA; Pratt and Whitney, West Palm Beach, FL; Litton Amecom, College Park, MD; Applied Physics Laboratory, Laurel, MD; Sanders Associates, Nashua, NH; Teledyne Systems, Northridge, CA; Texas Instruments, Ridgecrest, CA; Teledyne Microwave, Sunnyvale, CA; and PRB Associates, Hollywood, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: +$5,228 in FY 91 funds CR/E FSD.

F. (U) PROGRAM DOCUMENTATION: The ADVCAP NDCP was approved in September 1985. The ALQ-149/CRE NDCP was approved FY 88/2Q. TEMP 604 is being integrated into the RPG TEMP along with C/RE and Band 2/3 Transmitter. This will be the EA-6B ADVCAP TEMP (157-10 Revision 2) and will address each of the individual R&D programs. The consolidated TEMP is in review; final approval expected 3Q FY90. EA-6B HARM integration TEMP was approved in July 1989.

G. (U) RELATED ACTIVITIES: NONE

H. (U) OTHER APPROPRIATION FUNDS: (DOLLARS IN THOUSANDS)

APPN/P-1	FY-1989 ACTUAL	FY-1990 ESTIMATE	FY-1991 ESTIMATE	TO COMPLETE
APN-1/#3,4	Procurement justification material does not contain this level of detail.			

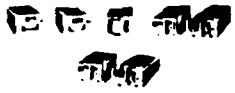
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

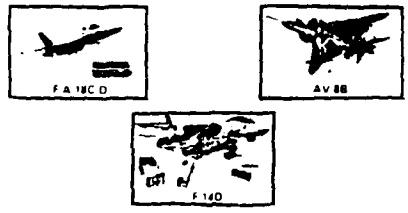
J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: W0619 PROJECT TITLE: AIRBORNE SELF-PROTECTION JAMMER

Airborne Self-Protection Jammer
ASPJ/ALQ-165





POPULAR NAME: AIRBORNE SELF-PROTECTION JAMMER (ASPJ)

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				
Engineering Milestones	N/A		PCA 3Q/91	
T&E Milestones	OT-IIC OT-IIB (Phase I) (USAF Only)		OT-IIE (F/A-18C) (F-16C)	OT-IIE/OT IIB Phase II (F-16C) (F/A-18C)
Contract Milestones				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total
Major Contract	3,888	1,738	188	91,522
Support Contract	308	100	100	68,968
In-House Support	3,885	3,480	4,810	68,633
GFE/ Other	0	0	0	30,100
Total	8,081	5,318	5,098	259,223

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROGRAM NUMBER: W0619 PROJECT TITLE: AIRBORNE SELF-PROTECTION JAMMER (ASPJ)

B. (U) DESCRIPTION: The Airborne Self-Protection Jammer (ASPJ), designated AN/ALQ-165, is a program to develop a defensive electromagnetic countermeasure system for self-protection of tactical aircraft (F/A-18, F-14, AV-8B, and F-16) to increase their probability of mission success and survivability when confronted by modern diversified radar-controlled weapon systems. The ASPJ is compatible with integrated system concepts, is capable of installation in existing aircraft, and is software reprogrammable to keep pace with changing threat scenarios, improved aircraft and support equipment systems, and alternative technologies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Commenced Developmental Flight Testing (DT) using FSD units in the AV-8B.
   b. (U) Continued ASPJ participatory flight testing in the F-14D.
   c. (U) Completed Initial Operational Test and Evaluation (IOT&E) in the F/A-18C with FSD units.
   d. (U) Obtained DAB Milestone IIIA approval for Low Rate Initial Production.

3. (U) FY 1990 PLANS:
   a. (U) Awarded Lot 1 LRIP contract for 100 systems.
   b. (U) Conduct qualification laboratory testing of Production Verification (PV) systems.
   c. (U) Conduct Production Verification (PV) system integration on F/A-18C.
   d. (U) Conduct F-14D developmental and operational testing with ASPJ FSD units.

4. (U) FY 1991 PLANS:
   a. (U) Award Lot II LRIP contract
   b. (U) Commence TECHEVAL and OPEVAL Flight Tests in the F/A-18C with PV Systems.
   c. (U) Commence Development Flight tests in the AV-8B with PV units.
   d. (U) Conduct F-14D FOT&E with PV units.

5. (U) PROGRAM TO COMPLETION:
   a. (U) Complete OT&E on AV-8B with PV units.
   b. (U) Complete Second Phase of F-14D FOT&E with PV units.

D. (U) WORK PERFORMED BY: In-house: Naval Research Laboratory, Washington, D.C; Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA; Aeronautical Systems Division, Wright-Patterson Air Force Base, Dayton, OH; 3246TH Test Wing, Eglin Air Force Base, Ft. Walton Beach, FL; and Warner-Robins Air Logistics Center, Warner Robins, GA. Contractors: Prime contractor is the Joint Venture of ITT, Avionics Division,

Nutley, NJ; and Westinghouse, Baltimore, MD with the Joint Venture Headquarters, in Nutley, NJ; Associated contractors include Grumman Aerospace Corporation, Bethpage, Long Island, (F-14) NY; McDonnell Douglas Corporation, St. Louis, MO (F/A-18, AV-8B); and General Dynamics Corporation, Fort Worth, TX (F-16).

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:

1. (U) DCP Signed by OSD 5 Sept 89

2. (U) Updated TEMP In final review process.

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
a. (U) APN-1/#6,7,8,9,10,11	Procurement justification material does not contain this level of detail.			
b. (U) APN-5/#34,37,41				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY 4
PROGRAM ELEMENT TITLE: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: W0638 PROJECT TITLE: TACTICAL AIRBORNE ELECTRONIC WARFARE

A. (U) RESOURCES: (Dollars in Thousands)

Popular Name	FY1989 Estimate	FY1990 Estimate	FY1991 Estimate	To Complete	Total Program
Airborne EW	63,275	52,391	67,560	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project develops various Electronic Warfare (EW) equipments including Radar Warning Receivers (RWRs), Defensive Electronic Countermeasures (DECM), jammers, expendable devices (flares, chaff and electronic expendables), laser warning receivers and missile warning equipments to increase aircraft survivability, and Soviet threat training simulators for use by the Fleet Electronic Warfare Support Group (FEWSG). Numerous laboratory EW efforts (hardware and software), improvements to existing EW systems, Infrared (IR) decoys, Electro-optical (EO) and laser countermeasures (CM), and system integration efforts are funded under this project. Sub-projects include: Advcanced Airborne Expendable Decoy-Towed (AAED-T); Integrated Defensive Avionics Program (IDAP); Proforma Countermeasures (PCM); Strike Electronic Warfare System (SEWS); Communications Radar Exciter (C/RE); and Generic Expendable (GEN-X).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) AAED-T, IDAP, APR-39(XE-2), ALE-47, Multi-CHAFF and GEN-X: Continue FSED.
   b. (U) Fly's Eye: Risk reduction. Transfer to INEWS/ICNIA.
   c. (U) BOL Chaff: Commenced TECHEVAL and planned OPEVAL.
   d. (U) PCM: Continued FSED Phase I, aircraft integration.
   e. (U) Airborne Self-Protection Jammer (ASPJ): Commenced Pre-Planned Product Improvement (P^3I) engineering development.
   f. (U) IR Decoy, IRCM, Laser CM and EOCM: Continued development.
   g. (U) Continued AN/ALT-40 upgrade development. Developed EDM.
   h. (U) Let FSD award for the ALR-67 Advanced Special Receiver (ASR).
   i. (U) RF Countermeasures (RFCM): Continued technique development for new and existing equipments.
   l. (U) SEWS: Continued development.

3. (U) FY 1990 PLANS:
   a. (U) AAED-T, ASR, EA-6B ADVCAP P^3I, ASPJ P^3I, ALE-47 and Multi-CHAFF: Continue FSED including integration/installation efforts.
   b. (U) APR-39(XE-2), and BOL chaff: Complete TECHEVAL, commence OPEVAL.
   c. (U) ALQ-164: Conduct OPEVAL.
   d. (U) PCM and C/RE: Commence software phase I development and aircraft integration.
   e. (U) FEWSG: Complete AN/ALT-40 upgrade. Initiate FEWSG mission avionics upgrade.
   f. (U) IR Decoys, IRCM, Laser CM and EOCM: continue advanced development.
   g. (U) RFCM: Continue technique development
   h. (U) SEWS: Complete Phase I Software development.

i. (U) Production Decision for AVR-2
j. (U) Commence AAR-47 Upgrade
k. (U) Transition Straight Thru Repeater Amplifier Program (STRAP) to FSED.

4. (U) FY 1991 PLANS:
a. (U) AAED-T, ASR, IDAP, Multi-CHAFF, GEN-X, ALE-47, EA-6B P^{3}I, ASPJ P^{3}I, AAR-47 Upgrade: Continue FSED including integration/installation efforts.
b. (U) APR-39(XE-2), BOL CHAFF: Complete OPEVAL and Procurement decision.
c. (U) FEWSG: Complete Upgrade of AN/ALT-40. Continue FEWSG Mission Avionics Upgrade.
d. (U) IR Decoys, IRCM, Laser CM and EOCM: Continue advanced development.
e. (U) ALE-47, Conduct Design/Operational Testing.
f. (U) PCM: Continue Software Phase I development and aircraft integration.
g. (U) RFCM: Continue technique development,
h. (U) SEWS: Continue development.
i. (U) SEWS: Initiate Phase II software development to support INEWS/A-12 P3I COEA.
j. (U) Transition Straight Through Repeater Antenna Performance (STRAP) program to FSED.

5. (U) Project to Completion: This is a continuing project. EA-6B P3I and PCM programs will move to Project W0556 to consolidate EA-6B efforts.

D. (U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN; Naval Weapons Center, China Lake, CA; Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA; Naval Weapons Support Center, Crane, IN; Naval Air Propulsion Center, Trenton, NJ. Contractors: Litton (ATD Division), Sunnyvale, CA; Dalmo Victor, Belmont, CA; Grumman Aerospace, Bethpage, NY; Honeywell Corp (E/O Division), Lexington, MA: Northrop, Defense Systems Division, Rolling Meadows, IL; Lockheed Sanders Inc., Nashua, NH; Texas Instruments, Colorado Springs, CO; Vitro, Silver Spring, MD; General Instruments, Hicksville, NY; E-Systems, Dallas, TX; Electrospace Systems, Dallas, TX; Raytheon, Goleta, CA; Westinghouse, Baltimore, MD; ITT, Nutley, NJ; Hughes Aircraft, Los Angeles, CA; Tracor, Austin, TX.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: NA

2. (U) SCHEDULE CHANGES: APR-39(XE-2), BOL-CHAFF delayed one year.

3. (U) COST CHANGES: The department reduction of $14,662 in FY-91 will delay AN/ALR-67(ASR) integration, AAED, and reduce effort on SEWS, Technique Development, IR Decoys, IRCM, Laser CM, and EOCM.

F. (U) PROGRAM DOCUMENTATION:
1. (U) The following programs have current and approved Operational Requirement, Test & Evaluation Plans, or Navy Decision Coordination Proposals: AAED, ASR, IDAP, GEN-X, AAR-47, BOL, FEWSG, PCM, and ASPJ P^{3}I.

G. (U) RELATED ACTIVITIES: Joint Service programs: APR-39(XE-2), AVR-2, ALE-47, ALQ-162, AAR-47, AAED.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
1. (U) PROCUREMENT				
a. (U) APN-1/#7,9,11,17		NOT APPLICABLE		Cont.
b. (U) APN-5/#62	85,388	46,674	102,798	Cont.
c. (U) APN-6/#66		NOT APPLICABLE		Cont.
d. (U) OPN/#199		NOT APPLICABLE		Cont.

O&M,N funding for installations is under individual aircraft funding lines.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: BOL is an FWE project with Sweden.

J. (U) MILESTONE SCHEDULE:

	M/S II	M/S IIIA	M/S IIIB
1. (u) AAED			
2. (u) ASR			
3. (u) IDAP			
4. (u) GEN-X			
5. (u) APR-39(XE-2)			
6. (u) AVR-2			
7. (u) BOL Chaff			
8. (u) PCM			
9. (u) ALE-47	-------		

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: X1794 PROJECT TITLE: C3 COUNTERMEASURES (C3CM)

C. (u) DESCRIPTION: This project develops the Shipboard Communications Countermeasures Module (SCCM). SCCM is the shipboard component of the Navy Command, Control and Communications Countermeasures (C3CM) Program which will enable the Fleet to decrease the effectiveness of adversaries' C3 systems. Various techniques will be utilized against a wide spectrum of signal types and frequencies.

SCCM will use existing shipboard antennas on a shared basis as feasible.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS.

1. (U) FY-89 ACCOMPLISHMENTS: Not Applicable.

2. (U) FY-90 PROGRAM:
   a. (U) Prepare acquisitiion documentation.

3. (U) FY-91 PLANS:
   a. (U) Obtain milestone II approval.
   b. (U) Initiate SCCM Full Scale Development including Preliminary Design Review (CDR).

4. (U) PROGRAM TO COMPLETION:
   a. (U) Continue SCCM FSED.
   b. (U) Complete concept of operations evaluations including a wide spectrum of Signals of Interest (SOI's) and frequency bands for EDM.
   c. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NAVOCEANSYSCEN San Diego, CA.; NAVELEX San Diego, CA.; NAVELEX Vallejo, CA.; NRL Washington, DC Contractors: TBD.

F. (U) RELATED ACTIVITIES: PE/Project: 0604270N/X1795 Command, Control and Communications Assessment Simulator (CMAS); PE/Project: 0604270N/S0954 Shipboard EW Improvement.

G. (U) OTHER APPROPRIATION FUNDS. (Dollars in Thousands)

APPN/P-1	FY-89 ACTUAL	FY-90 ESTIMATE	FY-91 ESTIMATE	TO COMPLETE
	Not	Applicable		Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N BUDGET ACTIVITY: 4
PROGRAM ELEMENT: CONSOLIDATED EW PROGRAM
PROJECT NUMBER: X1795 PROJECT TITLE: C3CM DECISION AID

C. (U) DESCRIPTION: Command, Control and Communications Countermeasures (C3CM) Assessment Simulator (CMAS) is a unique large scale, high resolution, real time, all source simulator which will provide an interactive C3CM modeling and data base capability to provide operational analysis to assess countermeasures effectiveness of applicable systems under development, perform architecture assessments and support tactics development and evaluation.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY-89 ACCOMPLISHMENTS:
   a. (U) Completed coding, debugging, and testing of baseline modules.
   b. (U) Initiated operational analysis support efforts.
   c. (U) Completed extraction of modules and algorithms for EWCM.

2. (U) FY-90 PROGRAM:
   a. (U) Initiate model and intelligence data base updates.
   b. (U) Continue operational support analysis efforts.
   c. (U) Continue extracting models and algorithms for EWCM.

3. (U) FY-91 PLANS:
   a. (U) Continue operational support analysis efforts.
   b. (U) Complete design and development of LBTS interface.
   c. (U) Complete transfer CMAS software algorithms to EWCM.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: NOSC, San Diego, CA.

F. (U) RELATED ACTIVITIES: The Electronic Warfare Coordination Module (EWCM) is in PE 0604230N and will incorporate subsets of CMAS software and functional algorithms to support C3CM planning and assessment capabilities onboard flagships.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604301N Budget Activity: 4
Program Element Title: MK 92 FCS UPGRADE
Project Number: S0179 Project Title: Mk 92 FCS Upgrade

A. (U) RESOURCES (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0179	MK 92 FCS UPGRADE	4,275	487	3,365	Cont.	Cont.

B. (U) DESCRIPTION: This program element supports integration and testing of the MK 92 FCS Coherent Receiver Transmitter (CORT) upgrade into FFG-61. Beginning in FY 1992, the program will be expanded to include system engineering, integration, and testing of all components of the FFG-7 class Anti-Ship Missile Defense (ASMD) mid-life upgrade.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 Accomplishments:
   a. (U) Provided programs to support FFG 61 builders trials.
   b. (U) Completed design changes resulting from previous testing.
2. (U) FY 1990 Program:
   a. (U) Complete development and land based testing of improvements for the MK 92 MOD 6 to enhance system performance in the presence of heavy sea clutter.
   b. (U) Initiate test plans and procedures to conduct DT/OT aboard FFG 61.
   c. (U) Initiate IDS documentation for FFG 61 baseline.
3. (U) FY 1991 Plans:
   a. (U) Conduct DT-II/OT testing aboard FFG 61.
   b. (U) Analyze data from DT-II/OT and initiate correction of any deficiencies noted in testing.
   c. (U) Re-compile and certify FCS MK92 MOD 6 computer program.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSEASYSCOM, Washington, DC.; COMOPTEVFOR, Norfolk, VA.; NAVSHIPWPNSYSENGSTA, Port Hueneme, CA. CONTRACTOR: UNISYS Corporation, Great Neck, N.Y., Johns Hopkins University, Applied Physics Laboratory, Laurel, MD.; Vitro Corporation, Silver Spring, MD.

E. (U) RELATED ACTIVITIES: Not Applicable.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	TO Complete	Total Program
(U) OPN	50,100	0	0	0	244,100

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604303N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS AREA AIR DEFENSE
PROJECT NUMBER: S1776 PROJECT TITLE: AEGIS WEAPON SYSTEM MODS

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1776	AEGIS WEAPON SYSTEM MODS	8,111	8,814	7,659	Cont.	Cont.

B. (U) DESCRIPTION: This program provides for modifications to the AEGIS Weapon System MK-7 and integration of the MK 41 Vertical Launching System (VLS) and is designed to counter the threat (NTIC Threat Assessment #012-88 of June 88).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS
   a. (U) Completed proof kit development and fabrication of AN/SPY-1A radar system ORDALTS and test at the ACSC.
   b. (U) Completed integration testing for delivery of VLS AN/UYK-44 computer programs.
2. (U) FY 1990 PROGRAM:
   a. (U) Complete testing of AN/SPY-1A signal processor ORDALTS.
   b. (U) Continue development of SPY-1D ECCM ORDALTS.
3. (U) FY 1991 PLANS:
   a. (U) Continue testing of SPY-1D ECCM improvements.
   b. (U) Build and test SPY-1 B/D signal processor changes for ECCM.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA; Naval Training Engineering Center, Norfolk, VA; NSWSES, Port Hueneme, CA.

E. (U) RELATED ACTIVITIES: PE 0604307N (AEGIS Combat System Engineering) and PE PE 0603382N (BGAAWC).

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY1989 Actual	FY1990 Estimate	FY1991 Estimate	To Complete	Total Program
OPN/	29,973	43,558	86,233	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1447	CG C/S ENGRG	23,146	20,997	17,946	Cont.	Cont.
S1337	DDG C/S ENGRG	33,196	32,169	34,063	Cont.	Cont.
S1937	DDG WEAPONS DEV	1,754	0	39,810	Cont.	Cont.
	TOTAL	58,096	53,166	91,819	Cont.	Cont.

B. (U) DESCRIPTION: AEGIS Combat System will provide immediate and effective capability to counter the current and expected air, surface and sub-surface threats as articulated in NTIC Threat Assessment #018-89 dated November 1989. Since the construction period of the ship classes extends into the 21st century changes in the threat capability require corresponding Combat System changes. This program provides the Combat System engineering and selected weapons development necessary for such a continued increase in the capability of the AEGIS Combat System in AEGIS cruisers and destroyers. It will also allow later ships of these classes to take advantage of maturing equipments and weapons systems being developed in other Navy research and development programs so that battle effectiveness will be retained against the evolving Soviet threat.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1447 PROJECT TITLE: CG Combat Systems Engineering

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1447	CG C/S Eng	23,146	20,997	17,946	Cont.	Cont.

B. (U) DESCRIPTION: The baseline AEGIS Combat System was developed under Program Element 0604304N, Combat System Engineering Development, and was introduced into the fleet in USS TICONDEROGA in 1983. The system is a set of integrated elements used to conduct anti-air, anti-surface, anti-submarine, and strike warfare effectively in both clear and adverse environments. Through the use of the core of the Combat System -- the AEGIS Weapon System -- a number of weapons including surface-to-air and surface-to-surface missiles, close-in weapons, gun systems, anti-submarine weapons, and aviation systems are integrated to operate in multi-mission battle environments. This project provides upgrades to integrate new equipment and systems to pace the threat. Three major improvements have been approved as separate Baselines: Baseline 2 (CG 52-58) consists of the Vertical Launching System, TOMAHAWK Weapon System, and Anti-Submarine Warfare upgrades; Baseline 3 (CG 59-64) includes the AN/SPY-1B radar and AN/UYQ-21 consoles; Baseline 4 (CG 65-73) converts computer programs for use on AN/UYK-43/44 computers and provides increased Battle Group capability in the AEGIS Display System. This program is in response to the NTIC Threat Assessment #018-89 dated November 1989.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued adaptation of Baseline 4 Cruiser unique requirements to DDG 51 computer program.
   b. (U) Continued Baseline 4 Combat System integration and testing.
   c. (U) Integrated and tested Upgraded AEGIS Display System Doctrine and advanced graphics.

2. (U) FY 1990 Program:

   a. (U) Conduct a Baseline 4 major engineering test (EO-3)/SQT. at the Combat System Engineering Development Site.
   b. (U) Commence shipyard testing of Baseline 4 Combat System.
   c. (U) Begin detailed design of AEGIS Display System force capability and OTH-T upgrades.
   d. (U) Commence systems engineering to integrate SPS-49(V)7 and MK86 Air Gun Mode into Combat System.
   e. (U) Conduct CDR and commence coding of SPS-49(V)7 and MK 86 Air Gun Mode.

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1447 PROJECT TITLE: CG Combat Systems Engineering

3. (U) FY 1991 PLANS:

   a. (U) Transfer ship custody of CG-65.
   b. (U) Integrate and test AEGIS Display System force capability and OTH-T upgrades.
   c. (U) Complete coding, debug, and begin testing of AN/SPS-49(V)7 and MK 86 Gun mode (Baseline 4 Phase II upgrades).

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NOSC, San Diego, CA.; NESEA, St. Inigoes, MD.; NSWC, Dahlgren, VA.; NUSC, New London, CT.; PAC, Corona, CA.; PMTR, Pt. Mugu, CA.; and NRL, Washington, DC. Contractors: General Electric, Moorestown, NJ.; Raytheon, Wayland, MA.; and General Electric, Syracuse, NY. OTHERS: Johns Hopkins University, APL, Laurel, MD.; Rockwell International Corp. Autonetics Marine Systems Division, Arlington, VA.; and Sperry, Minneapolis, MN.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

TLR, Rev 1, Chg 1	Dec 82
DCP-134	2 Mar 78 (Except Waiver ltr)
TEMP 100, Rev 3	Jan 89
NTP-30-7707B	Feb 88
Acq Plan 144-87 Rev D	Jun 87
Ship ILS Plan 127-DD, Rev 2, Chg. 7	Sep 87

G. (U) RELATED ACTIVITIES: PE 0604575N (AN/SQS-53C), develops Anti-Submarine Warfare Sonar for AEGIS Destroyer; PE 0604355N (Vertical Launch Anti-Submarine Rockets), develops the Anti-Submarine Rockets for AEGIS Combat System; PE 0604303N (AEGIS Area Air Defense), provides modification and development of the AEGIS Weapon System and development of the Vertical Launching System; PE 0604366N (Standard Missile Improvements), relates to missile development for the AEGIS Weapons System; and PE 0603382N (Battle Group Anti-Air Warfare Coordination), relates to coordination of Battle Group Anti-Air defenses; PE 0603318N (AEGIS ER), develops extended range surface-to-air missile for AEGIS ships with Vertical Launchers.

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1447 PROJECT TITLE: CG Combat Systems Engineering

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
(U) SCN*	0	0	0	0	25,838,055
(CG 47) Quantity	(0)	(0)	(0)	(0)	(27)
(U) SCN*	3,492,100	3,600,700	3,604,700	11,289,200	24,954,600
(DDG 51)Quantity	(5)	(5)	(5)	(15)	(33)
(U) OPN	29,973	43,558	86,233	Cont.	Cont.
(U) MILCON	8,470	None	3,100		

*SCN for ship construction. Combat Systems costs not separately identified.

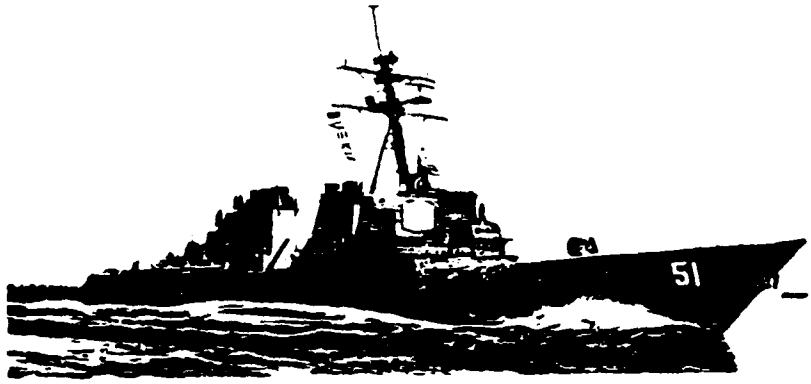
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

		COMPLETE
1.	(U) Baseline 4 Integration and Testing at the Combat System Engineering Development Site.	Mar 1988-Mar 1991
2.	(U) AAV demonstration at the Combat System Engineering Development Site.	Oct 1988
3.	(U) Baseline 4 major engineering test conducted at the Combat System Engineering Site.	Oct 1989
4.	(U) Conduct AEGIS Light-off in CG-65.	Jan 1990
5.	(U) CG 65 delivers	Nov 1990
6.	(U) ARLEIGH BURKE (DDG 51) delivers.	Feb 1991

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1337 PROJECT TITLE: DDG C/S ENGINEERING



A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	None	None	IIIB	None
ENGINEERING MILESTONES	DDG Instl--9/89-3/90	ALO 3/90 E03 10/89	DDG Dlvy 2/91	Cont.
T&E MILESTONES	SQT 10/88	SQT 11/89 ShipTest--5/90-1/91		Cont.
CONTRACT MILESTONES	None	None	None	None

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	24,768	19,880	18,285	Cont.
SUPPORT CONTRACT	2,365	1,500	905	Cont.
IN-HOUSE SUPPORT	6,063	10,789	14,873	Cont.
GPE/ OTHER	None	None	None	None
TOTAL	33,196	32,169	34,063	Cont.

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1337 PROJECT TITLE: DDG C/S ENGINEERING

B. (U) DESCRIPTION: This project provides for combat system design, engineering, integration, and testing for DDG 51 class ships similar to the TICONDEROGA class and is the next orderly evolution of a proven system. The combat system is derived from CG 47 Baselines 2 and 3 being developed in Project S1447, the major difference being the introduction of new computers and displays plus new elements developed under Project S1937. In turn, CG 47 Baseline 4 will benefit directly from most of the computer program and technical documentation developed for DDG 51. A Combat System prototype for DDG 51 was installed at the Combat System Engineering Development Site (CSEDS), Moorestown, NJ, for system engineering, validation, element level and system level test of computer programs and equipment. Also Planned Improvements/Modification to the Destroyer Combat System will be developed and integrated as Baseline Five Upgrades to include Joint Tactical Information Distribution System (JTIDS)/Command and Control Processor (C2P), TADIL J, Combat Direction Finding (DF), Tactical Data Information Exchange System (TADIX B), AN/SLQ-32(V)3 Active ECM, and AEGIS ER.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments
   a. (U) Prepared for major engineering test (EO-3) of Combat System at the Combat System Engineering Development Site.
   b. (U) Continued Destroyer Baseline 4 engineering, incorporating final modifications to the Destroyer Combat System.
   c. (U) Continued Destroyer Combat System check-out and testing.
   d. (U) Provided technical support for installation of Baseline 4 Combat Systems in DDG 51.

2. (U) FY 1990 Program:
   a. (U) Conduct major Combat System engineering test (EO-3)/SQT Baseline 4 at the Combat System Engineering Development Site.
   b. (U) Conduct Combat System Light-off in ARLEIGH BURKE. Continue final Destroyer Combat System checkout and testing.
   c. (U) Commence system engineering to integrate the AN/SPS-67(V)3, ASW Onboard Trainer and TWS Trainer into AEGIS Weapons System.
   d. (U) Conduct PDR and commence design specifications for integration of AN/SPS-67(V)3, ASW Onboard Trainer, and TWS Trainer capabilities (Baseline 4 Phase II).
   e. (U) Conduct CDR and commence coding of AN/SPS-67(V)3, ASW Onboard Trainer and TWS Trainer capabilities.
   f. (U) Begin system engineering to integrate SM-2 BLK IV, JTIDS/C2P/ TADIL J, TADIX B, AN/SLQ-32(V)3, and Combat DF into AEGIS Weapons System.

3. (U) FY 1991 PLANS:
   a. (U) Transfer ship custody of ARLEIGH BURKE (DDG 51).
   b. (U) Complete coding and commence system testing of AN/SPS-67(V)3, ASW Onboard Trainer and TWS Trainer into AEGIS Weapons System.
   c. (U) Conduct PDR, commence design specifications and conduct CDR for integration of AEGIS ER, JTIDs/C2P/TADIL J, TADIX B, and Combat DF into AEGIS Weapons System.

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1337 PROJECT TITLE: DDG C/S ENGINEERING

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA.; NESEA, St. Inigoes, MD.; NSWC, Dahlgren, VA; NUSC, New London, CT; Fleet Analysis Center, Corona, CA; PMTR, Pt. Mugu, CA; and NRL, Washington, DC. CONTRACTORS: General Electric, Moorestown, NJ; Raytheon Corporation, Wayland, MA; and General Electric, Syracuse, NY. OTHERS: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; Rockwell International Corp. Autonetics Marine Systems Division, Arlington, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

TLR, Rev 1, Chg 1	Aug 85
NDCP 1337, REV 1, Chg 1	Sep 86
NTPS-30-8511A	Sep 87
Acq Plan 369-86, Rev B	Oct 88
TEMP 801, Rev 4	May 89

G. (U) RELATED ACTIVITIES: PE 0604575N (AN/SQS-53C), PE 0604355N (Vertical Launch Anti-Submarine Rockets), PE 0604303N (AEGIS Area Air Defense), PE 0604366N (STANDARD Missile Improvements), PE 063382N (Battle Group Anti-Air Warfare Coordination), PE 0603318N (AEGIS ER),

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
(U) SCN*	0	0	0	0	25,838,055
(CG 47) Quantity	(0)	(0)	(0)	(0)	(27)
(U) SCN*	3,492,100	3,600,700	3,604,700	11,289,200	24,954,600
(DDG 51)Quantity	(5)	(5)	(5)	(15)	(33)
(U) OPN	29,973	43,558	86,233	Cont.	Cont.

*SCN for ship construction. Combat Systems costs cannot be separately identified

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

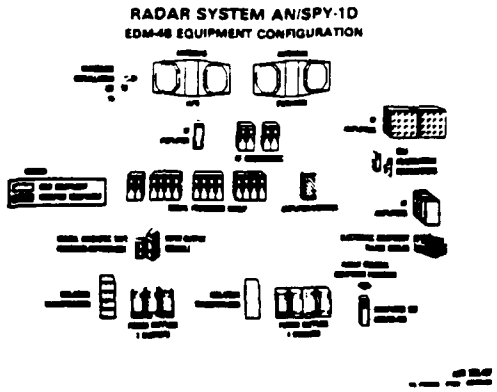
J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4

PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING

PROJECT NUMBER: S1937 PROJECT TITLE: DDG Weapons Development



A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	None	None	IIIB	None
ENGINEERING MILESTONES	EO3 10/89	SQT 11/89	DDG Dlvy 2/91	Cont.
T&E MILESTONES	SQT 10/88	EO3 10/89 SQT 11/89 DT-IIB-3 7/90 OT-IIB-3 8/90 SQT 9/90	Demo 6/91 SQT 7/91	Cont.
CONTRACT MILESTONES	None	None	None	None

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	1,431	0	28,000	Cont.
SUPPORT CONTRACT	0	0	5,917	Cont.
IN-HOUSE SUPPORT	323	0	5,893	Cont.
GFE/ OTHER	None	None	None	None
TOTAL	1,754	0	39,810	Cont.

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1937 PROJECT TITLE: DDG Weapons Development

B. (U) DESCRIPTION: This project develops selected systems and subsystems for the ARLEIGH BURKE (DDG 51) class ships. These developments involve elements of Anti-Air, Anti-Submarine, and Surface Strike detection and fire control systems which are the state-of-the-art multi-function AEGIS Weapon System with its AN/SPY-1D phased array radar. This design and technology is based on the TICONDEROGA class AN/SPY-1B radar approved for production in 1986. Major changes are in the transmitter, power supply, and computer. Additional parallel development included in this project are the Gun Weapon System and Anti-Submarine Warfare Control System. The Naval Surface Weapons Center, Dahlgren, VA, is developing the gun console computer, gun mount processor, and integration into the MK 34 Gun Weapon System. The Anti-Submarine Warfare Control System is being developed by General Electric at the Anti-Submarine Warfare Control System Engineering Development Site, Syracuse, NY, and will include integration of the active AN/SQQ-28 LAMPS shipboard equipment. This program responds to NTIC validated Threat Assessment #018-89 dated November 1989.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Completed Destroyer Anti-Submarine Warfare system engineering.

2. (U) FY 1990 Program: Not applicable.

3. (U) FY 1991 PLANS: Begin development/design of radar upgrade (EDM-4B) planned for introduction in an FY 94 destroyer. Upgrades consist of computer programs and equipment modifications which will enhance capability against seaskimming targets.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Engineering Agent, St. Inigoes, MD.; Naval Surface Weapons Center, Dahlgren, VA.; Naval Undervater Systems Center, New London, CT; Fleet Analysis Center; Corona, CA; Pacific Missile Test Range, Pt.Mugu, CA; and Naval Research Laboratory, Washington, DC. CONTRACTORS: General Electric, Moorestown, NJ; Raytheon Corporation, Wayland, MA; and General Electric, Syracuse, NY. OTHERS: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; Rockwell International Corp., Autonetics Marine Systems Division, Arlington, VA; and Sperry Corporation, Minneapolis, MN.

E. (U) COMPARISON WITH REVISED BY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

PROGRAM ELEMENT: 0604307N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: AEGIS COMBAT SYSTEM ENGINEERING
PROJECT NUMBER: S1937 PROJECT TITLE: DDG Weapons Development

F. (U) PROGRAM DOCUMENTATION:

TLR, Rev 1, Chg 1	Aug 85
NDCP 1337, REV 1, Chg 1	Sep 86
NTPS-30-8511A	Sep 87
Acq Plan 369-86, Rev B	Oct 88
TEMP 801, Rev 4	May 89

G. (U) RELATED ACTIVITIES: PE 0604575N (AN/SQS-53C), develops the Anti-Submarine Warfare Sonar for AEGIS Destroyer; PE 0604355N (Vertical Launch Anti-Submarine Rockets), develops the Anti-Submarine Rockets for AEGIS Combat Systems; PE 0604303N (AEGIS Area Air Defense), provides for the modification and development of the AEGIS Weapon System and development of the Vertical Launching System; PE 0604366N (STANDARD Missile Improvements), relates to missile development for the AEGIS Weapon System; PE 0603382N (Battle Group Anti-Air Warfare Coordination), relates to coordination of Battle Group Anti-Air defense; PE 0603318N (SM-2 BLK IV), develops an extended range surface-to-air missile for AEGIS cruisers with Vertical Launchers and AEGIS destroyers.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
(U) SCN* (CG 47)	0	0	0	0	25,838,055
(Quantity)	(0)	(0)	(0)	(0)	(27)
(U) SCN* (DDG 51)	3,492,100	3,600,700	3,604,700	11,289,200	24,954,600
(Quantity)	(5)	(5)	(5)	(15)	(33)
(U) OPN	29,973	43,558	86,233	Cont.	Cont.

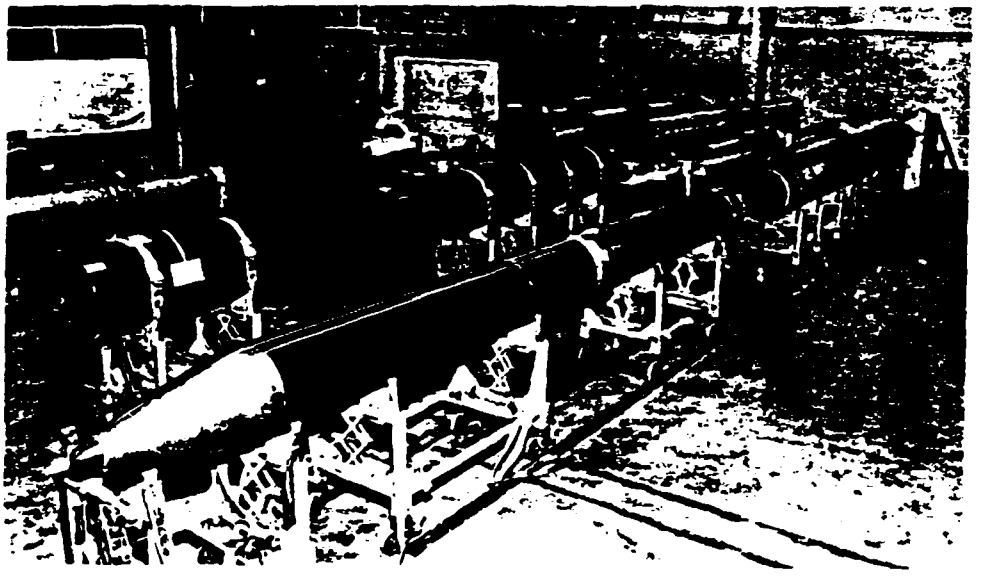
* SCN for ship construction. Combat Systems costs cannot be separately identified. Procurement costs for Flight II are not priced.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604309N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Standoff Weapon
PROJECT NUMBER: S0883 PROJECT TITLE: SEA LANCE



POPULAR NAME: SEA LANCE

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
Program Milestones				
Engineering Milestones				
T&E Milestones				
Contract Milestones				
BUDGET(SK)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	59,327	58,303	0	461,206 0
Support Contract	1,000	700	0	7,314 0
In-House Support	17,795	22,500	0	131,086 0
GFE/Other	0	0	0	0
Total	78,122	81,503	0	599,606 0

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604309N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Standoff Weapon
PROJECT NUMBER: S0883 PROJECT TITLE: SEA LANCE

B. (U) DESCRIPTION: The SEA LANCE Weapon System will provide surface ships and submarines with a quick reaction, conventional, anti-submarine warfare (ASW) tactical weapon. It is being developed to counter both current and projected submarine threats as specified in the System Threat Assessment Report (STAR), ASW Weapon Systems, NISC TA #010-89 of August 1989. SEA LANCE is designed to increase overall system effectiveness and reduce counterattack vulnerability by limiting the period of engagement with the enemy. The SEA LANCE will complement the Light Airborne Multipurpose System (LAMPS) and other ASW systems on surface ships, as well as submarine launched heavyweight torpedoes, such as the MK 48 ADCAP. This synergistic mix of weapons will provide surface ships and submarines with a tactically robust ASW capability aimed at increasing overall ASW effectiveness.

The SEA LANCE system consists of a common flight vehicle/missile and two launch adaptors. The submarine launch adaptor provides physical compatibility with the submarine, environmental protection for the missile, and buoyancy to bring the weapon to the surface. The surface launch adaptor consists of the missile adaptor and associated hardware for integration with the VLS canister. The VLS canister and missile adaptor provide physical compatibility with the surface ship MK 41 VLS and environmental protection for the missile.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted Dynamic launch.
   b. (U) Initiated surface ship development and integration.
   c. (U) Conducted Modal Survey Test.
   d. (U) Conducted CTE flight certification testing.
   e. (U) Conducted Surface Adaptor PDR.
   f. (U) Conducted Air Stabilizer testing.
2. (U) FY 1990 Program:
   a. (U) Conduct Air Drop test.
   b. (U) Document Software Design.
   c. (U) Conduct Separation Sled test.
   d. (U) Conduct two Contractor Technical Evaluation non-separation flight tests.
   e. (U) Terminate SEA LANCE program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NUSC, Newport, RI (lead laboratory - systems integration); Naval Weapons Center, China Lake, CA (lead laboratory - missile); Naval Surface Warfare Center, White Oak, Silver Spring, MD; Naval Surface Warfare Center, Dahlgren, VA; NOSC, San Diego, CA; and Naval Ordnance Station, Indian Head, MD. CONTRACTOR: Boeing Aerospace and Electronics, Seattle, WA. SUBCONTRACTORS: Westinghouse Naval Systems Division, Cleveland, OH; Hercules, Inc., McGregor, TX; Litton Industries, Woodland Hills, CA; and Westinghouse Electric Corporation, Sunnyvale, CA.

PROGRAM ELEMENT: 0604309N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Standoff Weapon
PROJECT NUMBER: S0883 PROJECT TITLE: SEA LANCE

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: Program terminated by FY 1990 end
2. (U) Schedule changes: Program terminated prior to Milestone IIIA
3. (U) Cost changes: The Department funding reduction of 46,392 in the FY 1990 budget results from the decision to terminate by the end of FY 1990. All funding has been removed from FY 1991 to Completion.

F. (U) PROGRAM DOCUMENTATION: MENS-1/80, DCP (In approval process), TEMP-2/2/89, AP-12/21/88.

G. (U) RELATED ACTIVITIES: PE 0604610N (Mk 50 Advanced Lightweight Torpedo), PE's 0603560N /0604524N Submarine Combat System Development, PE 0603634N Tactical Nuclear Development, 0603318N Vertical Launch System Development, PE 0205620N Surface Ship Fire Control System Development. The Torpedo Mk 50 (0604610N) was planned to be the conventional payload for SEA LANCE.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Millions)

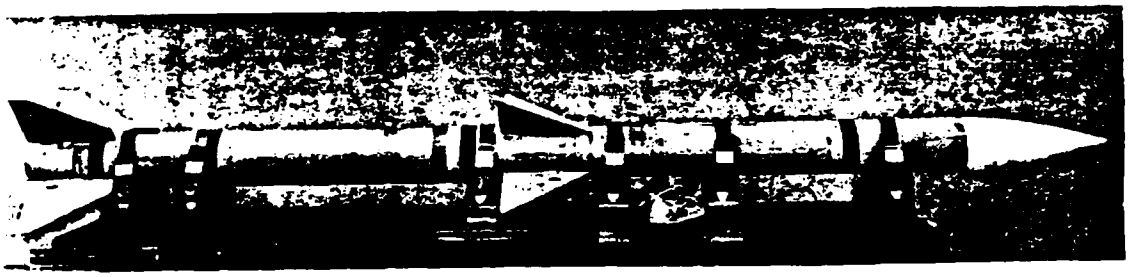
	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT (0311200)	-	0	0	0	0
MILCON (0211991)	-	-	0	0	0

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604314N Budget Activity: 4
Program Element Title: ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE (AMRAAM)
Project Number: W0981 Project Title: ADVANCED MEDIUM RANGE AIR-TO-AIR-MISSLE



POPULAR NAME: AMRAAM

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		DAB IIIB		
Engineering Milestones				
T&E Milestones		OT-IIIA 20/90 Navy	OT-IIIB 10/91 Navy	Continuing
Contract Milestones	LOT III	LOT IV	LOT V	Continuing

BUDGET (SK)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	4,225	58	0	Continuing
Support Contract	623	320	250	Continuing
In-House Support	7,604	6,576	3,435	Continuing
GFE/ Other				
Total	12,452	6,954	3,685	Continuing Continuing

Program Element: 0604314N Budget Activity: 4
Program Element Title: ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE (AMRAAM)
Project Number: W0981 Project Title: ADVANCED MEDIUM RANGE AIR-TO-AIR-MISSLE

B. (U) DESCRIPTION: This joint Navy/Air Force program is structured in response to the Joint Service Operational Requirement and Mission Element Need Statement to develop an air superiority air-to-air missile as a SPARROW follow-on with significant improvements in operational utility and combat effectiveness. This program supports the integration of the Advanced Medium Range Air-to-Air Missile into Navy aircraft with analysis of Navy unique applications, simulation capability development, aircraft missile integration tasks, logistics development, insensitive munitions tasks, pre-planned product improvement efforts, and procurement of hardware to support Navy test and evaluation tasks.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued participation in AMRAAM ECCM working group to define enhanced software requirements and validation for new projected threats.
   b. (U) Completed Operational Test and Evaluation (OT-IIIA) Test Plan and initiated captive carry reliability program and OT-IIIB planning.
   c. (U) Completed AMRAAM/F/A-18C software development and initiated verification flight test program.
   d. (U) Initiated preliminary integration planning for F-14D and A-12 aircraft.
   e. (U) Participated in Joint Program P3I design definition.
   f. (U) Continued IM technical efforts.
   g. (U) Continued captive flight test and ground simulation efforts in support of software/ECCM verification.
   h. (U) Depot/Naval Weapon Station (NWS) activation tasks initiated.

2. (U) FY 1990 Program:
   a. (U) Commence Operational Testing (OT-IIIA).
   b. (U) Continue execution of Insensitive Munitions Plan.
   c. (U) Continue refinement of missile performance. (i.e. ECCM)
   d. (U) Participate in AMRAAM P3I program.
   e. (U) Continue depot/NWS activation efforts.
   f. (U) Complete verification of F/A-18C/AMRAAM capability.
   g. (U) Continue F-14 activities.
   h. (U) Complete OT-IIIB planning.

3. (U) FY 1991 Plans:
   a. (U) Continue Operational Testing (OT-IIIB).
   b. (U) Continue Insensitive Munitions Plan.
   c. (U) Continue refinement of missile performance and participate in follow-on AMRAAM improvement programs.
   d. (U) Continue depot/NWS activation tasks.
   e. (U) Continue F-14 integration efforts.

4. (U) Program to Completion: This a continuing program.

Program Element: 0604314N Budget Activity: 4
Program Element Title: ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE (AMRAAM)
Project Number: W0981 Project Title: ADVANCED MEDIUM RANGE AIR-TO-AIR-MISSLE

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA, Pacific Missile Test Center, Naval Air Station, Point Mugu, CA. CONTRACTORS: Hughes Aircraft Company, Canoga Park, CA; Raytheon Company, Bedford, MA. OTHERS: Munitions System Division, Advanced Medium Range Air-to-Air Missile Joint System Program Office, Eglin, Air Force Base, FL.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

JSOR	9/78
MENS	11/78
MOU	8/80
ILSP	7/89
DCP	6/87
TEMP	12/89

G. (U) RELATED ACTIVITIES: P.E. 0205667N, F-14 Squadrons; P.E. 0207130F, F-15 Squadrons; P.E. 0207133F, F-16 Squadrons; P.E. 0204136N, F/A-18 Squadrons; P.E. 0604314F, Advanced Medium Range Air-to-Air Missile.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 * WPN/#9	34,800	107,900	421,900	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The cooperative agreement signed by the U.S., the Federal Republic of Germany (GE), and the United Kingdom (UK) in August 1980 provides for U.S. development and production of the Advanced Medium Range Air-to-Air Missile while GE and UK are responsible for the development and production of the Advanced Short Range Air-to-Air Missile (ASRAAM). The recent withdrawal of GE from the ASRAAM effort will compel substantiation of the AMRAAM MOU.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

* Source: 12/20/89 P-1 Exhibit Page N-3

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR-TO-AIR MISSILE SYSTEMS ENGINEERING

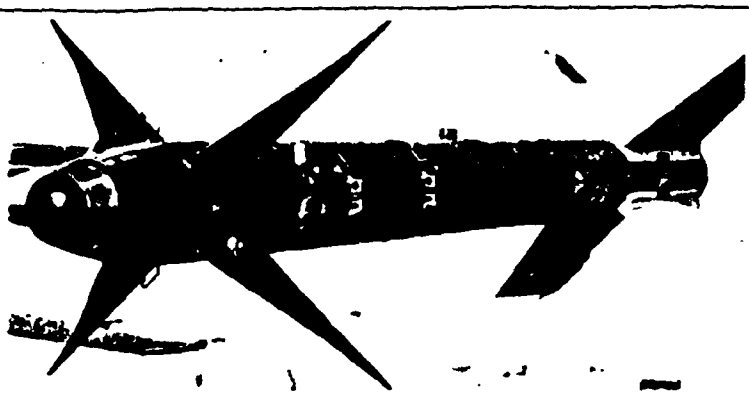
A. (U) Resources: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0456	AIM-9M PIP	24,439	27,279	26,487	28,677	130,698
W1738	ASRAAM SUPP	218	49	0	Cont.	Cont.
TOTAL		24,657	27,328	26,487	Cont.	Cont.

B. (U) DESCRIPTION: This program funds the upgrades required for various air-to-air missiles currently in inventory. Funds within Project W1738 cover ASRAAM administrative expenses and Navy T&E.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR-TO-AIR MISSILE SYSTEMS ENGINEERING
Program Number: W0456 Project Title: AIM-9M PIP (9R)



POPULAR NAME: SIDEWINDER

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			LOW RATE PROD DEC	FULL RATE PROD DEC
Engineering Milestones		GOV UPDATES 12/89 - 9/90		
T&E MILESTONES	DT-IIB 1/89-8/89	DT-IIC OT-IA 10/90-6/91	OT-IIB 8/91-6/92	
Contract Milestones	1st Del. EMs 3/89	Last Del EMs 4/90	Del PMs 5/92	

Budget ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	8,551	9,660	5,570	46,791 13,000
Support Contract	100	1,200	4,970	7,137 1,700
In-House Support	15,788	16,419	15,947	76,770 14,850
GFE/ Other				
Total	24,439	27,279	26,487	130,698 20,550

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR-TO-AIR MISSILE SYSTEMS ENGINEERING
Program Number: W0456 Project Title: AIM-9M PIP (9R)

B. (U) DESCRIPTION: The AIM-9M Product Improvement Program will upgrade the United States' forces with a superior air-to-air missile by increasing current head-on aquisition range, increasing background discrimination and increasing counter counter-measures capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Contractor continued fabrication of 15 EM's.
   b. (U) Initiated second source build-up.
   c. (U) Conduct successful live firings of an engineering test model.
2. (U) FY 1990 Program:
   a. (U) Commence DT-IIB firing/test program.
   b. (U) Build DT-IIC/OT-IIA missiles.
3. (U) FY 1991 Plans:
   a. (U) Conduct DT-IIC/OT-IIA.
   b. (U) Low Rate production decision.
4. (U) Program to Completion: Not Applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA. CONTRACTOR: Ford Aerospace, Newport Beach, CA; Raytheon, Bedford, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:
OR 2/86
TEMP 2/87

G. (U) RELATED ACTIVITES: Not Applicable.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Actual	FY 1990 Estimate	FY1991 Estimate	To Complete
APPN/P-1					
WPN/#32				7,000	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: See Congressional Data Sheet for AIM-9M.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR-TO-AIR MISSILE SYSTEMS ENGINEERING
Program Number: W1738 Project Title: ASRAAM

C. (U) DESCRIPTION: Countering an advancing threat and meeting the need for strong interoperability with NATO Allies requires an advanced short-range missile for the early 2000's. The advancement in state-of-the art technology will require Navy participation for Navy unique requirements and testing of hardware in the late 1980's and early 1990's.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued involvement in evaluation of ASRAAM technical approach.
2. (U) FY 1990 Program:
   a. (U) Continue technical evaluation of ASRAAM, including aircraft integration requirements.
3. (U) FY 1991 Plans:
   a. (U) Monitor ongoing development efforts and continue evaluation of technical aspects of ASRAAM, if required.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Systems Command, Washington, DC; Naval Weapons Center, China Lake, CA.

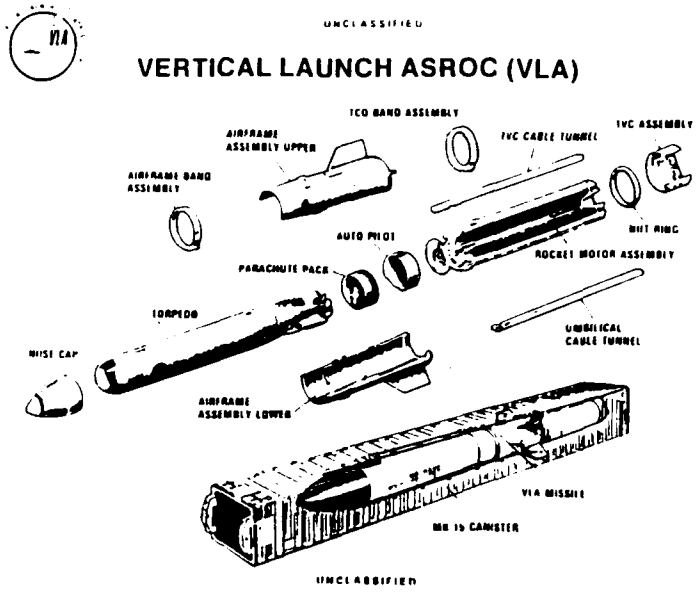
F. (U) RELATED ACTIVITES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604355N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Vertical Launch ASROC
PROJECT NUMBER: S1504 PROJECT TITLE: Vertical Launch ASROC



POPULAR NAME: VERTICAL LAUNCH ASROC

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	M/S IIIA 8/89	M/S IIIB 8/90		M/S IIIC 2QFY96
Engineering Milestones	PCA 12/88	Final Drawings 2/90	Start Detail Design 3/91	Complete MK50 FSD 2Q/FY96
T&E Milestones	TECHEVAL 9/89	OPEVAL 3/90		TECHEVAL/OPEVAL TBD
Contract Milestones	LRIP 8/89	LRIP Option 9/90	MK50 FSD 3/91	MK50 LRIP 2Q/FY96
BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	13,651	424	15,000	CONT.
Support Contract	613	0	500	CONT.
In-House Support	11,229	1,082	4,000	CONT.
GFE/Other	4,000	494	10,500	CONT.
Total	29,493	2,000	30,000	CONT. CONT.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604355N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Vertical Launch ASROC
PROJECT NUMBER: S1504 PROJECT TITLE: Vertical Launch ASROC

B. (U) DESCRIPTION: This program element provides for the design, development and testing of a replacement for the current Antisubmarine Rocket (ASROC) and modification to the Vertical Launching System MK 41 and affected fire control systems to permit launching Vertical Launch ASROC missiles from the Vertical Launching System in _____ class ships. The Vertical Launch ASROC missiles will provide an intermediate range _____ yards, all-weather, quick-reaction, antisubmarine weapon delivery capability for ships equipped with the Vertical Launching System MK 41 and MK 116 Mod 6/7/8 Underwater Fire Control System. The program provides for design, development, test and integration of two payloads, the MK 46 Mod 5 Torpedo and the MK 50 Torpedo.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed range table tests and generated range table data.
   b. (U) Conducted OT-IIA at sea tests.
   c. (U) Completed component qualification and safety tests.
   d. (U) Completed maintenance demonstration and verified logistic documentation.
   e. (U) Received authorization to award limited rate production (LRIP) contract (M/S IIIA) (100 units plus long lead material).
   f. (U) Completed TECHEVAL (five missile test firings).

2. (U) FY 1990 Program:
   a. (U) Conduct OPEVAL (ten missile test firings).
   b. (U) Conduct M/S IIIB review (full production authorization).
   c. (U) Commence MK 50 development effort by beginning prime item specification and interface documentation.
   d. (U) Execute LRIP option for 200 units.

3. (U) FY 1991 Plans:
   a. (U) Begin fabrication of VLA MK 46/50 common components for FSD testing.
   b. (U) Finalize interface documentation and prime item development specification.
   c. (U) Award FSD contract to develop MK 50 VLA variant.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NAVOCEANSYSCEN, San Diego, CA (lead lab); NAVSURFWPNCEN Dahlgren, VA; NAVSHIPWPNSYSENGSTA Port Hueneme, CA; NAVORDSTA Indian Head, MD; NWAC Corona, CA; WPNSTA EARLE Colt's Neck, NJ; Contractors: Loral Defense Systems-Akron, OH; Martin Marietta Baltimore, MD; Thiokol Inc., Elkton, MD.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604355N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Vertical Launch ASROC
PROJECT NUMBER: S1504 PROJECT TITLE: Vertical Launch ASROC

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET
1. (U) TECHNICAL CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: The +$30,000 is to develop the MK 50 VLA variant.

F. (U) RELATED ACTIVITIES: The MK 50 Torpedo is being developed under PE 0604610N.

G. (U) PROGRAM DOCUMENTATION:

NPDM (M/S IIIA)	8/89
DCP	8/89
OT-IIA Report	7/89
ILSP S1504-276-A-P-I	7/89
TEMP 917	5/89
Acquisition Plan 412-85 Rev B (88)	12/88

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OM&N	487	695	1,966	CONT.	CONT.
WPN	104	-	-		

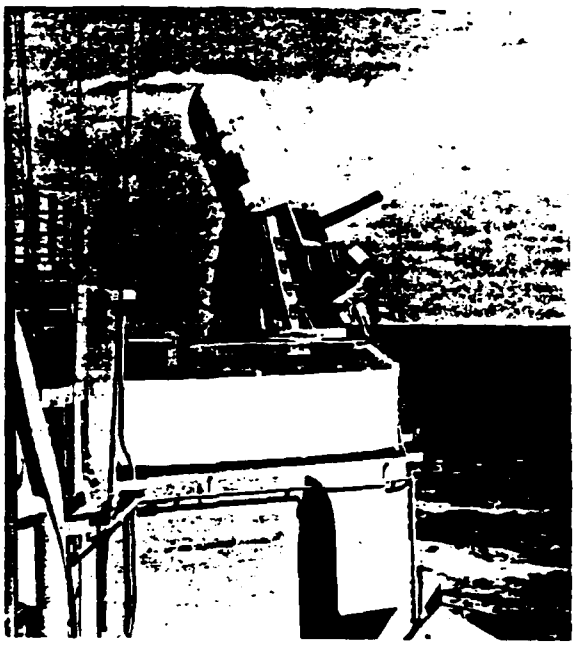
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: This information is contained in the FY 1991 Congressional Data Sheets.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604358N Budget Activity: 4
Program Element Title: Close-In Weapon System (PHALANX)
Project Number: S0172 Project Title: Close-In Weapon System (PHALANX)



POPULAR NAME: PHALANX

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES:	IOC OCT	IIIB MAY		Cont.
ENGINEERING MILESTONES:	B/L 2 CDR	B/L 2 PRR		Cont.
T&E MILESTONES:	DT III	OT III	B/L 3 DT/OT	Cont.
CONTRACT MILESTONES:		Block 1 B/L 2 Prod		Cont.

BUDGET	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT:	N/A	N/A	N/A	N/A
SUPPORT CONTRACT:	N/A	N/A	N/A	N/A
IN-HOUSE SUPPORT	7,024	5,541	6,119	Cont.
GFE/ OTHER	375	311	324	Cont.
Total:	7,399	5,852	6,443	Cont.

Program Element: 0604358N Budget Activity: 4
Program Element Title: Close-In Weapon System (PHALANX)
Project Number: S0172 Project Title: Close-In Weapon System (PHALANX)

B. (U) DESCRIPTION: The PHALANX Close-In Weapon System (CIWS) is an automatic, fast-reaction, computer-controlled radar and gun system. It functions as the last segment in the Navy's "defense-in-depth" concept. Its mission is to detect, engage, and destroy hostile anti-ship missiles that have penetrated the ship's primary defense system. It is intended for simple installation on a large variety of Navy ships. The program requirements are contained in the CIWS Block I (MK 15 MODS 11-14) TEMP 142-1. The system consists of a search and track radar subsystem, a six-barrel Gatling gun, and a control system. When operating automatically, the CIWS' primary mode of operation, the system continually searches azimuth. It automatically detects, evaluates, tracks, and engages threats and then returns to search mode ready for another target. The initial CIWS version, Block 0, has been approved for service use (ASU) and is in the fleet. CIWS Block I, Baseline 0, provides increased performance in search elevation coverage, increased velocity coverage, a larger magazine, augmented reliability, built-in test equipment (BITE), and improvements to system operability test (SOT) and fault isolation test (FIT) programs. Baseline 0 received ALP in FY 85 and IOC occured 10/88. CIWS Block 1, Baseline 1, adds a pneumatic gun drive, enabling the gun to fire 4,500 spm, and increased search sensitivity. In FY 88 the Block 1, Baseline 1 system received Approval for Limited Production for FY 88 and FY 89 procurements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Performed EMI testing (CIWS/SLQ-32) at NAVSWC Dahlgren, VA and at-sea in a fleet ship.
   b. (U) Performed system engineering and effectiveness analysis to maintain capability versus threat.
   c. (U) Conducted developmental testing of fire control improvements at NWC/China Lake.
   d. (U) Initiated high velocity tungsten/DU penetrator evaluation at NAVSWC Dahlgren, VA.
2. (U) FY 1990 Program:
   a. (U) Conduct Tactical Missile Test of Block I in ex-STODDARD.
   b. (U) Gain Block I Approval for Full Production (Milestone III-B).
   c. (U) Perform system engineering and effectiveness analysis to maintain capability versus threat.
   d. (U) Plan for IOT&E for Block I Baseline 3 upgrade.
   e. (U) Conduct Aegis interface testing.
   f. (U) Continue high velocity tungsten/DU penetrator evaluation.
3. (U) FY 1991 Plans:
   a. (U) Perform system engineering and effectiveness analysis to maintain capability versus threat.
   b. (U) Conduct IOT&E for Block I Baseline 3.
   c. (U) Conduct Block I/NATO AAW interface testing.
4. (U) Program to Completion: This is a continuing program.

Program Element: 0604358N Budget Activity: 4
Program Element Title: Close-In Weapon System (PHALANX)
Project Number: S0172 Project Title: Close-In Weapon System (PHALANX)

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSWC, Dahlgren, VA; NAVORDSTA, Louisville, KY. CONTRACTORS: General Dynamics, Pomona, CA; General Electric, Pittsfield, MA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

(1) (U) TECHNICAL CHANGES: Not Applicable.
(2) (U) SCHEDULE CHANGES: Not Applicable.
(3) (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: CIWS Block I TEMP 142-I (Rev 2) 8/89

G. (U) RELATED ACTIVITIES: Program Element 0603319N, (NATO AAW Systems).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989	FY 1990	FY 1991	To Comp.	Total Program
(U) PROCUREMENT					
WPN (411000 411001)	18,851	59,868	61,958	Con't	Con't
Quantity	2	18	17		
SCN (Various)	80,300	79,098	80,023	Con't	Con't
Quantity	13	15	14		
WPN MODS (420500)	54,252	56,456	81,292	Con't	Con't

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: GOALKEEPER Close-In Weapon System Foreign Weapon Evaluation (proposed).

- Candidate nomination proposal submitted for testing the Dutch 30mm GOALKEEPER CIWS during FY 1989/FY 1990.
- Coproduced by Hollandse Signaalapparaten (HSA) Netherlands and General Electric (GE) United States.
- United Kingdom to provide GOALKEEPER system for effectiveness evaluation at Pacific Missile Test Center, California.
- Two year evaluation, up to 9 missile targets (3 from UK, 6 from US). System installed on ex-USS STODDARD and tests to be remotely controlled.
- US financial commitment estimate $6M; UK and HSA/GE estimates unknown.
- Memorandum of Understanding concluded by US/UK in January 1990.

J. (U) TEST AND EVALUATION: This information is contained in the FY1991 Congressional Data Sheets.

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604361N Budget Activity: 4
Program Element Title: NATO SEASPARROW
Project Number: S0173 Project Title: NATO SEASPARROW

A. (U) RESOURCES (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0173	NATO SEASPARROW	4,840	4,764	6,007	Cont.	Cont.

B. (U) DESCRIPTION: This program integrates multiple weapon and sensor systems in the operational computer program (OCP) resident in the MK-23 Target Acquisition System (TAS) to improve acquisition and reaction times for existing shipboard self defense systems. This will be accomplished through improved correlation/association and Threat Evaluation Weapon Assigment (TEWA) algorithms. Corrects fire control system deficiencies noted during RIM-7M OPEVAL. Updates TAS software to match evolution of shipboard Combat Direction System (CDS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Corrected RIM-7M OPEVAL discrepancies, implemented MK-23 TAS computer modifications, commenced integration of AN/SAR-8 with MK-23 TAS.

2. (U) FY 1990 Program:

a. (U) Support RIM-7M (PIP) OPEVAL; continue TAS/IRSTD integration including land based testing of RADAR/IR/ESM correlation mods.

b. (U) Initiate development of Systems Modifications to fully support the MK-41/SEASPARROW Vertical Launch and Missile Homing Improvement Program initiatives.

c. (U) Commence development of a single, common UYK-44 program supporting MK-23 TAS interface with CDS and non-CDS equipped ships.

3. (U) FY 1991 Plans:

a. (U) Conduct at-sea testing of TAS/IRSTD modifications.

b. (U) Continue development of system modifications for the MK-41/SEASPARROW Vertical Launch and Missile Homing Improvement initiatives.

c. (U) Continue development of MK-23 TAS Computer Program.

4. (U) Program to Completion: This a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWSES, Port Hueneme, CA. CONTRACTORS: Hughes Aircraft Company, Fullerton, CA.

E. (U) RELATED ACTIVITIES: P.E. 0603609N, Conventional Munitions; P.E. 0604369N, 5-inch Rolling Airframe Missile, P.E. 0604608N, Surface Electro-Optic Systems, P.E. 0603319N, NATO AAW Systems.

F. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: MOU For International development of NSSMS (June 88). MOU for Cooperative support of NSSMS (Dec 77).

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604363N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT II

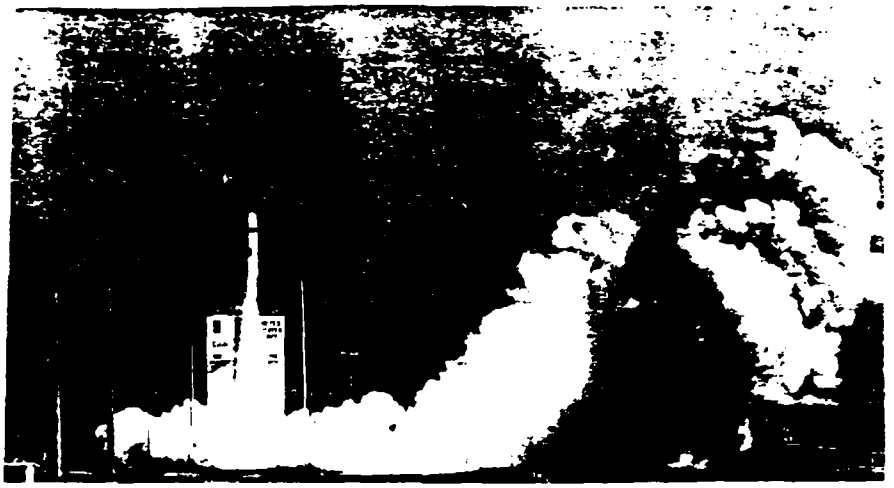
A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J0951	TRIDENT II Missile	566,415	213,123	87,750	CONT.	CONT.
J1546	TRIDENT II Ship Systems	825	814	4,072	3,068	72,887
TOTAL		567,240	213,937	91,822	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The TRIDENT II (D5) Strategic Weapon System program develops an improved Sea Launched Ballistic Missile (SLBM) with greater accuracy and payload capability at equivalent ranges as compared to the current TRIDENT I (C4) system. TRIDENT II will enhance U.S. strategic deterrence by providing a survivable sea-based system capable of engaging the full spectrum of potential targets. It will enhance the U.S. position in strategic arms negotiations by providing a weapon system with performance and payload flexibility that will accommodate various treaty initiatives. TRIDENT II's increased payload allows the deterrent mission to be achieved with fewer submarines.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604363N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT II
PROJECT NUMBER: J0951 PROJECT TITLE: TRIDENT II Missile



A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		DAB III B: June		
Engineering Milestones		First DASO(Feb) IOC: MARCH		
T&E Milestones		DT Ends (Feb) End OT II (Mar)	OTIII begins (Dec)	
Contract Milestones				

BUDGET ($M)	FY 1989	FY 1990	FY 1991	Program Total To Completion	
Major Contract	379.0	151.6	56.7	7,024.6	
Support Contract	113.2	23.7	-	1,608.8	
In-House Support	54.9	12.1	-	743.5	
GFE/Other 1/	19.3	25.7	31.1	CONT.	
Total	566,415	213,123	87,750	9,376.9	2/

1/ Only costs for Ballistic Missile Defense Penetration System, SLBM Effectiveness Enhancement (SEE) and SLBM Retargeting System (SRS) are included in "other."
2/ Total program cost excludes the costs budgeted for research and development of Ballistic Missile Defense Penetration System (started in FY 1984) SEE, SRS, and all RDT&E,N beyond the year of the TRIDENT II missile IOC (FY 1990).

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604363N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT II
PROJECT NUMBER: J0951 PROJECT TITLE: TRIDENT II Missile

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The TRIDENT II (D5) Strategic Weapon System program develops an improved Sea Launched Ballistic Missile (SLBM) with greater accuracy and payload capability at equivalent ranges as compared to the current TRIDENT I (C4) system. TRIDENT II will enhance U.S. strategic deterrence by providing a survivable sea-based system capable of engaging the full spectrum of potential targets. It will enhance the U.S. position in strategic arms negotiations by providing a weapon system with performance and payload flexibility that will accommodate various treaty initiatives. TRIDENT II's increased payload allows the deterrent mission to be achieved with fewer submarines.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) The TRIDENT II (D5) development flight test program continued with the launch of Performance Evaluation Missiles from a D5 configured TRIDENT submarine.

b. (U) Major effort was expended on analyses of flight test results and preparation of design documentation.

c. (U) A major underground test was completed for survivability assessment of the missile body, MK5 reentry body, and Department of Energy components.

d. (U) Second sources of MK6 guidance system critical components delivered qualification hardware.

e. (U) Testing was completed of the flight test support system at the Eastern Space and Missile Center and the system now has the capability of tracking both TRIDENT I (C4) and TRIDENT II (D5) missiles.

f. (U) Launcher/missile interface tests at Hunters Point were be completed.

g. (U) A fire control reliability demonstration was successfully conducted in the engineering development test berth at the subsystem contractor's plant.

h. (U) Reliability demonstration testing of new navigation equipments was completed.

i. (U) Final testing of the Strategic Weapon System subsystems installed in the SSBN 734, the first D5 configured TRIDENT submarine, was completed prior to delivery of the SSBN in November of 1988.

j. (U) Weapon system accuracy evaluation gained confidence on the basis of development flight tests and ship installation test program results, and an update of the TRIDENT II weapon system accuracy model was issued that reflects these evaluations.

2. (U) FY 1990 Program:

a. (U) Meet a March 1990 IOC for the TRIDENT II (D5) Strategic Weapon System on OHIO Class SSBN 734.

PROGRAM ELEMENT: 0604363N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT II
PROJECT NUMBER: J0951 PROJECT TITLE: TRIDENT II Missile

b. (U) Major effort will continue to be expended on analysis of development flight test results.

c. (U) Development documentation for all D5 subsystems will be finalized.

d. (U) Deployable software for the fire control subsystem will be finalized.

e. (U) Navigation subsystem performance and availability, during at sea operations, will be validated.

f. (U) D5 weapon system accuracy evaluation will continue.

g. (U) Laboratory installation at the TRIDENT Training Facility will be completed.

h. (U) Evaluate performance of subsystem prime development contractors.

i. (U) Intensified effort for the SLBM Effectiveness Enhancement (SEE) Program.

j. (U) Develop an SLBM Retargeting System (SRS).

3. (U) FY 1991 Plans:

a. (U) TRIDENT II development Training Program efforts will conclude with the completion of contractor led development/curricula.

b. (U) Evaluation of the performance of development contractors will continue.

c. (U) SLBM Effectiveness Enhancement (SEE) effort will continue in order to resolve critical technology issues associated with maintaining and enhancing the effectiveness of TRIDENT II (D5).

d. (U) Effort will intensify to develop an SLBM Retargeting System (SRS).

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Strategic Systems Programs, Washington, DC. CONTRACTORS: Westinghouse Electric Corporation, Sunnyvale, CA; General Electric Company, Ordance Systems, Pittsfield, MA; UNISYS Corp., Shipboard and Ground Systems Group, Great Neck, NY; Charles Stark Draper Laboratory, Cambridge, MA; Lockheed Missiles and Space Company, Sunnyvale, CA; and others.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technical changes: NONE
2. (U) Schedule changes: NONE
3. (U) Cost changes: The additional $21,065 in FY 91 will for used for more effort in the SLBM Effectivess Enhancement (SEE) program.

F. (U) PROGRAM DOCUMENTATION: DCP - 2/87; NAPDD #171-02 (SEE) - 9/87; TEMP - 8/89; OR #196-02-88 (SRS) - 1/88

G. (U) RELATED ACTIVITIES:

1. Program Element 0604363N, Project J1546, TRIDENT II Ship Systems. Identifies necessary subsystem changes to incorporate the TRIDENT II (D5) into

PROGRAM ELEMENT: 0604363N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT II
PROJECT NUMBER: J0951 PROJECT TITLE: TRIDENT II Missile

the TRIDENT Submarine Baseline and develop the necessary weapon support systems and/or components.

2. Program Element 0101221N, Fleet Ballistic Missile System, Project J0091. Developments related to deployed POSEIDON (C3) and TRIDENT I (C4) Strategic Weapon Systems.

3. The Department of Energy is developing and will provide the new high yield to weight warhead for the new MK 5 Ballistic Reentry Body. An Interagency Agreement, effective 18 March 1986, between Navy and the Department of Energy identifies responsibilities with respect to development and production.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Millions)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
WPN LI 3 & 4	1,865.6	1,439.2	1,536.4	CONT.	CONT.
MILCON	15.4	7.6	115.6	CONT.	CONT.

Kings Bay, GA; Bangor, WA

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) TEST AND EVALUATION: This information is contained in the FY 1991 congressional data sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604363N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: TRIDENT II
PROJECT NUMBER: J1546 PROJECT TITLE: TRIDENT II Ship Systems

C. (U) BRIEF DESCRIPTION OF ELEMENT: Project J1546 will identify the necessary subsystem changes to incorporate the TRIDENT II (D5) into the TRIDENT submarine baseline and develop the necessary weapon support systems and/or components. The ninth OHIO Class submarine (SSBN 734) will be the first ship to accommodate the TRIDENT II (D5) missile, and necessary changes were accomplished during initial construction of the submarine. Ship delivery was extended to November 1988, to accommodate the required ship modifications and weapon system installation, but will still support the March 1990 Initial Operational Capability of the TRIDENT II (D5) missile.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Continued development of weapon support system interfaces and components in response to submarine launched Performance Evaluation Missile (PEM) development flight test results.
b. (U) Continued evaluation of weapon and weapon support system operational parameters and installation of equipments.
2. (U) FY 1990 Program: Continue evaluation of weapon and weapon support system operational parameters and installation of equipments.
3. (U) FY 1991 Plans: Complete evaluation of weapon and weapon support system operational parameters and installation of equipments.
4. (U) Program to Completion: Complete necessary modifications.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington, DC. CONTRACTORS: General Dynamics Electric Boat, Groton, CN.

F. (U) RELATED ACTIVITIES: TRIDENT Submarine Systems, Program Element 0101228N/S0004.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
PROGRAM ELEMENT: 0604366N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: STANDARD MISSILE IMPROVEMENTS

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0176	SM Testing	16,632	16,008	0*	0	81,417
S0439	SM Improvement	37,927	39,492	44,734	Cont.	Cont.
TOTAL		54,559	55,500	44,734	Cont.	Cont.

* Beginning in FY 91, funding is reflected in SM Improvement Project S0439

B. (U) DESCRIPTION: This program element provides for engineering development/improvement to current versions of STANDARD Missile to counter evolving threats.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDAFD MISSILE IMPROVEMENTS
Project Number: S0176 Project Title: Standard Missile Testing

A. (U) Resources: (Dollars in Thousands)

PROJECT	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	TO Complete	Total Program
S0176	SM Testing	16,632	16,008	0*	0	81417

* Beginning in FY 91, this effort is funded in SM Improvement Project S0439.

B. (U) DESCRIPTION: This project fabricates and procures test missiles and interface test units. The project is responsible for test planning, performance and analysis of SM Improvements (Project S0439) including support required for missile interfacing and integration into operational and new weapon systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Began transition to SM-2 Block IIIA flight test hardware and assembly of ordnance sections for delivery
2. (U) FY 1990 Program:

3. (U) FY 1991 Plans:
   These efforts will continue under project s0439.

D. (U) WORK PERFORMED BY: IN HOUSE: NWC, China Lake, CA; NWSC Dahlgren, VA; Johns Hopkins University, APL, Laurel, MD. CONTRACTORS: General Dynamics, Pomona, CA; Raytheon Company, Bedford, MA; Motorola GEG, Scottsdale, AZ; Allied Signal, Communications Division, Baltimore, MD; Bendix Communications Division, Baltimore, MD; RCA, Moorestown., NJ.

E. (U) Comparison with Revised FY 1990/1991 President's Budget - See Project S0439.

F. (U) Program documentation - See Project S0439

G. (U) RELATED ACTIVITIES: PE 0603318N (AEGIS ER (SM-2 Block IV)), PE 0604372N (New Threat Upgrade), PE 0604307N (AEGIS Combat System Engineering)

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

Procurement justification material does not contain this level of detail.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: See Project S0439

UNCLASSIFIED

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENTS
Project Number: S0439 Project Title: Standard Missile Improvements

STANDARD MISSILE-2 BLOCK IIIA MODIFICATIONS FROM SM-2 BLOCK III(U)

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MS III BLK/ IIIA-SEP MS IIIA BLK IIIB-APR	Continuing
Engineering Milestones	CDR IIIA NOV	PRDR IIIA FEB	PRDR IIIB NOV	Continuing
T&E Milestones	DT/OT II FOR	SM-1 BLK VIB DT/OT SM-2 BLK III/IIIA	BLK IIIA-WSMR FEB BLK IIIA-SEA APR BLK IIIA-OT JUN BLK IIIB-WSMR	Continuing
Contract Milestones		BLK IIIA PROD.	BLK IIIB O/A PROD.	BLK IIIB PROD.

BUDGET ($K)	FY 1989	FY 1990	FY 1991	To Complete	Total Program
Major Contract	25,565	22,533	27,856	Continuing	Continuing
Support Contract	2,423	5,400	3,500	Continuing	Continuing
In-House Support	9,569	11,059	12,978	Continuing	Continuing
CSS/Other	370	500	400	Continuing	Continuing
Total	37,927	39,492	44,734	Continuing	Continuing

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENTS
Project Number: S0439 Project Title: STANDARD MISSILE IMPROVEMENTS

B. (U) DESCRIPTION:

The improvement program will improve performance against targets. It will be implemented in two phases: Phase I added a fuze altimeter and enabling improved target detection Phase II will add The will improve lethality

SM-1 Block VIB missiles will receive Phase I. SM-2 will receive Phase I (Block III) and be upgraded by Phase II (Block IIIA). The importance of these Block improvements cannot be overemphasized

One of these threats has already inflicted damage on a ship of the U.S. Fleet (USS STARK). Additionally, the missile homing improvements program (MHIP) (SM-2 BLK IIIB) will expand this effort to improve the missile's capability

These improvements are being developed in such a way that current systems in the fleet can be backfitted with this capability. Specific threats for SM-2 Block III/IIIA are identified in the NDCP.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed Block III performance validation.
   b. (U) Completed AEGIS vertical and rail launch performance validation for SM-2 Block IIIA.
   c. (U) Completed MS IIA, IIB, and PDR for Block IIIB.
2. (u) FY 1990 Program:

   c. (U) Conduct LRG audit in March (BLK IIIA).

3. (u) FY 1991 Plans:

   c. (U) Complete documentation of the SM-2 Block IIIA program.

   analysis to support MS III.
   h. (U) Continue engineering efforts to incorporate lessons learned from flight testing.
   i. (U) Complete data analysis of flight testing (BLK IIIA).
4. (U) Program to Completion: This is a continuing program.

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENTS
Project Number: S0439 Project Title: STANDARD MISSILE IMPROVEMENTS

D. (U) WORK PERFORMED BY: IN HOUSE: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; Naval Weapons Center, China Lake, CA; Naval Surface Warfare Center, Dahlgren, VA. CONTRACTORS: General Dynamics, Pomona, CA; Raytheon Company, Bedford, MA; Motorola, Scottsdale, AZ; Allied Signal, Communications Division, Baltimore, MD; RCA, Moorestown, NJ.

E. (U) COMPARISON WITH REVISED FY1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: Block IIIA at-sea DT/OT delayed to FY 91 to achieve requisite fuze design maturity/production.
3. (U) COST CHANGES: Commencing in FY 91, Project S0176 budget has been combined with Project S0439; this net of +6405 also reflects a reduction of -5100 for inhouse support.

F. (U) PROGRAM DOCUMENTATION:

AP 408-85 Amendment 2 TAB approved 6 Jun 86
PEM signed 7 Oct 85
J&A approved 28 Mar 86
PMP 85-02 approved 23 May 86
TEMP 623-1 approved Jun 89
NCDP approved 10 May 88

G. (U) RELATED ACTIVITIES: Program Element 0603318N (AEGIS ER) supports development of SM-2 Block IV. The ordnance section being developed in this program element for SM-2 Block IIIA is to be provided as GFE to Raytheon as part of PE 0603318N.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

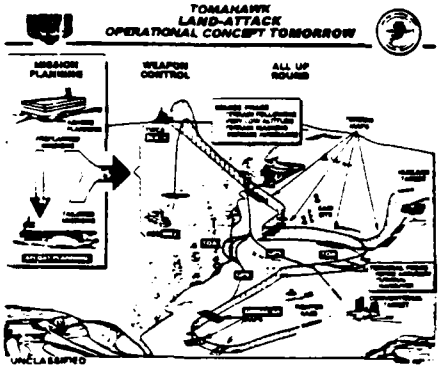
	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(WPN)Funding	This level of detail is not available				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604367N
Program Element Title: TOMAHAWK
Budget Activity: 4
Project Number: W1784 Project Title: THEATER MISSION PLANNING



POPULAR NAME: Theater Mission Planning Center (TMPC)/ Afloat Planning System (APS)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS 2 ISPS		MS 3A/3B APS MS 3 ISPS & TMPCU
Engineering Milestones	TMPC CDR	Des. Rev. APS and TMPCU		IOC APS IOC ISPS, TMPCU
T&E Milestones	DTIII/OTIII TMPC		DT/OTIIA & OPEVAL TMPCU	DT/OT ISPS DT/OT APS OPEVAL APS
Contract Milestones	TMPCU APS	TMPCU APS ISPS	TMPCU APS ISPS	TMPCU APS ISPS

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(23,318)*	16,013	12,775	Continuing
Support Contract	0	0	0	0
In-House Support	(1,323)	2,130	2,578	Continuing
GFE/Other	0	0	0	0
Total	(24,641)*	18,143	15,353	Continuing Continuing

Note: ISPS means Integrated Strike Planning System.
*TMPC in FY 89 was funded in P.E. 0604707N. APS in FY 89 was funded in Project P.E. 0604367N

Program Element: 0604367N Budget Activity: 4
Program Element Title: TOMAHAWK
Project Number: W1784 Project Title: THEATER MISSION PLANNING

B. (U) DESCRIPTION: The Tomahawk Theater Mission Planning Center (TMPC) Upgrade ashore and Afloat Planning System (APS) provide data base generation and processing, flight mission data, command and control information preparation, and distribution for nuclear and conventional land attack missiles (TLAM). The TMPC Upgrade project designs and develops software to decrease mission planning time in response to contingency requirements, improve the production of mission data for distribution and provide automated command and control information for employment and strike planning. APS utilizes the TMPC Upgrade's software on down-sized computer hardware for use in Navy flagships. This improves battle-group tactical flexibility and responsiveness while maximizing Tomahawk Weapon Systems (TWS) wartime capability. ISPS allows cruise missile, guns, and manned aircraft strike and anti-surface warfare planning to be accomplished in a consolidated system to improve overall effectiveness and efficiency. These systems will be compatible with the Navy Command and Control Systems (NCCS), TMPC ashore and the TWS.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: (From P.E. 0604707N)
   a. (U) Completed TMPC Tech base.
   b. (U) Continued TMPC Upgrade program and APS.

2. (U) FY 1990 Program:
   a. (U) Continue TMPC Upgrade and APS program development.
   b. (U) Commence ISPS development.

3. (U) FY 1991 Plans:
   a. (U) Continue TMPCU Upgrade program development.
   b. (U) Continue APS development and install EDM units.
   c. (U) Continue development of ISPS.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Weapons Center, Dahlgren, VA; Naval Ship Weapon System Engineering Station, Port Hueneme, CA; Naval Avionics Center, Indianapolis, IN; Naval Electronic Systems Engineering Activity Detachment (NESEA Det), Philadelphia, PA; CINCPAC, Camp Smith, HI. CONTRACTORS: McDonnell Douglas Missile System Company, St. Louis, MO; Tiburon Systems Inc., San Jose, CA; Science Application Inc., Arlington, VA; Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; General Dynamics Electronics , San Diego, CA.

Program Element: 0604367N Budget Activity: 4
Program Element Title: TOMAHAWK
Project Number: W1784 Project Title: THEATER MISSION PLANNING

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) ENGINEERING CHANGES: None

2. (U) SCHEDULE CHANGES: IOC delayed to FY 1992 owing to unexpected difficulty in software conversion.

3. (U) COST CHANGES: FY 1991 program reduced $3,483 based on schedule slip. Similar amount added back in FY 1992.

F. (U) PROGRAM DOCUMENTATION:

	TOR	DOP	OR	NDCP	TEMP
TMPC Baseline	N/A	N/A	N/A	8/83	8/87
TMPC Upgrade	N/A	N/A	N/A	8/88	12/88
APS	6/86	9/87	N/A	7/88	12/88
ISPS	7/87	7/88	10/88	-	-

G. (U) RELATED ACTIVITIES:
PE 0204229N (Surface Combined ORD/MISSL, TOMAHAWK)
PE 0604370N (SSN-688 Class VLS)

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

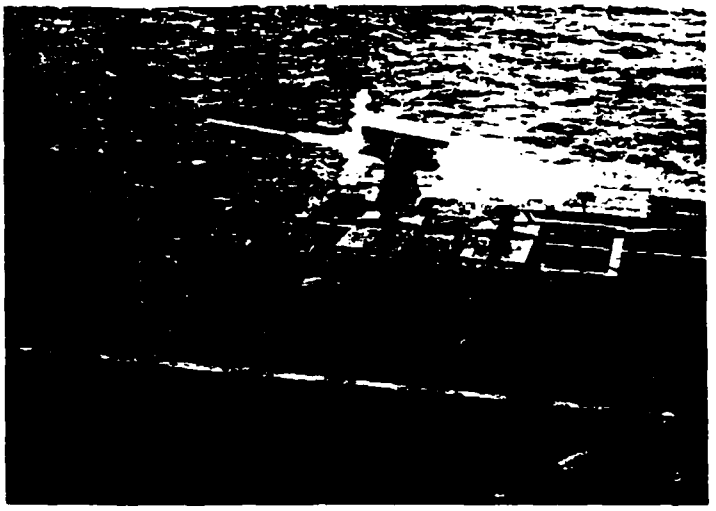
APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
WPN/# 6, 7, 28	[Procurement justification material does not contain this level of detail.]			
OPN/# 224, # 225				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604369N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: 5" ROLLING AIRFRAME MISSILE
PROJECT NUMBER: S0167 PROJECT TITLE: RAM EX-31 GUIDED MISSILE WEAPON SYSTEM



POPULAR NAME: RAM

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in thousands)

SCHEDULE	FY1989	FY1990	FY1991	TO COMPLETE
PROGRAM MILESTONES		MS IIIB 6/90		
ENGINEERING MILESTONES		FUZE UPGRADE CDR 2/90	IR SEEKER UPGRADE: BEGIN EDM FAB 4/91	
T&E MILESTONES		DT-IIE/OT IIC - 5/90		FUZE FOT&E - 8/92 SEEKER FOT&E - 6/94
CONTRACT MILESTONES	1ST LTD PROD CONTRACTS: 6/89 (GMRP) 9/89 (GMLS)	DUAL SOURCE COMPETITION (GMRP) 7/90	DUAL SOURCE COMP (GMRP), FULL PROD (GMLS) 3/91	ANNUAL DUAL SOURCE COMPETITION (GMRP)

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
MAJOR CONTRACT	854	2,134	1,611	Cont.
SUPPORT CONTRACT	2,271	550	550	Cont.
IN-HOUSE SUPPORT	4,160	2,436	789	Cont.
GFE/OTHER				
TOTAL	7,285	5,120	2,950	Cont.

PROGRAM ELEMENT: 0604369N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: 5" ROLLING AIRFRAME MISSILE
PROJECT NUMBER: S0167 PROJECT TITLE: RAM EX-31 GUIDED MISSILE WEAPON SYSTEM

B. (U) DESCRIPTION: The purpose of this program is to develop a surface-to-air self-defense system utilizing a dual mode, passive Radio Frequency/Infrared 5" Rolling Airframe Missile. The baseline system will provide a self-defense capability against incoming active radar guided anti-ship missiles and is being developed on an equal cost share basis with the Government of the Federal Republic of Germany. This system will complement existing point defense systems and provide the fleet with a high firepower system capable of engaging the growing and changing anti-ship missile threat.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS
   a.(U) Initiated TECHEVAL.
   b.(U) Continued Guided Missile Launcher System computer software testing and validation.
   c.(U) Continued low altitude fuze efforts.
   d.(U) Continued Guided Missile Launcher System development.
   e.(U) Continued testing and validation of TAS MK 23 tactical computer programs.
   f.(U) Initiated corrective actions indicated by previous technical and operational testing.
   g.(U) Initiated study on RAM utilization of CIWS (PHALANX) radar information.
   h.(U) Initiated study for design of IR Mode Upgrade to encounter passive targets.

2. (U) FY 1990 PROGRAM:
   a.(U) Complete TECHEVAL. Conduct OPEVAL.
   b.(U) Successful OPEVAL will support attainment of Milestone IIIB, Approval for Full Production in FY 1990 followed by Initial Operational Capability (IOC).
   c.(U) Continue low altitude fuze efforts.
   d.(U) Initiate feasibility/predesign of Block I Upgrade Program, including threat definition, guidance design evaluation, ship system evaluation, launcher modifications and simulation preparation.

3. (U) FY 1991 PLANS:
   a.(U) Initiate design/development of Block I Upgrade Program.
   b.(U) Initiate design for RAM launch from MK13 Launcher.
   c.(U) Continue low altitude fuze efforts.

PROGRAM ELEMENT: 0604369N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: 5" ROLLING AIRFRAME MISSILE
PROJECT NUMBER: S0167 PROJECT TITLE: RAM EX-31 GUIDED MISSILE WEAPON SYSTEM

4. (U) PROGRAM TO COMPLETION:
   a.(U) Continue design development of Block I Upgrade Program.
      1) (U) Specification completion
      2) (U) Detailed design
      3) (U) Fabricate engineering models
      4) (U) Simulation/EM Testing
      5) (U) Critical experiments
   b.(U) Continue design proofing of Block I Upgrade Program
      1) (U) Build pilot production Guided Missile Round Pack.
      2) (U) GMLS mods
      3) (U) TE Mods
      4) (U) System Tests
      5) (U) Flight tests
   c.(U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA (Acquisition Engineering Agent). Naval Surface Warfare Center, Dahlgren,VA; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Naval Ordnance Missile Test Facility, White Sands, NM; Fleet Analysis Center, Corona, CA; Naval Weapons Handling Center, Colts Neck, NJ; Pacific Missile Test Center, Point Mugu, CA. PRIME CONTRACTOR - General Dynamics Corp., Ontario, CA. OTHERS: RAMSystem, Ottobrunn, FRG; Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; EG&G, Washington Analytical Services Center, Rockville, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:

OR: 5/75
PSED MOU: 3/79
NDCP: 2/89
ILSP: 1/85
TEMP: 1/90
AP: 8/87
PRODUCTION MOU: 8/87

G. (U) RELATED ACTIVITIES: Program Element 64361N, (NATO SEASPARROW), for the NATO Seasparrow/RAM ORDALT; Program Element 63609N, (Conventional Munitions), for fuze, guidance, and target detector improvements.

PROGRAM ELEMENT: 0604369N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: 5" ROLLING AIRFRAME MISSILE
PROJECT NUMBER: S0167 PROJECT TITLE: RAM EX-31 GUIDED MISSILE WEAPON SYSTEM

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	TO COMPLETE	TOTAL PROGRAM
(U) WPN 302242 Missiles	51,802	90,191	70,383	508,693	843,000
(U) Procurement Quantity	(260)	(580)	(405)	(3,415)	(4,900)
(U) OPN (GMLS)	22,152	32,384	9,672	359,040	443,228
(U) Procurement Quantity	(4)	(6)	(2)	(71)	(85)
(U) Nunn Funding	1,200	5,000	0	0	10,000

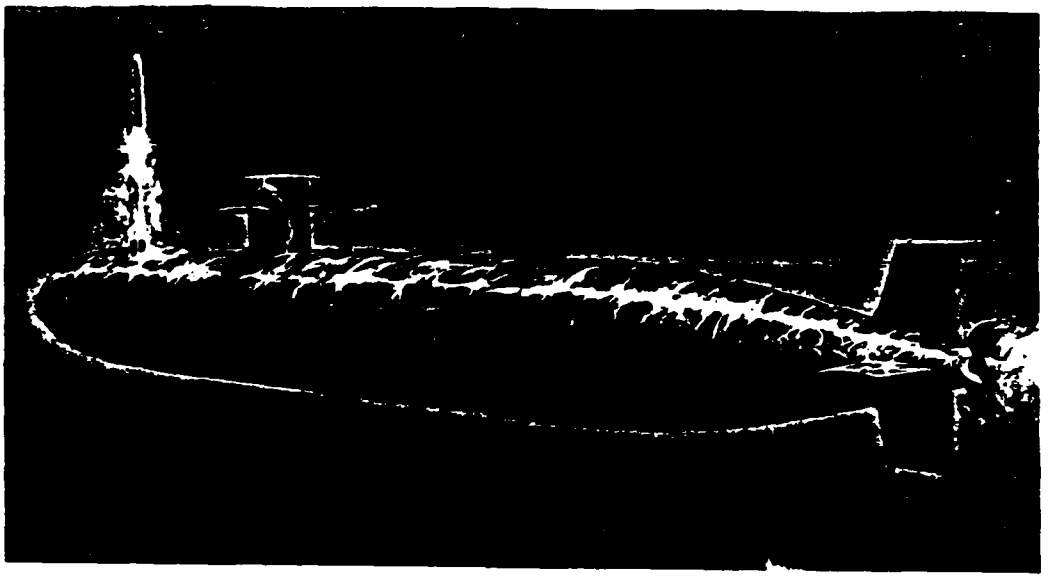
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

(U) On 17 October 1986, OUSD (IP & T) provided ASN (RE & S) authority to conclude negotiations on a cooperative production MOU with the Federal Republic of Germany (GE) as a follow on to earlier jointly executed MOUs for Advanced Development in 1977 (U.S. and GE) and Full-Scale Engineering Development in 1979 (U.S., GE, and the Kingdom of Denmark). The production MOU was approved and signed by both countries on 3 August 1987. The MOU requires dual-source production of the Guided Missile Round Pack, coproduction of the Guided Missile Launching System and sharing of follow developments. After qualification of both sources, a U.S. prime contractor (General Dynamics/Valley Systems Division) and a GE follower (RAMSystem GmbH) will compete in 1990 for combined annual U.S. and GE missile requirements. GD/VSD and GE industry have formed a joint venture, TRANSLANT, to produce the launcher, with GE industry performing over half of the fabrication effort. Both countries will share joint costs, either pro rata or equally.

J. (U) TEST AND EVALUATION: This information is provided in FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604370N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SSN 688 Class Vertical Launch System
PROJECT NUMBER: S1500 PROJECT TITLE: SSN 688 Class VLS



POPULAR NAME: SSN 688 CLASS VLS

A. (u) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 89	FY 90	FY 91	TO COMPLETE
PROGRAM MILESTONES	IOC-11/89 IIID-TASM/ TLAM-C			
ENGINEERING MILESTONES				FULL SHOCK CAPABILITY 3Q/92
T&E MILESTONES	OT-IIB 5/89 OT-IIIA 7/89	DT-III 9/90	OT-IIIB 12/90	OT-IIIC 2Q/92
CONTRACT MILESTONES	DESIGN & INTEGRATION 12/88			
BUDGET ($K)	FY 89	FY 90	FY 91	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	10,313	3,244	6,522	227,731 4,300
SUPPORT CONTRACT	396	500	500	6,402 500
IN-HOUSE SUPPORT	2,787	4,970	5,617	50,287 5,413
GFE/OTHER	0	0	0	0
TOTAL	13,496	8,714	12,639	284,420 10,213

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604370N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SSN 688 Class Vertical Launch System
PROJECT NUMBER: S1500 PROJECT TITLE: SSN 688 Class VLS

B. (U) DESCRIPTION: This program will provide SSN 719 and follow-on submarines of the SSN 688 Class with increased firepower by providing the capability to stow and launch twelve TOMAHAWK Cruise Missiles from vertical tubes in the forward main ballast tank area of the submarine. This capability will greatly enhance the Navy's ability to counter the increasingly large Soviet surface naval forces as well as add to the United States' total capability for land attack.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Completed OPEVAL for TASM and TLAM-C weapons.

b. (U) Prepared of missiles and support systems for conduct of missile/capsule TLAM-N (Tomahawk land attack-nuclear) FOT&E in FY 1990.

c. (U) Developed and incorporated ship, fire control,and CLS changes to correct both operational test and fleet usage identified problems.

d. (U) Conducted land based testing on a bare missile to evaluate impact of the AN/BSY-1 Acoustic Set.

2. (U) FY 1990 Program:

a. (U) Conduct at sea sonar impingement testing with AN/BSY-1 Acoustic Set.

b. (U) Support AN/BSY-1 TECH/OPEVAL by accomplishment of VLS integration testing and vertical missile launch support.

c. (U) Evaluate VLS system modifications and improvements.

d. (U) Develop CCS targeting upgrade to improve engagement planning.

e. (U) Conduct FOT&E for TLAM-N.

f. (U) Conduct Logistics Evaluation Exercise for TLAM-N.

g. (U) Support CCS Mk1 Mod3 with computer program C4.2 TECH/OPEVAL by accomplishment of VLS integration testing and vertical missile launch support.

3. (U) FY 1991 Plans:

a. (U) Continue development of CCS targeting upgrade.

b. (U) Conduct Preliminary Operational Safety Study for CCS Mk1 TLAM-N.

c. (U) Conduct Special Safety Study for AN/BSY-1 TLAM-N.

d. (U) Correct OPEVAL deficiencies.

e. (U) Develop and plan testing for system modif cations to provide full shock capability.

f. (U) Define VLS system improvements and performance modifications.

g. (U) Develop OT&E test plans for OPEVAL corrections and system upgrades.

PROGRAM ELEMENT: 0604370N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SSN 688 Class Vertical Launch System
PROJECT NUMBER: S1500 PROJECT TITLE: SSN 688 Class VLS

4. (U) Program to Completion:
   a. (U) Complete CCS targeting upgrade.
   b. (U) Complete component development and testing for shock capability.
   c. (U) Conduct FOT&E efforts to validate OPEVAL corrections and system upgrades.
   d. (U) Complete development of VLS system performance modifications.
   e. (U) Complete program milestones and conclude RDT&E efforts for baseline Tomahawk VLS.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Pacific Missile Test Center, Point Mugu, CA; Naval Surface Warfare Center, Dahlgren, VA; and Naval Air Test Center, Patuxent River, MD. CONTRACTORS: Westinghouse Electric, Sunnyvale, CA; McDonnell Douglas, St. Louis, MO; General Dynamics/Electric Boat Division, Groton CT; General Dynamics/Convair, San Diego, CA; Singer Librascope, Glendale, CA; and Raytheon, Portsmouth, RI.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
   1. (U) Technical changes: None.
   2. (U) Schedule changes: None.
   3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION: Program Management Proposal - Approved 11/88; Test and Evaluation Master Plan (Rev 2) - Approved 6/88.

G. (U) RELATED ACTIVITIES: PE 0604367N, Tomahawk Missile System, and 0604524N and 0604562N, Submarine Combat Control Systems Programs.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT OPN (24284N) VLS SUPPORT EQUIPMENT (232)	7,259	9,449	5,993	11,392	50,268

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION: This information is contained in the FY 1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604372N Budget Activity: 4
Program Element Title: New Threat Upgrade

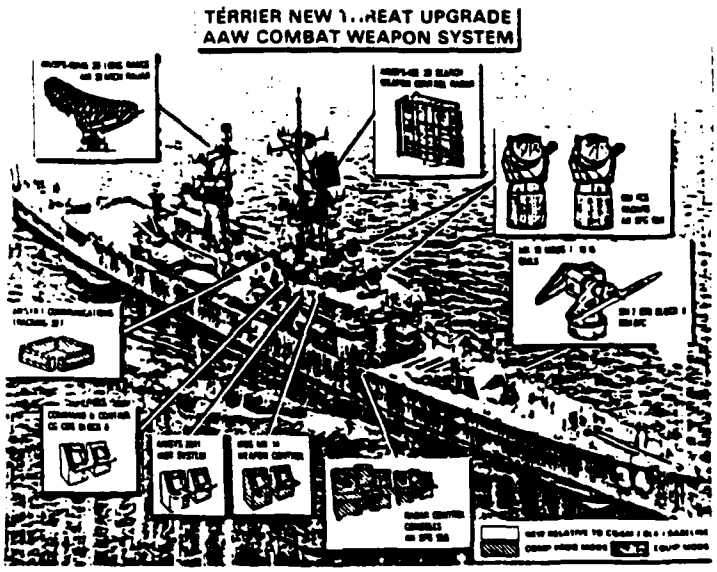
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0188	TERRIER SM-2/NTU	7,636	2,770	6,575	Cont.	Cont.
S0964	TARTAR SM-2/NTU	3,152	4,424	5,868	Cont.	Cont.
TOTAL		10,788	7,194	12,443	Cont.	Cont.

B. (U) DESCRIPTION: This program element develops shipboard weapon engagement system improvements needed to counter current and projected anti-ship cruise missile threats at extended ranges. The New Threat Upgrade (NTU) program is applicable to a total of 30 TERRIER and TARTAR guided missile cruisers and destroyers. The SM-2 Block 1 modification is a prerequisite for the follow-on NTU/SM-2 Block II modification to TERRIER/TARTAR ships. Significant improvements include modifications to weapons direction systems (WDS), guided missile fire control systems (GMFCS), guided missile launching system (GMLS), and communications tracking sets (CTS) in various ship classes.

FY 1991 NAVY DESCRIPTIVE SUMMARY

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0188 Project Title: TERRIER SM-2/NTU



A. (u) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				
Engineering Milestones				
T&E Milestones				
Contract Milestones		Phase 1	Phase 2/3	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	To Complete	Program Total
Major Contract	3,905	1,606	5,050	Continuing	Continuing
Support Contract	2,000	1,000	1,000	Continuing	Continuing
In-House Support	1,731	164	525	Continuing	Continuing
GFE/ Other					
TOTAL	7,636	2,770	6,575	Continuing	Continuing

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0188 Project Title: TERRIER SM-2/NTU

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops modifications required to provide NTU TERRIER Weapon Engagement System in 19 ships (CG 16/26 and CGN 9 Classes) the capability to engage emerging threats with STANDARD extended range missiles (SM-1(ER) Blk V; SM-2(ER) Blk II/III).

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 Accomplishments:
   a. (u) Continued Phase I development efforts.
   b. (U) Continued design/development of modifications to fully exploit Blk III round capabilities, correct deficiencies from testing and lessons learned during fleet operations.
2. (U) FY 1990 Program:
   a. (u) Complete design/development of Phase I.
   b. (U) Continue design/development of modifications to fully exploit Blk III capabilities, correct deficiencies from testing and lessons learned during fleet operations.
3. (U) FY 1991 Plans:
   a. (U) Continue design/development of modifications to fully exploit Blk III capabilities, correct deficiencies from testing and lessons learned during fleet operations.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Fleet Combat Directions Systems Support Activity, Dam Neck, VA; Naval Surface Warfare Center, Dahlgren, VA; Naval Ship Weapon Systems Engineering Station, Pt. Hueneme, CA. CONTRACTORS: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; Vitro Corporation, Silver Spring, MD; Raytheon, Wayland, MA; Unisys Corp. Great Neck, NY; General Dynamics, Pomona, CA; FMC Northern Ordnance, Minneapolis, MN; E-Systems, ECI Division, St. Petersburg, FL; Republic Electronics, Hauppauge, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. Technical Changes: NA
2. Schedule Changes: NA
3. Cost Changes: NA

F. (U) PROGRAM DOCUMENTATION

TEMP 547	APR 87	Integrated Logistic	NOV 82
NDCP	FEB 81	Support Plan (0558-40)	
Navy Training Plan (Engagement System)	MAY 86	Integrated Logistic Support Plan (084-4/5)	AUG 83

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0188 Project Title: TERRIER SM-2/NTU

G. (U) RELATED ACTIVITIES: Program Element 064366N (Standard Missile Improvements) supports development of Standard Missile-2 Block II/III improvements.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

OPN #225(523200) TERRIER SUPPORT EQUIPMENT (includes TERRIER CG/SM-2, TERRIER New Threat Upgrade and Post-NTU improvements)

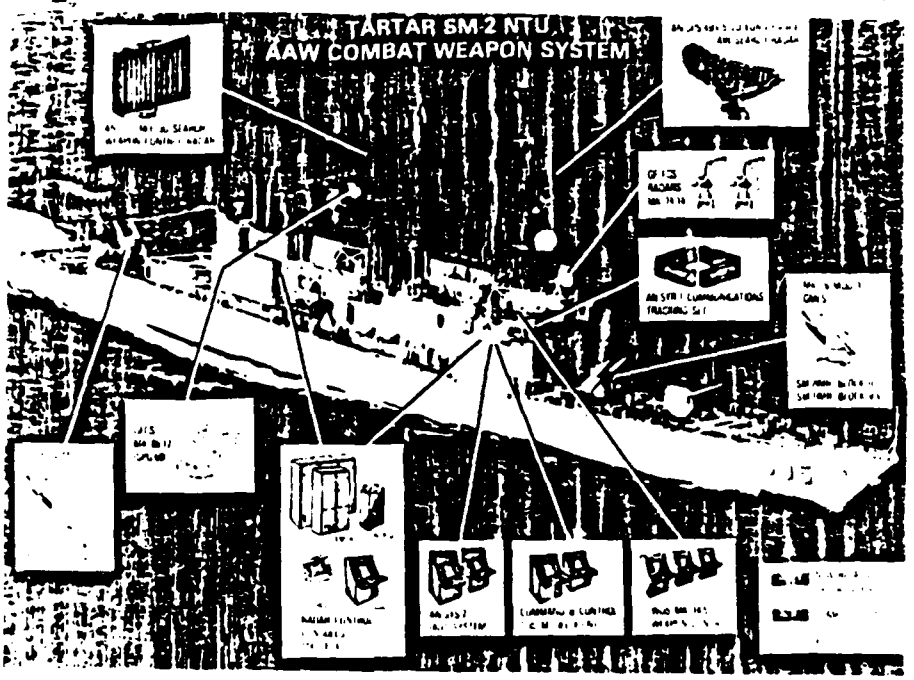
	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN	36,003	25,537	15,113	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0964 Project Title: TARTAR SM-2/NTU



A. (C) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				
Engineering Milestones	WDS CDR			
T&E Milestones	OT-IIIB	DT-IIIE	DT-IIIF	
Contract Milestones				

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total
Major Contract	3,000	3,043	4,066	Continuing
Support Contract				Continuing
In-House Support	152	1,381	1,802	Continuing
GFE/ Other				
TOTAL	3,152	4,424	5,868	Continuing

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0964 Project Title: TARTAR SM-2/NTU

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops SM-2 Block I compatibility modifications to increase engagement system capability

The TARTAR CGN/New Threat Upgrade engagement system will further increase range to meet an evolving threat by incorporating the STANDARD Missile-2 Block II and the New Threat Upgrade detection system. This effort includes a continuation of development and adaptation of baseline CGN/SM-2 and New Threat Upgrade (NTU) computer programs and related systems documentation for integration into the combat systems in TARTAR ships. The modifications also incorporate changes and provide additional track processing by using continuous wave acquisition and tracking to improve performance in defeating high altitude, supersonic, steep dive angle anti-ship cruise missiles The TARTAR CGN/SM-2 and CG/New Threat Upgrade Improvements are scheduled for 10 TARTAR guided missiles cruisers and destroyers (CGN 36-41 and DDG 993-996). This project supports SM-2 Block III/IIIA compatibility modifications

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 Accomplishments:
   a. (U) Continued DT/OT IIIC Testing of CGN/NTU USS SCOTT.
   b. (U) Initiated efforts in developing modifications to correct deficiencies identified in CGN DT/OT IIIC in USS SCOTT (DDG 995).
   c. (U) Continued engineering design/development of modifications to the TARTAR weapon systems to provide improved performance and to provide compatibility with the SM-2 Block III Missile.
2. (U) FY 1990 Program:
   a. (U) Completed DT/OT IIIC Testing of CGN/NTU USS SCOTT.
   b. (U) Initiate contractor Integration Tests and DT-IIIE landbased testing of TARTAR weapon system (CGN 36/NTU), and provides compatibility with the SM-2 Block III Missile.
   c. (U) Complete development of modifications to correct deficiencies identified in CGN DT/OT-IIIC in USS SCOTT (DDG995).
3. (U) FY 1991 Plans:
   a. (U) Complete DT-IIIE testing at landbased site and conduct combat system integration testing of the CGN 36/NTU combat system.
   b. (U) Initiate DT-IIIF/OT IID testing of the CGN 36/NTU combat system in USS CALIFORNIA (CGN 36).
4. (U) Program to Completion: This is a continuing program.

Program Element: 0604372N Budget Activity:4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0964 Project Title: TARTAR SM-2/NTU

D. (U) WORK PERFORMED BY: IN-HOUSE: Fleet Combat Directions Systems Support Activity, Dam Neck, VA; Naval Surface Warfare Center, Dahlgren, VA; Naval Ship Weapon Systems Engineering Station, Pt. Hueneme, CA. CONTRACTORS: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; Vitro Corporation, Silver Spring, MD; Raytheon, Wayland, MA; Unisys Corp. Great Neck, NY; General Dynamics, Pomona, CA; FMC Northern Ordnance, Minneapolis, MN; E-Systems, ECI Division, St. Petersburg, FL; Republic Electronics, Hauppauge, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

TEMP 731	FEB 88
Navy Training Plan (Engagement System)	MAY 88
Integrated Logistic Support Plan (084-4/5)	AUG 88
Integrated Logistic Support Plan (0558-40)	NOV 88
NDCP	FEB 81

G. (U) RELATED ACTIVITIES: PE 0604366N (Standard Missile Improvements), PE 0603382N (Battle Group AAW Coordination), and PE 0204229Q (SM-2 (ER) and SM-2 (MR)).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program

Not Applicable. (Includes fleet support ORDALTS for all TARTAR Fire Control Systems and all non-VLS AEGIS associated with TARTAR SM-2 and TARTAR NTU).

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604502N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Communications

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0742	Submarine Integrated Antenna System	3,448	6,463	9,733	CONT.	CONT.
S1411	Attack Submarine Integrated Communications	297	700	1,684	CONT.	CONT.
TOTAL		3,745	7,163	11,417	CONT.	CONT.

B. (U) DESCRIPTION: The Submarine Integrated Antenna Systems project develops the antennas needed to communicate in new networks such as Ultra High Frequency Satellite Communications, Extremely Low Frequency, Extremely High Frequency, and NAVSTAR Global Positioning System, and allows submarines to use these new communication networks as they are developed. Hardware developments include: (a) mast/periscope mounted systems; (b) floating wire systems; (c) expendable buoy systems, and (d) antenna signal distribution systems. The objectives of the Attack Submarine Tactical Communications program is to provide to SSN-21 SEAWOLF a communications suite which (a) minimizes time required at communications depth, (b) enhances operability, reducing errors and manpower requirements, and (c) provides flexibility for low impact growth and change throughout the life of the submarine. SEAWOLF design efforts will provide adequate time frequency distribution, antenna signal distribution, a central automatic interconnection sub-system and a message processing subsystem. Pre-SEAWOLF efforts include existing attack class submarine communications equipment redesign to provide required upgrades to correct known time-frequency, antenna and internal signal distribution deficiencies and to provide a message processing subsystem.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604502N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Communications
PROJECT NUMBER: S0742 PROJECT TITLE: Submarine Integrated Antenna Systems

C. (U) DESCRIPTION: The purpose of this project is to provide submarines with antenna systems designed to (a) permit greater operational flexibility through improved speed/depth performance; (b) improve reliability and availability; and (c) be compatible with existing and emerging communications systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Started development of the Arctic Buoy.
   b. (U) Completed analysis of two-way tethered buoy technology.
   c. (U) Completed modeling of the Towed Buoy Antenna System.
   d. (U) Issued contract for improved AN/BRA-34.
2. (U) FY 1990 Program:
   a. (U) Start development of a high speed floating wire antenna.
   b. (U) Determine EMP requirements for SSBN mast-mounted antennas.
   c. (U) Issue contract for AN/BST-1 improvements.
   d. (U) Continue development of the improved AN/BRA-34.
   e. (U) Start development of the EHF antenna.
   f. (U) Develop high lift auxiliary antenna for towed buoys.
3. (U) FY 1991 Plans:
   a. (U) Issue contracts for EHF antenna and Arctic Bouy EDM.
   b. (U) Complete development of AN/BST-1 improvements.
   c. (U) Continue development of the high speed floating wire.
   d. (U) Continue development of the improved AN/BRA-34.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Underwater Systems Center, New London, CT. CONTRACTORS: Spears Associates, Inc., Norwood, MA; Hazeltine Corporation, Braintree, MA; Granite State Machine Co., Manchester, NH., Bravo Co., Fullerton CA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN #137 (3130)	4,765	9,539	9,741	CONT.	CONT.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NONE

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604502N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Communications
PROJECT NUMBER: S1411 PROJECT TITLE: Attack Submarine Integrated Communications

C. (U) DESCRIPTION: The purpose of the attack submarine communication system is to provide attack submarines with communications systems designed to (a) enhance data throughput; (b) copy tactical data networks such as TADIXS (Tactical Data Information Exchange System); (c) be interoperable with other U.S. and Allied military networks; and (d) improve reliability and availability. This can be accomplished by providing the attack submarine with a properly integrated mix of Navy standard communications equipment covering a wide range of frequencies.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Evaluated Antenna Distribution Subsystem candidates.
b. (U) Developed specification for Message Processing System.
c. (U) Identified alternative Interconnection Subsystem candidates for SSN 688 Class.
2. (U) FY 1990 Program:
a. (U) Develop specification for SSN 688 Class Interconnection Subsystem.
b. (U) Develop concept for radio room miniaturization & volume recovery.
c. (U) Conduct SSN 688 communication problems survey.
3. (U) FY 1991 Plans:
a. (U) Conduct concept evaluation of Programmable Tactical Data Interface.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Underwater Systems Center, New London, CT (Lead Laboratory); Naval Ocean Systems Center, San Diego, CA; and Naval Electronic Systems Command Systems Security Engineering Center, Washington, DC. CONTRACTORS: Submarine Signal Division, Portsmouth, RI; Rockwell International, Anaheim, Ca; Magnavox, Philadelphia, PA; AVW, Inglewood, CA; Delta Electronics, Alexandria, VA; ECI, St. Petersburg, FL.

F. (U) RELATED ACTIVITIES: None

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN #137 (3130)	4,765	9,539	9,741	CONT.	CONT.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE POSITION

PROGRAM ELEMENT: 0604503N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Sonar Improvements (Engineering)
PROJECT NUMBER: 30219 PROJECT TITLE: Submarine Sonar Improvements

AN/BQQ-5E(V)3, (SSN)

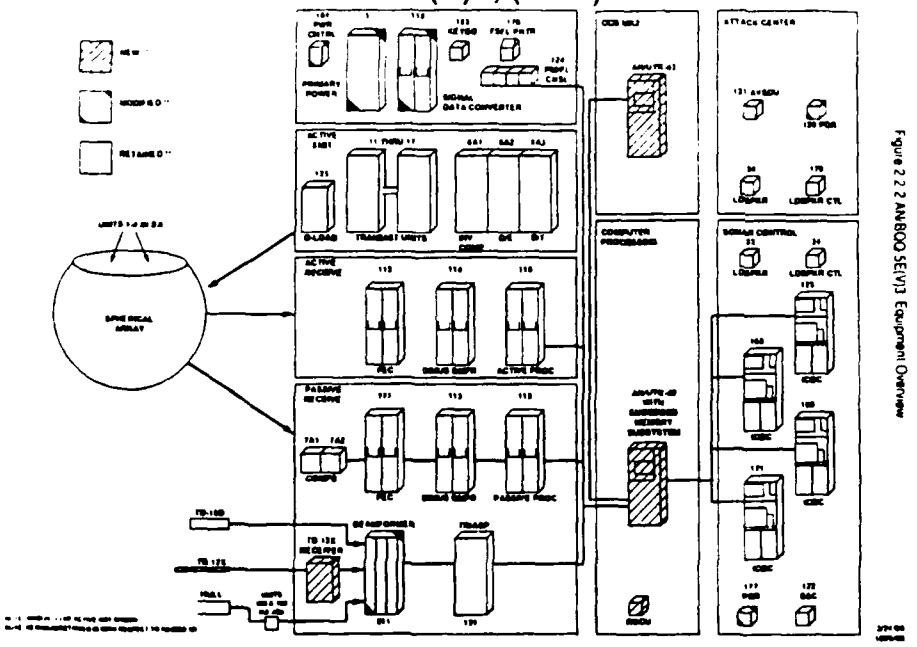


Figure 2.2.2 AN/BQQ-5E(V)3 Equipment Overview

POPULAR NAME: Submarine Sonar System (Engineering)

A. (U) SCHEDULE/BUDGET INFORMATION:(Dollars in Thousands)

SCHEDULE		FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	Q-5D	III 6/89			
	Q-5E	II 11/88	IIIA 12/89	IIIB 11/90	IIIC 1Q/92
	BQS-24		II 8/90		
Engineering Milestones	Q-5E		Final H/W Spec 1Q/90		SDCT 2Q/92
	TB-12x Array	Final Specifications 3Q/89			
T&E Milestones	TB-12x Array		SEA TEST 1Q/90	SEA TEST 1Q/91	TECHEVAL 1Q/93 OPEVAL 2Q/93
Contract Milestones	Q-5E	Award FSD 1Q89			
	TB-12x		Award FSD 2Q/90		
	BQS-24			Award FSD 1Q/91	

BUDGET (SK)	FY 1989	FY 1990	FY 1991	Program Total
Major Contract	12,521	15,387	28,001	CONT.
Support Contract	1,840	1,000	1,500	CONT.
In-House Support	21,779	10,013	12,855	CONT.
GFE/Other	0	0	0	0
Total	36,140	26,400	42,356	CONT.

FY 1991 RDT&E, NAVY DESCRIPTIVE POSITION

PROGRAM ELEMENT: 0604503N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Sonar Improvements (Engineering)
PROJECT NUMBER: S0219 PROJECT TITLE: Submarine Sonar Improvements

B. (U) DESCRIPTION: The future operating environment and mission requirements of the submarine force will increase the demands on acoustic detection, localization, and tracking in Antisubmarine Warfare (ASW), Antisurface Warfare (ASUW), Barrier, Escort and other mission areas. These requirements have necessitated developing improvements to acoustic processing, and sensor integration. This program delivers these block updates to the submarine sonar systems onboard SSN 688, and TRIDENT class submarines. These improvements are vital to counter the threat of advanced classes of enemy submarines. The threat possesses significantly reduced radiated noise levels and improved sonar detection capabliity. Each hardware and software update is embodied in a block change package, such that the Combat System as a whole can capitalize on synergism of the individual improvements. The AN/BQQ-5D with the TB-23 Thin Line Array will provide significant improvement in detection, classification, localization and tracking. The AN/BQQ-5(E) with TB-12X array will provide a quantum improvement in long range detection, localization, and significantly enhance the defensive capability of TRIDENT SSBN's. Future improvements will address the integration of Low Frequency Active (LFA) ICDC Improvement with color display, and dual towed array processing. The AN/BQS-24 will significantly improve the minehunting and under ice navigation capabilities of SSN 688 and TRIDENT class submarines.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Received MII approval for AN/BQQ-5(E) FSD.
   b. (U) Continued TB-12X development.
   c. (U) Started upgrade of acoustic measurement equipment.
   d. (U) Completed TECH/OPEVAL for AN/BQQ-5D system.
   e. (U) Finalized BQS-24 specifications.
   f. (U) Received MIII approval for AN/BQQ-5D system.
2. (U) FY 1990 Program:
   a. (U) Continue development of AN/BQQ-5(E). MSIIIA approval.
   b. (U) Continue upgrade of acoustic measurement equipment.
   c. (U) Start development of AN/BQS-24.
   d. (U) Award FSD Contract for TB-12X Array.
3. (U) FY 1991 Plans:
   a. (U) Continue developments of AN/BQQ-5(E). MSIIIB approval.
   b. (U) Award FSD Contract for AN/BQS-24.
   c. (U) Continue TB-12X array development. MSIIIA approval.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NAVSEASYSCOM, Washington, DC; NUSC, New London, CT; Naval Weapons Support Center, Crane, IN; COMOPTEVFOR, Norfolk, VA; and NOSC, San Diego, CA. Contractors: International Business Machines Corp.,

PROGRAM ELEMENT: 0604503N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Sonar Improvements (Engineering)
PROJECT NUMBER: S0219 PROJECT TITLE: Submarine Sonar Improvements

Systems Integration Division, Manassas, VA; Martin Marietta, Ocean Systems Operation, Glen Burnie, MD; EG&G, Washington Analytical Services Center, Inc., Rockville, MD; Allied Corp., Bendix Oceanics Division, Symlar, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET
1. (U) Technical changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION:

NDCP S0219 - as approved	02/86
TEMP 137-07	06/87
TEMP 137-8	11/88
Acquisition Plan 424-87 (CHANGE 1)	08/89

G. (U) RELATED ACTIVITIES: PE 0604524N - Submarine Combat System Development and PE 0604561N - SSN-21.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1 PROCUREMENT	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
AN/BQQ-5 Sonar System					
OPN #60					
OPN BA 2:(312145)	80,182	84,695	127,259	CONT.	CONT.
Quantities	(9)	(4)	(4)		
TB-16 Towed Arrays					
OPN #61					
OPN BA 2:(312146)	5,584	0	0		
Quantities	(14)				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: Q-5D - OPEVAL completed and certified May 1989. Q-5E - TECHEVAL October 92.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0993	Carrier Air Traffic Control	4,267	2,467	3,373	Cont.	Cont.
W1579	LPH/LHA Air Traffic Control	540	584	0	0	12,600
W1657	ATC Improvements	0	2,139	6,347	Cont.	Cont.
W1680	Multi-Mode Receiver	13,575	10,232	2,487	4,131	45,755
X0718	Marine Air Traffic Control Landing System	1,279	3,210	3,691	Cont.	Cont.
TOTAL		19,661	18,632	15,898	Cont.	Cont.

B. (U) DESCRIPTION: This program element provides for the development, integration, and testing of automated Air Traffic Control (ATC) hardware and software required to provide improved flight safety, support more reliable all-weather ATC and landing capabilities ashore and afloat, and decrease Low Probability of Intercept radiated electromagnetic energy from ATC radars. The new systems are required to replace obsolete ATC and approach/landing equipment on aircraft, aircraft carriers, amphibious ships, Naval Air Stations, and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Program Number: W0993 Project Title: CARRIER AIR TRAFFIC CONTROL

C. (U) DESCRIPTION: Shipboard Air Traffic Control Centers identify, marshal and direct aircraft within 50 nm to a ships Automatic Carrier Landing System (ACLS) and Independent Landing Monitor (ILM). The Precision Approach Radar and Independent Landing Monitor then provide precise automatic control and verification of aircraft during their final approach and landing sequence. Low Probability of Intecept (LPI) is required to enable aviation ships to conduct operations while preventing opposing forces from exploiting the unique radar signature of the ship. Operational requirements were approved in FY87 for Phase II of the AN/SPN-46(V) development, ILM and LPI.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Conducted TECHEVAL of AN/SPN-46(V) Phase I.
2. (U) FY 1990 Program:
   a. (U) Conduct OPEVAL of AN/SPN-46(V) Phase I.
   b. (U) Obtain Approval for Full Production for AN/SPN-46(V) Phase I.
3. (U) FY 1991 PLANS:
   a. (U) Complete shipboard AN/SPN-46(V) developmental program.
   b. (U) Continue production of AN/SPN-46(V) Phase I.
4. (U) Program To Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NASC, Washington, DC; NESEA, St. Inigoes, MD; NATC, Patuxent River, MD; NWSC, Crane, IN; NAC, Indianapolis, IN; NRL, Washington, DC. CONTRACTOR: Bell Aerospace Textron, Inc., Buffalo, NY.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#108	1,992	6,799	900	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Program Number: W1579 Project Title: LPH/LHA AIR TRAFFIC CONTROL

C. (U) DESCRIPTION: Tactical Air Control Centers (TACC) aboard LPH/LHA class ships are responsible for making the most effective use of aircraft to support the amphibious force by controlling aircraft within the Amphibious Objective Area (AOA). TACC provides coordination to insure an integrated defense for amphibious ships and troops ashore in landing operations. This project provides the following Tactical Air Control Center/Helicopter Direction Center Direct Altitude Identity Readout capability: (a) simultaneous display of up to 200 targets with Direct Altitude Identity Readout information, (b) discrimination between two targets spaced as closely as 250 yards apart, (c) selectable altitude layers at discretion of the operator and (d) a tactical mapping capability. All friendly aircraft within 50 nautical miles of the ship will be under positive Tactical Air Control Center control.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Conducted DT-IIA.
   b. (U) Obtained Approval for Limited Production (ALP) for three systems.
2. (U) FY 1990 Program:
   a. (U) Conduct TECHEVAL (DT-11B) and OPEVAL.
   b. (U) Obtain Approval for Full Rate Production (AFRP).
3. (U) FY 1991 Plans: Not applicable.
4. (U) Program To Completion: Not applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Systems Command, Washington, DC; Naval Electronics Systems Engineering Activity, St. Inigoes, MD; Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN. CONTRACTOR: Command Systems Division (CSD) Telephonics Corp., Farmingdale, NY.

F. (U) RELATED ACTIVITIES: Not Applicable.

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#107	686	6,799	5,428	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Program Number: W1657 Project Title: ATC IMPROVEMENTS

C. (U) DESCRIPTION: This program provides for the development, integration, adaptation, and testing of new and/or modernized real-time Air Traffic Control (ATC) systems, air navigational aids and landing systems, ATC communications systems, and Airspace Management Systems (AMS). Existing systems i.e., FACSFAC and Ranges must be modified to ensure continued interoperability with the National Airspace System (NAS).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not Applicable.

2. (U) FY 1990 Program: Define requirements for Navy unique subsystems and interfaces that will be required for the Fleet Area Control and Surveillance Facilities and Ranges to remain interoperable with the FAA's new automation systems. Develop program plan of action and transition plans for these interfaces.

3. (U) FY 1991 Plans:

a. (U) Develop draft system specifications for equipment identified as required by cost/benefit analyses and technological feasibility studies.

b. (U) Continue analyzing FAA systems as new/revised specifications/ capabilities emerge.

c. (U) Initiate alternative studies as emerging technology dictates.

d. (U) Continue the updating of initial findings as force structure changes occur.

4. (U) Program To Completion:

a. (U) Continue to analyze and adapt pertinent subsystem components to satisfy shorebased FACSFAC/Ranges application.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Systems Command, Washington, DC; Naval Electronics Systems Engineering Center, Charleston, SC; Naval Electronics Systems Engineering Activity, St. Inigoes, MD; Naval Air Test Center, Patuxent River, MD; Naval Ocean Systems Center, San Diego, CA. CONTRACTOR: TBD.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Program Number: W1680 Project Title: MULTI-MODE RECEIVER

C. (U) DESCRIPTION: This project provides for development of a Multi-Mode Receiver (MMR) for use in Navy/Marine Corps aircraft to insure compatibility with the future Federal Aviation Administration National Microwave Landing System, Civil Instrument Landing Systems, Navy/Marine Corps unique Automatic Carrier Landing System (ACLS), and the Marine Remote Area Approach and Landing System (MRAALS). In the ACLS application only, MMR provides an Independent Landing Monitor for the primary system. In other applications it is the primary and only precision landing indicator in the aircraft. Without MMR, Navy and Marine Corps tactical aircraft will have no precision indicating system compatible with any other system worldwide except ACLS. Further development includes a Low Probability of Intercept (LPI) capability for the MMR.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
   a. (U) Monitored FSED contract.
   b. (U) Began F/A-18 MMR integration efforts.
   c. (U) Initiated CH-53/MMR integration efforts.
2. (U) FY 1990 Program:
   a. (U) Complete preproduction design approval tests.
   b. (U) Complete integration efforts on F/A-18 and CH-53.
   c. (U) Begin TECHEVAL of MMR in F/A-18 and CH-53E.
3. (U) FY 1991 Plans:
   a. (U) Complete TECHEVAL on F/A-18 and CH-53E.
   b. (U) Commence and complete OPEVAL on F/A-18.
   c. (U) Commence OPEVAL on CH-53.
   d. (U) Milestone IIIA production decision for F/A-18.
4. (U) Program To Completion:
   a. (U) Complete OPEVAL on CH-53E.
   b. (U) Milestone IIIB production decision.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN. CONTRACTOR: Plessey Electronic Systems, Wayne, NJ.

F. (U) RELATED ACTIVITIES: Development in both the Marine Air Traffic Control and Landing System and AN/SPN-46(V) Automatic Carrier Landing System projects has been coordinated with the National Microwave Landing System objectives of the FAA.

G. OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APNN/P-1 APN #10, 13	Not applicable			Continuing

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Program Number: X0718 Project Title: MARINE AIR TRAFFIC CONTROL AND LANDING SYSTEM (MATCALS)

C. (U) DESCRIPTION: MATCALS is an automated Air Traffic Control System which provides the capability for safe all-weather operations at Marine Expeditionary Airfields. This project also provides for modifications to the AN/TPN-30 and for the development and testing of the AN/SPN-47 Shipboard Marine Remote Area Approach and Landing System (SMRAALS) for use on LHA, LPHs and LHDs.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Continued DT of MATCALS operational capabilities; initiated software changes and safety-of-flight testing for Mode I.
2. (U) FY 1990 Program:
a. (U) Continue DT of MATCALS operational capabilities and software changes.
b. (U) Commence development of software for required downlink.
c. (U) Commence studies for Advanced Air Traffic Control.
3. (U) FY 1991 Plans:
a. (U) Complete DT of MATCALS operational capabilities including additional software changes.
b. (U) Commence qualification testing of new airborne receivers.
c. (U) Continue Advanced Air Traffic Control studies.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: SPAWAR, Washington, DC, NESEA, St. Inigoes, MD; NESEC, Vallejo, CA; MCRDAC, Washington, DC; NATC, Patuxent River, MD. CONTRACTORS: Plessey Electronic Systems, Wayne, NJ; UNISYS Corp., Great Neck, NY; UNISYS Corp., St. Paul, MN.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#106	12,068	15,358	13,355	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604506N Budget Activity: 4
Program Element Title: Chemical Warfare Countermeasures
Project Number: S0410 Project Title: BR/CW Countermeasures

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0410	BR/CW Countermeasures	5,805	7,310	8,596	Cont.	Cont.

B. (U) DESCRIPTION: Develop chemical, biological and radiological (CBR) defensive systems: protective clothing compatible with naval ops; collective protection ashore and on ships (CPS); detectors to locate and identify CBR contamination; contamination control procedures, materials and equipment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted OT-II on CAM and DT-II on Selected Area CPS (SACPS).
   b. (U) Developed permeable Interim Chemical Protective Overgarment (ICPO) prototype and MCU-2/P mask technical documentation.
2. (U) FY 1990 Program:
   a. (U) Conduct DT-I of Improved Point Detector (IPD); OPDEMO of permeable ICPO prototype and contamination control procedures; DT/OT-II of SACPS. Evaluate Improved CBR Protective Footwear candidates.
3. (U) FY 1991 Plans:
   a. (U) Conduct DT-II on IPD and DT-I on Improved CBR Protective Footwear.
   b. (U) Conduct DT-IID/OT-IIB on LSD-44 CPS.
   c. (U) Evaluate EDM candidates for Advanced Filtration.
   d. (U) Gain production approval (M/S III) for SACPS.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSWC, Dahlgren, VA; DTRC, Bethesda, MD; NCTRF, Natick MA; NAEC, Lakehurst, NJ; NRL, Washington, DC. CONTRACTORS: Nuclear Research Corp., Philadelphia, PA; J.J. McMullen & Battelle, Washington, DC; Brunswick Corp., Clearwater, FL; Donaldson Corp., Minneapolis, MN.

E. (U) RELATED ACTIVITIES: Program Elements 0603514N Ship Combat Survivability; 0602233N Mission Support Technology.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN1810LI0989	15,137	13,438	17,973	Cont.	Cont.
OPN1810LI9020	16,894	26,603	22,950	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Navy Standard Signal Processor (NSSP)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1440	AN/UYS-2 Enhanced Modular Signal Processor (EMSP)	30,756	24,428	20,463	Cont.	Cont.
S1990	ASP Common Operational Support System (ACOS)	860	3,787	0	0	4,647
	TOTAL	31,616	28,215	20,463	Cont.	Cont.

B. (U) DESCRIPTION: The Navy Standard Signal Processor (AN/UYS-2, also known by its popular title - Enhanced Modular Signal Processor or EMSP) will provide increased signal processing capability to help re-establish the Navy's ASW detection advantage. It is a general purpose programmable signal processor with a high order language Applications Development Environment (ADE) which automatically generates Signal Processing Graph Notation (SPGN) from applications input graphically for a broad range of ASW weapon system applications, including the SQQ-89 Combat System, P-3C Update IV, SSN 21 Combat System, Fixed Distributed System, Surveillance Towed Array Sensor System Upgrade, Advanced Lightweight Sonar and P-7A. The ADE includes an extensive set of software tools for development and maintenance of code including a multi-tasking operating system with scheduler, complete set of SPGN algorithms, a graphics editor, an event-time scheduler, compiler, libraries and interactive software debugger.

The ACOS project was initiated to develop software to implement SPGN-like graphics programming capability on the older, but still widely used Advanced Signal Processor (AN/UYS-1).

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Navy Standard Signal Processor (NSSP)
PROJECT NUMBER: S1440 PROJECT TITLE: AN/UYS-2 (EMSP)

A. (U) RESOURCES: (Dollars in Thousands)

POPULAR NAME	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
EMSP	30,756	24,428	20,463	Cont.	Cont.

B. (U) DESCRIPTION: The AN/UYS-2 will provide increased signal processing capability to help re-establish the Navy's ASW detection advantage. It is a general purpose programmable signal processor with a development environment for a broad range of ASW weapon system applications. AN/UYS-2 will be repackaged from Standard Electronics Module Format B (SEM B) onto larger SEM E format circuit cards using high-density gate array and memory devices, thereby meeting aircraft weight limit requirements. The entire AN/UYS-2 system, both hardware and software, is designed to accommodate functional element upgrades which include VHSIC and VLSI insertion and enhanced parallel processing capabilities in future block configurations. The Signal Processing Graph Notation (SPGN) software development environment offers an order of magnitude increase in computer program productivity.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Delivered Development Test Equipment (DTE) with Input Signal Conditioner.
   b. (U) Continued full scale development to Floating Point Arithmetic Processor.
   c. (U) Continued functional module repackaging and ADA transition.
   d. (U) Conducted DT IIC TECHEVAL on the SEM B variant.
   e. (U) Released RFP for module procurement.
   f. (U) Began SEM E Service Test Model long lead orders.
2. (U) FY 1990 PROGRAM:
   a. (U) Begin SEM B limited production long lead orders.
   b. (U) Begin Advanced Development Model phase for the Matrix Array Processor Functional Element.
   c. (U) Continue delivery of Development Test Equipment.
   d. (U) Begin Full Scale Engineering Development phase for the Matrix Array Processor Functional Element.
   e. (U) Continue functional module repackaging and ADA transition.
   f. (U) Begin SEM B limited production.
   g. (U) Begin SEM E Service Test Model development.
   h. (U) Begin non-recurring engineering for integration of unique SEM E items.
3. (U) FY 1991 PLANS:
   a. (U) Begin FSED of the Matrix Array Processor.
   b. (U) Deliver repackaged Service Test Model to P-3C Update IV Program.
   c. (U) Conduct DT III SEM E test.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Complete Matrix Array Processor development and perform DT III testing.
   b. (U) Insert VHSIC Phase II (sub-micron) technology.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Navy Standard Signal Processor (NSSP)
PROJECT NUMBER: S1440 PROJECT TITLE: AN/UYS-2

c. (U) Test and evaluate new VHSIC Functional Elements.
d. (U) Continue transition to ADA.
e. (U) Continue implementation of Engineering Change and Value Engineering Proposals.
f. (U) Complete functional module repackaging and begin production.
g. (U) Develop air-transportable rack design for repackaged modules.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Underwater Systems Center, New London, CT; Naval Weapon Support Center, Crane IN; Naval Air Development Center, Warminster, PA; Naval Research Laboratory, Washington, D.C.; Naval Ocean Systems Center, San Diego, CA. CONTRACTORS: Prime contractor is AT&T Technologies, Inc., Burlington, NC. The principal subcontractors are AT&T Bell Laboratories, Whippany, NJ; Honeywell Marine Systems Division, Everett, WA; and UNISYS, St. Paul, MN.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET: A Department adjustment of +$3,625K resulted from cancellation of the ACOS project and subsequest transfer of funds to EMSP for development of the Input Signal Conditioner.

F. (U) PROGRAM DOCUMENTATION: AP #270-87 dated 21 November 89
NDCP #S-1440 dated August 1983
TEMP #880 (Rev 2) dated 6 June 1989

G. (U) RELATED ACTIVITIES: PE 0604524N, AN/BSY-2 Submarine Combat System; PE 0604221N, P-3 Update IV; PE 0204313N, Surface Ship Towed Array Surveillance System; PE 0604575N, AN/SQQ-89; PE 0604784N, Fixed Distributed System; PE 0603553N, Surface Ship Advanced Tactical Sonar; PE 0604503N, Thin Line Towed Array.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
OPN (332975)	11,306	9,480	5,514	Cont.	Cont.
EMSP Facilitization for In-service support	(9,306)	(6,580)	(5,514)	Cont.	Cont.
EMSP Second Source	(2,000)	(2,900)	TBD	Cont.	Cont.

I. (U) INTEPNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: A Sponsor Program Review in 4Q/FY86 authorized fabrication of Laboratory Development Equipment and procurement of long lead items for Development Test Equipment.

Very High Speed Integrated Circuit (VHSIC) Milestone II in 4Q/FY86 authorized Full Scale Engineering Development of the Very High Speed Integrated Circuit components and Floating Point Arithmetic Processor for AN/UYS-2.

Milestone IIIA, scheduled for 2Q/FY90, is intended to authorize fabrication for first production SEM B buy.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604508N Budget Activity: 4
Program Element Title: RADAR SURVEILLANCE EQUIPMENT
Project Number: S0166 Project Title: SPS Improvements

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0166	SPS Improvements	6,064	5,841	4,655	Cont.	Cont.

B. (U) DESCRIPTION: This program develops upgrades to fleet surveillance radars to improve radar performance and reliability. These upgrades are required due to the increasing age of fleet radar systems and a more challenging threat. The program also develops Integrated Automatic Detection and Tracking (IADT) Systems and a Ships Sensors Integrated Data System (SSIDS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Initiated critical experiment of AN/APQ-164 radar, continued development of SYS-2(V) IADT (FFG-61).
b. (U) Discontinued AN/SPS-49 SSTX FSED.
2. (U) FY 1990 Program:
a. (U) Commence development of AN/SPS-49 Medium PRF Upgrade (MPU).
b. (U) Continue AN/APQ-164 radar critical experiment.
c. (U) Complete DOP for SSIDS.
3. (U) FY 1991 Plans:
a. (U) Continue development of AN/SPS-49 MPU.
b. (U) Continue AN/APQ-164 radar critical experiment.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN HOUSE: NAVSEACOMBATSYSENGSTA Norfolk, VA.; NSWSES, Port Hueneme, CA.; NSWC, Dahlgren, VA.; NRL, Wash, DC. CONTRACTORS: Raytheon, Wayland, MA.; JHU/APL, Laurel, MD.; Westinghouse, Balt, MD.; Norden Systems, Melville, NY.

E. (U) RELATED ACTIVITIES: PE 0604307N, Aegis Combat Sys Eng; PE 0604372N, NTU; PE 0603319N, NATO AAW; PE 0604301N, MK-92 FCS Upgrade.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	TOTAL Program
OPN (RADAR VARIOUS)	60,923	34,672	37,577	Cont.	Cont.

G. (U) INTERNATIONAL AGREEMENTS: Not Applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604514N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Navigation Systems
PROJECT NUMBER: S0253 PROJECT TITLE: Navigation Systems

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0253	Navigation Systems	0	5,547	5,339	CONT.	CONT.

B. (U) DESCRIPTION: This program is developing two systems, the Photonics Mast and the Doppler Sonar Velocity Log (DSVL). The Photonics Mast will exploit a variety of sensors including advanced electro-optical imaging systems that will utilize fiber optics, various electromagnetic spectra, and others, and process that information to be passed through the hull using simple electrical connections. The Photonics Mast will be tactically superior to all current optical periscopes in the U.S. Navy inventory. This program is also developing a high accuracy DSVL for precise measurement of own ship's relative and absolute speed to minimize speed errors being introduced into the fire control solution.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1989 Accomplishments: Not applicable.
2. (U) FY 1990 Program:
   a. (U) Complete threat assessment and requirement analysis for Photonics Mast.
   b. (U) Develop detailed technical specification.
   c. (U) Re-initiate DSVL program.
   d. (U) Redesign and fabricate DSVL Transducer.
   e. (U) Upgrade DSVL Microprocessor.
3. (U) FY 1991 Plans:
   a. (U) Conduct Photonics Mast Milestone I (ARB/NPDM).
   b. (U) Prepare Photonics Mast FSED RFP.
   c. (U) Conduct Technical Evaluation of DSVL.
   d. (U) Update DSVL Documentation.
4. (U) Program to Completion: This is a continuing program.

D. (U) Work Performed By: IN HOUSE: Naval Underwater Systems Center/Nev London Lab, Nev London, CT; Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA; Naval Ship Systems Engineering Station, Philadelphia, PA; David Taylor Naval Research and Development Center. CONTRACTORS: Hughes, Los Angeles, CA; Sperry Marine Inc., Charlottesville, VA; Kollmorgen Corp., Northampton, MA; Honeywell, Minneapolis, MN; Northrop-Anaheim, CA.

E. (U) Related Activities: None.

F. (U) Other Appropriation Funds: (Dollars in thousands)

APPN/P-1	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
PROCUREMENT					
SCN/BLT #12	0	0	2,405	CONT.	CONT.

P-1 ESGN (Electrically Suspended Gyro Navigator)

G. (U) International Cooperative Agreements: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604515N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Submarine Surveillance Support Program
PROJECT NUMBER: S0775 PROJECT TITLE: Submarine Surveillance Support Program

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0775	SSSP	19,053	10,933	5.648	CONT.	CONT.

B. (U) DESCRIPTION: This program improves Electronic Support Measures (ESM) techniques, components, equipment, and systems for submarines to provide threat warning, direction finding, over-the-horizon targeting support (OTH-T), and tactical surveillance/data collection. Also develops periscope and mast modification kits to reduce vulnerability to detection by radar.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued repackaging and quieting SEA NYMPH for SSN 21 Class.
   b. (U) Terminated the AN/BLQ-9 program.
   c. (U) Began development of a new radome for the AN/BRD-7.
   d. (U) Continued to evaluate new Radar Cross Section Reduction (RCSR) materials.
   e. (U) Continued development of data processing equipment subsystem (DPES) upgrade.
2. (U) FY 1990 Program:
   a. (U) Complete repackaging and quieting of SEA NYMPH for SSN-21.
   b. (U) Begin planning for upgrades to the AN/WLQ-4(V)1 (SSN-21).
   c. (U) Continue development of improved radome for AN/BRD-7 antenna.
   d. (U) Continue to evaluate new RCSR materials.
   e. (U) Begin development of an integrated ESM mast for submarine systems.
   f. (U) Complete development of the DPES Upgrade.
3. (U) FY 1991 Plans:
   a. (U) Begin development of upgrades to the AN/WLQ-4(V)1 ESM System.
   b. (U) Continue to evaluate new RCSR materials.
   c. (U) Continue development of an integrated ESM mast for submarine systems.
   d. (U) Begin program for replacement of obsolete parts in submarine ESM systems.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: David Taylor Research Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI; Naval Sea Systems Engineering Station, Philadelphia, PA; Naval Electronic Systems T&E Detachment, St. Indigoes, MD; Naval Research Laboratory, Washington, DC. CONTRACTOR: GTE, Government Systems, Mountain View, CA; SANDERS Associates, Nashua, NH; LITTON AMECON, College Park, MD; ARGO SYSTEMS, Sunnyvale, CA; BRUNSWICK, Marion, VA.

E. (U) RELATED ACTIVITIES: PE 0603522N, Advanced Submarine Surveillance Support Program; PE 0604561N, Project S1946, SSN-21 Development.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT					
OPN #90	12,598	7,430	29,761	CONT.	CONT.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604516N Budget Activity: 4

Program Element Title: SHIP SURVIVABILITY

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1828	Ship Surv. Eng.	5,765	1,757	1,691	Cont.	Cont.
S2054	DC/FF	0	5,040	4,578	Cont.	Cont.
TOTAL		5,765	6,797	6,269	Cont.	Cont.

B. (U) DESCRIPTION: Full scale development of equipment/ systems to enable continued, effective combat missions through protection from weapons effects from hostile actions and peacetime accidents. Engineering development of improved Damage Control/Fire Protection and Firefighting equipment, devices, and systems for rapid control/suppression of damage/fire with retention of the ship's mission.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604516N Budget Activity: 4

Program Element Title: SHIP SURVIVABILITY
Project Number: S1828 Project Title: SHIP SURVIVABILITY ENGINEERING

C. (U) DESCRIPTION: This project supports the full scale development of systems and components to provide protection from weapons effects, and to enable continued combat readiness.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued development of MK-32 Surface Ship Torpedo Tube (SSTT) Armor System.

b. (U) Completed Smoke Ejection System (SES) Phase I and II test and evaluation.

c. (U) Completed testing of Liferaft Desalinator.

d. (U) Awarded Engineering Development contract for Destroyer/Frigate Wire Free Communications System.

e. (U) Completed development and test of fire retardant intumescent paint coatings.

2. (U) FY 1990 Program:

a. (U) Complete DDG-51 (Flight II) Naval Adjudication Board package

3. (U) FY 1991 Plans:

a. (U) Submit interim SES update to General Specifications, Heating Ventilation Air Conditioning Manual, Navy Standard Technical Manual, and Shipboard Damage Control Book.

b. (U) Complete restoration of SES fire test areas.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA; DTRC, Bethesda, MD; NWC, China Lake, CA; NUSC, Newport, RI; NAVSSES, Philadelphia, PA; NSCSES, Norfolk, VA; CONTRACTORS: McDonnell Douglas, St. Louis, MO; DYNALEC Corp., Sodus, NY; G.C. Sharp, Inc., NY, NY; RCA Corp., Camden, NJ; Recovery Engineering, Minneapolis, MN; JJMA, Arlington, VA

F. (U) RELATED ACTIVITIES: P.E. 0603514N S0384, (Ship Combat Survivability)

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U)PROCUREMENT					
091000 OPN #19	16,288	0	0	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604516N Budget Activity: 4
Program Element Title: SHIP SURVIVABILITY ENGINEERING
Project Number: S2054 Project Title: Ship Damage Control Engineering

C. (U) DESCRIPTION: This project supports the engineering development of improved damage control, fire protection and firefighting systems for the rapid control of damage.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. U) FY 1989 Accomplishments: Not Applicable.
2. U) FY 1990 Program:
   a (U) Obtain Initial Operational Capability for Damage Control Wirefree Communications System (WIFCOM).
   b (U) Complete modifications to Full Scale Fire Test Facility to permit conduct of tests for interior ship conflagration control.
   c (U) Complete test and evaluation of selected damage control/firefighting non-development item candidates.
3. U) FY 1991 Plans:
   a (U) Commence engineering development of Damage Control Ultrasonic Hull Communications System.
   b (U) Complete qualification testing of Lightweight Structural Fire Insulation for new construction.
   c (U) Complete test and evaluation of selected damage control/firefighting non-development item candidates.
   d. (U) Complete TECHEVAL for shipboard fire detection system.
   e. (U) Obtain Initial Operational Capability for Liferaft Reverse Osmosis Desalinator.
   f. (U) Commence engineering development of Damage Control Portable Pumping and Power System.
4. (U) Program to completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, NOSC, San Diego, CA; NSWC, Dahlgren, VA; NWC, China Lake, CA; DTRC, Bethesda, MD; NAVSSES, Philadelphia, PA; NSCSES, Norfolk, VA. CONTRACTORS: DYNALEC Corp., Sodus, NY; RCA Corp., Camden, NJ; Recovery Engineering, Minneapolis, MN; Hale Fire Pump Company, Conshohocken, PA; English Electric Valve, United Kingdom.

F. (U) RELATED ACTIVITIES: Program Element 0603514N - Project S1565 (Damage Control for advanced development efforts.)

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) Procurement					
(091(00) OPN #19	11,322	18,583	15,101	Cont.	Cont.
(091(00) OPN/FMP	-	-	44,167	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: N/A.

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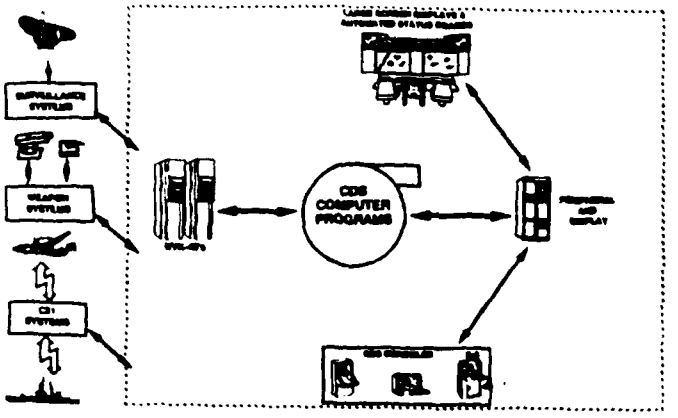
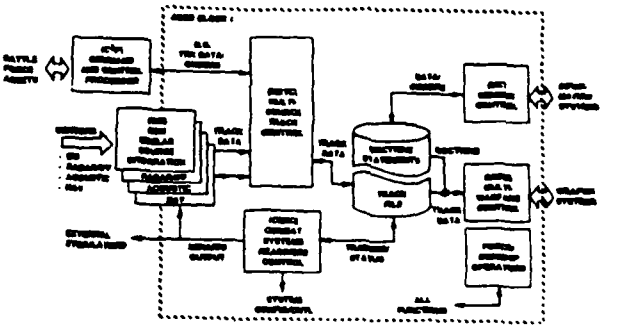
FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604518N
PROGRAM ELEMENT TITLE: CIC Conversion
BUDGET ACTIVITY: 4
PROJECT NUMBER: S1604 PROJECT TITLE: NTDS Software Improvements





POPULAR NAME: Advanced Combat Direction System (ACDS) Block 1

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	MSII			MSIII
ENGINEERING MILESTONES		CDR	Test Rqmts Rvw Final Qual Rvw	
T&E MILESTONES	OT I		Contr Acc Tst Sys Acc Tst	OT II
CONTRACT MILESTONES		CDR		Navy Acceptance

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	10,970	12,675	19,900	Cont.
SUPPORT CONTRACT	911	4,300	4,651	Cont.
IN-HOUSE SUPPORT	1,121	445	1,725	Cont.
GFE/ OTHER	3,637	2,865	3,685	Cont.
TOTAL	16,639	20,285	29,961	Cont.

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PROGRAM ELEMENT: 0604518N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CIC Conversion
PROJECT NUMBER: S1604 PROJECT TITLE: NTDS Software Improvements

B. (U) DESCRIPTION:

(U) This program element develops software that replaces 1960s vintage Naval Tactical Data System (NTDS) operating systems and applications algorithms and implements advanced concepts for Tactical Data System upgrades for surface ships in response to current and future threats, operational deficiencies, and current operational requirements. The program's objective is to develop integrated, coherent ship's command and control systems that will increase operational capabilities, promote standardization and introduction of new shipboard tactical displays and support equipment, and provide integration between sensor/weapons systems which are organic to and outside the battle force. Included in this program are planned improvements to CV/CVN, CG/CGN, DDG 993, LHD, LCC and LHA class ships and an upgrade of the Atlantic Fleet Weapons Training Facility (AFWTF) and the Pacific Missile Range Facility (PMRF) with an ACDS Block 1 derivative. This program provides for significant Combat Direction System improvements including implementation of the JTIDS/TADIL J message standard, implementation of the Aegis Tactical Executive System (ATES), integration and interface with New Threat Upgrade (NTU), and implementation of the Command and Control Processor (C2P).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued ACDS Block 1 Computer Program detailed design.
b. (U) Conducted OT I to test initial program coding/design to ensure performance goals were met.
c. (U) Commenced coding and debugging of remaining elements of ACDS Block 1 computer program.
d. (U) Continued Combat Direction System (CDS) Standard Simulation System development in support of ACDS Block 1 operational shore site testing.

2. (U) FY 1990 PROGRAMS:

a. (U) Complete detailed design of ACDS Block 1 computer program and conduct Critical Design Review (CDR).
b. (U) Continue coding/testing ACDS Block 1 program.
c. (U) Integrate Command and Control Processor (C2P) with the Advanced Combat Direction System.
d. (U) Complete design and specification of the AFWTF and PMRF derivatives.

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PROGRAM ELEMENT: 0604518N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: CIC Conversion
PROJECT NUMBER: S1604 PROJECT TITLE: NTDS Software Improvements

3. (U) FY 1991 PLANS:

a. (U) Complete coding of ACDS Block 1 Program.
b. (U) Complete Test Requirements Review (TRR) for Contractor Acceptance Tests (CAT) and System Acceptance Tests (SAT).
c. (U) Complete CAT and SAT.
d. (U) Complete Program Acceptance Test (PAT).
e. (U) Complete CDS Standard Simulation System development in support of ACDS Block 1 operational shore site tests.
f. (U) Commence Combat System Integrated Testing (CSIT).
g. (U) Begin coding CGN-38/DDG-993 program.
h. (U) Complete coding of the AFTWF/PMRF derivatives.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; FLTCOMBATDIRSSACT, San Diego, CA; INTCOMBATSYSTESTFAC, San Diego, CA. CONTRACTORS: Hughes Aircraft Co., San Diego, CA; Raytheon Services Corporation, Arlington, VA; QuesTech Inc., San Diego, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNICAL CHANGES: NONE
2. (U) SCHEDULE CHANGES: NONE
3. (U) COST CHANGES: Departmental addition of $1,435K in FY 1991 recovers a three month IOC slip.

F. (U) PROGRAM DOCUMENTATION:
1. (U) NDCP - 22 Aug 89
2. (U) TEMP #935 - 15 Dec 88

G. (U) RELATED ACTIVITIES:
1. (U) CV ASW Module, PE 0603228N
2. (U) Combat System Integration, PE 0603582N
3. (U) JTIDS, PE 06025604N
4. (U) C2P, PE 0603717N

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION: Completed OT I on initial program coding in March 1989.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1347	AN/BSY-1	85,972	23,922	2,091	0	956,931
S1941	AN/BSY-2	279,719	316,941	344,638	731,966	1,972,982
TOTAL		365,691	340,863	346,729	731,966	2,929,913

B. (U) DESCRIPTION: This program element encompasses the development of submarine combat systems for both the SSN 688 Class and SSN 21 Class submarines. The AN/BSY-1 Combat Control and Acoustic (CC/A) Subsystem will be installed in new construction submarines beginning with SSN 751. AN/BSY-1 replaces the AN/BQQ-5 Sonar and CCS MK1 Combat System. AN/BSY-1 provides capabilities for detection, classification, tracking, target action analysis, onboard training, vertical launch of weapons, under-ice operations, and increased acoustic performance over previous SSN 688 Class systems. AN/BSY-1 is planned for the FY83-FY90 SSN 688 Class submarines. The AN/BSY-2 Submarine Combat System is being developed with a distributed architecture specifically designed to meet increased processing requirements of the SSN 21 Class acoustic array suite. Major components included in the AN/BSY-2 SCS are: Wide Aperture Array, Large Spherical Array, Tactical Situation Plotter, Combat System Display Consoles, Transmit Group, Weapon Launch System (WLS), TB-12X Thin Line Towed Array, and TB-16 Towed Array.

FY1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1347 PROJECT TITLE: AN/BSY-1

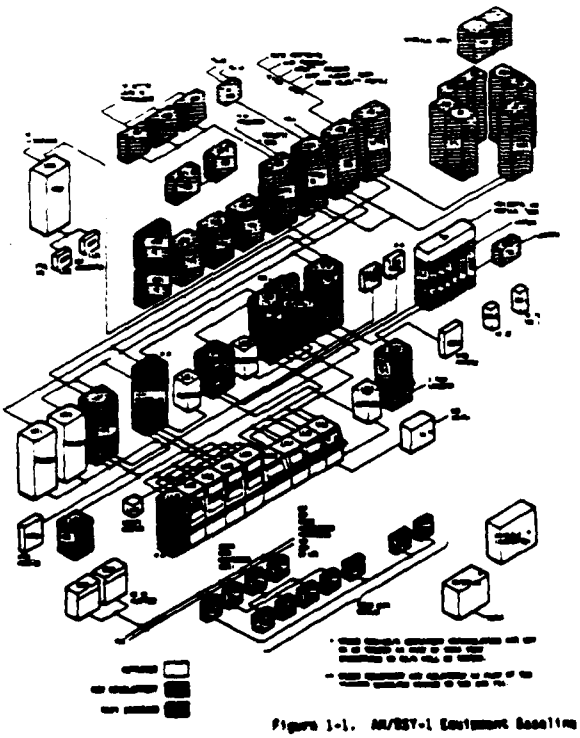


Figure 1-1. AN/BSY-1 Equipment Location

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY89	FY90	FY91	TO COMPLETE
PROGRAM MILESTONES				
ENGINEERING MILESTONES				
T&E MILESTONES		TECHEVAL 3Q/90 OPEVAL 1Q/91		
CONTRACT MILESTONES				

BUDGET (SK)	FY89	FY90	FY91	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	77,200	12,933	1,037	761,596
SUPPORT CONTRACT	1,769	9,437	1,054	36,186
IN-HOUSE SUPPORT	7,003	1,552	0	67,918
GFE/OTHER	0	0	0	91,231
TOTAL	85,972	23,922	2,091	956,931 0

FY1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1347 PROJECT TITLE: AN/BSY-1

B. (U) DESCRIPTION

1. (U) The AN/BSY-1 Combat Control and Acoustic (CC/A) Subsystem is installed in new construction SSN 688 Class submarines beginning with the FY83 new construction SSN 751. AN/BSY-1 replaces the AN/BQQ-5 Sonar and CCS MK1 Combat System. AN/BSY-1 provides capabilities for detection, classification, tracking, target motion analysis, and onboard training. It provides capabilities for vertical launch of weapons, under-ice operations, and increased acoustic performance over previous SSN 688 Class systems. AN/BSY-1 is planned for the FY83-FY90 SSN 688 Class submarines.

2. (U) In order to support the SSN 688 Class mission, the following functional capabilities are provided/supported by the AN/BSY-1 system: (1) detection of multiple contacts, including early warning threat determination through processing and analysis of sensor data; (2) classification of sensor data for the purpose of identifying contacts; (3) localization (tracking) of contacts to determine position and motion through analysis of sensor data; (4) preset, launch, and control of weapons and countermeasures; (5) command and control of the combat system (combat system management) using controls, displays, correlation of sensor data, and audio circuits; (6) communication with submerged, surface, airborne, and land forces via voice and data links; and (7) navigation in open ocean and restricted waters.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Completed System Design Certification Testing.
   b. (U) Completed Land Based Test Site testing.
   c. (U) Completed the full scale development of the Submarine Combat System AN/BSY-1 configuration.
   d. (U) Delivered two ship systems to SSNs 753 and 755.
   e. (U) Delivered two upgrade kits to SSNs 751 and 752.
   f. (U) Deliver Maintenance Trainer.
2. (U) FY 1990 Program:
   a. (U) Conduct Technical Evaluation.
   b. (U) Deliver seven ship systems to SSNs 756, 757, 758, 759, 760, 762, and 763.
   c. (U) Deliver two upgrade kits to SSNs 753 and 754.
3. (U) FY 1991 Plans:
   a. (U) Conduct Operational Evaluation.
   b. (U) Correct deficiencies found during testing.
   c. (U) Deliver four ships systems to SSNs 761, 764, 765, and 766.
4. (U) Program to Completion:
   a. (U) Deliver remaining seven ship systems to SSNs 767-773.
   b. (U) Deliver Software Maintenance Facility and two Team Trainers.

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1347 PROJECT TITLE: AN/BSY-1

D. (U) WORK PERFORMED BY: IN-HOUSE: The Naval Sea Systems Command, Washington, DC has the responsibility for overall program management, development, and procurement. Naval Underwater Systems Center (NUSC) at Newport, RI, and New London, CT (Lead Laboratory and Technical Development Agent); Naval Weapons Support Center (NWSC), Crane, IN (Production Readiness); Naval Sea Systems Combat Systems Engineering Station (NSCSES) (In Service Engineering Agent). CONTRACTORS: International Business Machines, Federal Systems Division, Manassas, VA, is the prime contractor for systems development and integration. Raytheon Company, Submarine Signal Division, Portsmouth, RI is the prime contractor for the acoustic transmit group. These are both firm fixed price contracts.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET: No changes.

F. (U) PROGRAM DOCUMENTATION

OR	04/17/80
MENS	11/28/80
DCP	11/30/88
TEMP	03/24/88

G. (U) RELATED ACTIVITIES: Acoustic systems concepts completing advanced development in PE 0603504N will, as applicable, be transitioned to full scale engineering development. Development of the Combat Control System MK1 and related software programs are continuing in PE 0604562N, Submarine Tactical Warfare Systems (Engineering), Project S0236. The Submarine Combat System also interfaces with: SSN 688 Class Vertical Launch System (PE 0604370N); MK48 Advanced Capabilities Torpedo (PE 0604675N); TOMAHAWK (PE 0604367N); Submarine Sonar Development (Engineering) (PE 0604503N); Navigation Systems (All Projects, PE 0604514N); Submarine Surveillance Equipment (PE 0604515N); Over-the-Horizon Targeting (PE 0604707N Project X0798); and Submarine Communications (PE 0604502N).

H. (U) OTHER APPROPRIATIONS FUNDS ($000)

	FY89 ACTUAL	FY90 ESTIMATE	FY91 ESTIMATE	TOTAL PROGRAM
SCN/P-1	213,784	134,804	0	2,429,860.5
(4) SSN-688 Quantities	2	1	0	23
OPN (BA 2)	0	0	83,168	237,230
OPN (BA 7)	2,055	0	0	35,600
OPN (BA 8) (299)	0	3,335	5,766	23,500

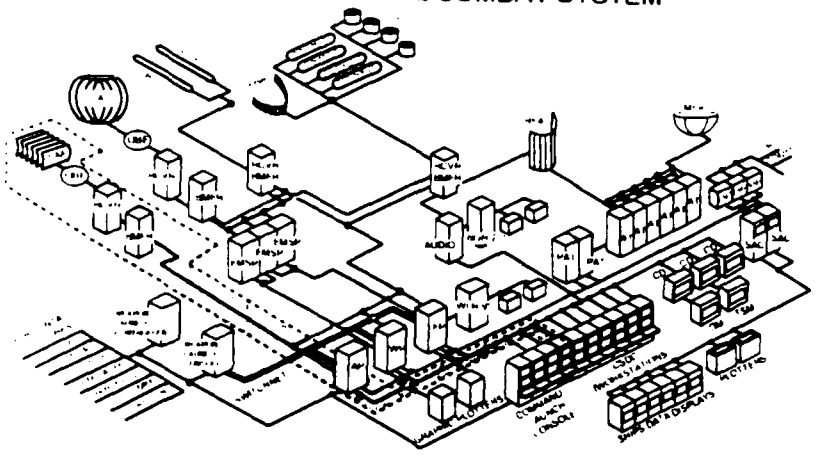
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1941 PROJECT TITLE: AN/BSY-2

AN/BSY-2 SUBMARINE COMBAT SYSTEM



POPULAR NAME: AN/BSY-2 Submarine Combat System

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES				
ENGINEERING MILESTONES		PDR 10/89 CDR 1/90	MT PDR 2/91	PCA 4Q/93 PCA 1Q/93
T&E MILESTONES		Crit. item Testing		OPEVAL 4Q/95 TECHEVAL 2Q/95
CONTRACT MILESTONES	Exercise LP Option AN/BQG-5 12/88	Exercise AN/BSY-2 MT LP Contract 12/89	Award TT Unique Contract 12/90	Award Follow-on Prod. Contract 12/91

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	235,287	256,516	276,689	1,346,085
SUPPORT CONTRACT	7,530	9,300	8,900	73,398
IN-HOUSE SUPPORT	34,611	40,423	39,072	365,141
GFE/	1,500	6,620	17,000	104,803
OTHER	791	4,082	2,977	83,555
TOTAL	279,719	316,941	344,638	1,972,982 731,966

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1941 PROJECT TITLE: AN/BSY-2

B. (U) DESCRIPTION: The Soviets have made significant advances in submarine platform quieting and combat system performance. As a result, the projected exchange ratios have shown a continual decline since the 1960's. In order to meet the threat, the Chief of Naval Operations established the SSN 21 SEAWOLF and the AN/BSY-2 Combat System Top Level Requirements. The development objectives for AN/BSY-2 are: Meet the SEAWOLF combat system related Top Level Requirements, develop an architecture which facilitates tactical improvements and future growth, and provide computer processes that improve response time from initial threat detection to weapon launch. AN/BSY-2 will provide new acoustic arrays which have improved self noise characteristics and improved detection performance. It will provide computer aids to assist the operator in sensor, contact and weapon management, and will support employment of the most advanced submarine weapons from eight torpedo tubes. The system architecture will be partitioned to facilitate tactical improvements, future growth, and high availability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted software specification review (top level and interface requirements).
   b. (U) Commenced Production Readiness Reviews (PRR).
   c. (U) Conducted Preliminary Design Review (PDR).
   d. (U) Continued full scale development.
   e. (U) Exercised limited production options for AN/BSY-2 and AN/BQG-5.
   f. (U) Continued array tests.
   g. (U) Conducted critical item testing (WAA, Flexnet, Graphics Engine).
2. (U) FY 1990 Program:
   a. (U) Complete Preliminary Design Review.
   b. (U) Conduct Critical Design Review (CDR).
   c. (U) Exercise AN/BSY-2 Maintenance Trainer limited production option.
   d. (U) Conduct maintenance trainer system design review.
   e. (U) Exercise limited production option for AN/BQG-5.
   f. (U) Continue array tests.
   g. (U) Conduct Development Systems Installation.
   h. (U) Exercise Limited Production Option for AN/BSY-2 Long Lead Material.
   i. (U) Continue Critical Item Tests. (Graphics Engine, Outboard Electronics, CSDC, WAA).

UNCLASSIFIED

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1941 PROJECT TITLE: AN/BSY-2

3. (U) FY 1991 Plans:
   a. (U) Conduct maintenance trainer Preliminary Design Review (PDR).
   b. (U) Continue Critical Item Tests. WAA Shock, OBE RDBM, System Response Time, CSDC Response Time.
   c. (U) Conduct follower Production Readiness Reviews (PRR).
   d. (U) Award team trainer unique equipment contract.
   e. (U) Exercise limited production options for AN/BSY-2 systems and Software Maintenance Facility system.
   f. (U) Complete WAA hardware assembly and unit test.
   g. (U) Conduct Thread 1 software demonstration.
   h. (U) Begin Thread 2 software integration and test.
4. (U) Program to Completion:
   a. (U) Conduct maintenance trainer Critical Design Review (CDR).
   b. (U) Award follow-on production contracts.
   c. (U) Conduct factory acceptance test and design certification test.
   d. (U) Deliver first AN/BSY-2 and AN/BQG-5 limited production systems.
   e. (U) Accomplish initial delivery of AN/BSY-2 development systems.
   f. (U) Complete Thread 2 through 6 integration and test.
   g. (U) Conduct TECHEVAL/OPEVAL.
   h. (U) Achieve system approval for full production.
   i. (U) Award follow-on production contracts.

D. (U) WORKED PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington, DC (Program Management, development and procurement); Naval Underwater Systems Center, Newport, RI and New London, CT; Naval Weapons Support Center, Crane, IN; David Taylor, Naval Research and Development Center, Bethesda, MD; Navy Training Systems Center, Orlando, FL; Naval Sea Combat System Engineering Station, Norfolk, VA. CONTRACTORS: General Electric Company, Syracuse, NY; International Business Machines, Manassas, VA; Librascope, Glendale, CA; Martin Marietta, Baltimore, MD; Computer Sciences Corporation, Moorestown, NJ; EG&G Washington Analytical Services Center, Rockville, MD; General Dynamics Electric Boat Division, Groton, CT; MITRE.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
   1. (U) Technical changes: None.
   2. (U) Schedule changes: None.
   3. (U) Cost changes: This program was decreased in FY 1991 by 42,384 to realign the Team Trainer Development Program.

F. (U) PROGRAM DOCUMENTATION:

OR	3/86
DCP	9/87
TEMP	12/87

PROGRAM ELEMENT: 0604524N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Combat Systems (Development)
PROJECT NUMBER: S1941 PROJECT TITLE: AN/BSY-2

G. (U) RELATED ACTIVITIES: Acoustic system concepts completing advanced development in PE 0603504N will, as applicable, be transitioned to full scale engineering development in this program. Development of the Combat Control System MK I and related software program is continuing in Submarine Tactical Warfare System (Engineering) (PE 0604562N, Project S0236). The Submarine Combat system also interfaces with: Anti-Submarine Warfare Standoff Weapon (PE 0604309N); MK 48 Advanced Capability Torpedo (PE 0604675N); TOMAHAWK (PE 0604367N); Submarine Launched Mobile Mine (PE 0604601N); Submarine Sonar Development (Engineering) (PE 0604503N); Enhanced Modular Signal Processor (PE 0604507N): Submarine Surveillance Equipment (PE 0604515N); Over-the-Horizon Targeting (PE 0603530N Project X0798); Submarine Tactical Warfare Systems (Engineering) (All Projects) (PE 0604562N); and Submarine Communications (PE 0604502N).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

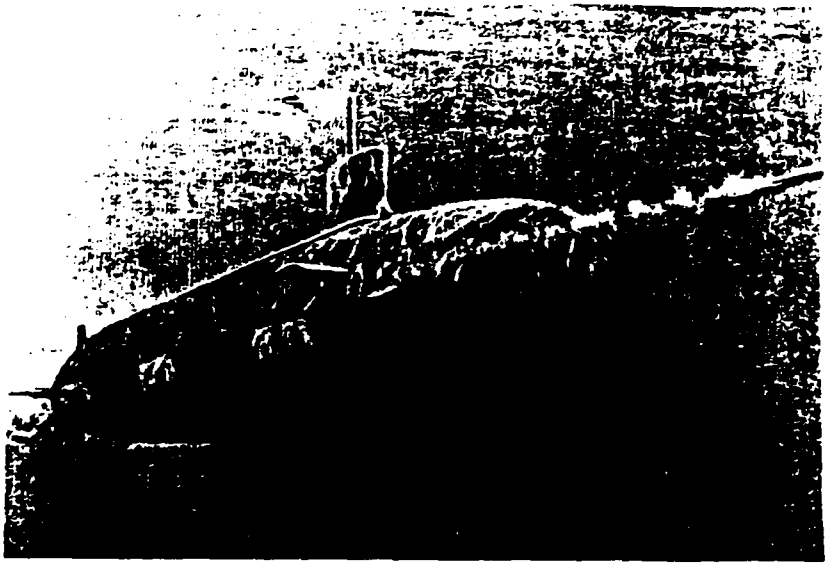
APPN/P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT (SCN)					
SCN SSN-21	206,800	0	385,652	4,599,586	5,192,038
Quantities	1	0	2		29
SSN 688 (AN/BQG-5)	69,475		0		69,475
Quantities	2				2
BA 2 (OPN) #69		190.5	141.9		

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION: Not applicable.

FY1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: SSN-21 Development
PROJECT NUMBER: S1946 PROJECT TITLE: SSN21 Development



POPULAR NAME: SEAWOLF

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY1989	FY1990	FY1991	To Complete
Program Milestones				
Engineering Milestones	Lead Ship Construction	Follow-on Ships Long Lead	Follow-on Ships	Follow-on Ships
T&E Milestones	DT-II OT-II Comp	DT-II OT-II Comp	DT-II OT-II Comp	Ship Trials DT-III OT-III
Contract Milestones	Competitive Lead Ship Contract Awarded		Competitive Follow-on Ship Contracts	Competitive Follow-on Ship Contracts

BUDGET ($K)	FY1989	FY1990	FY1991	Program Total To Complete
Major Contract	62,927	48,989	50,869	CONT.
Support Contract	5,458	5,646	5,371	CONT.
In-House Support	110,682	117,818	121,702	CONT.
GFE/Other	8,139	9,411	8,951	CONT.
Total	187,206	181,864	186,893	CONT. CONT.

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DECLASSIFY ON: OADR

FY1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: SSN-21 Development
PROJECT NUMBER: S1946 PROJECT TITLE: SSN21 Development

B. (U) DESCRIPTION: The new attack submarine (SSN 21) is being designed to counter the threat and provide growth potential for improvements to meet even more capable threats in the future. This program element provides the advanced technology, prototype components and systems to design and construct the SSN21 Class attack submarine, and directly supports the SSN21 mission to aggressively seek out and destroy enemy submarines and surface ships across a wide spectrum of tactical scenarios.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U)

b. (U)

c. (U) Performed land based testing of Began fabrication of SSN21 advanced air conditioning plant. Expanded validated design guidance for water/self-lubricated external bearings.

d. (U) Prepared procurement specifications and complete dockside testing of

e. (U) Continued prototype torpedo tube test/upgrade. Continued ejection system testing. Complete IAL and test facility.

f. (U) Provided general fire and toxicity specification for habitability materials, and specifications for battery well fire protection system. Continued full scale mock-up fire tests.

g. (u) Conducted long term at-sea evaluations of prototype equipments and features. Continue acoustical evaluation of design effort.

h. (u) Continued evaluation of Continued LSV propulsor testing. Completed model shock tests.

2. (U) FY 1990 Program:

a. (U) Complete manufacture and qualification of SEAWOLF SSTG. Conduct land based testing on Improved Propulsion Machinery Program (IPMP II).

b. (U) Conduct shock qualification of those components identified as a result of the SSN699 shock testing to be most susceptible to failure under shock on the SSTV, A/B-1, Full Scale Section #5 (FSS-5).

c. (U) Complete large scale fire testing of SEAWOLF configurations/ materials. Validate fire performance of HM&E systems.

d. (u)

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DECLASSIFY ON: OADR

PROGRAM ELEMENT: 0604561N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: SSN-21 Development
PROJECT NUMBER: S1946 PROJECT TITLE: SSN21 Development

e. (U) Finalize [illegible] scheme. Conduct [illegible] at-sea tests and analyze results.

f. (U) Conduct hull stress analysis evaluation. Conduct NDE to support use of advanced materials. Conduct foundation acoustic design evaluation/validation. Analyze electromagnetic systems.

g. (U) Conduct assessment of [illegible] Lab test prototype power conditioners. Fabricate and evaluate inherently quiet hydraulic pumps. Verify SEAWOLF sonar response model.

h. (U) Commence Ship Control System (SCS) hardware and software integration testing. Validate submerged operating envelope of design.

i. (U) Complete R-114 prototype fabrication and commence qualification testing. Complete shipboard evaluation, receive AFP for SPE Oxygen Generator. Fabricate Advanced Submarine Battery II and III and advanced battery test cells; begin qualification tests.

j. (U) Complete shipyard manufacturing procedures for INCONEL pipe. Complete qualification test and A/B-1 shock test of SEAWOLF shaft seal.

k. (U) Provide [illegible] for SSN-21. Commence [illegible] Continue testing of critical design features.

l. (U) Perform [illegible] model tests to update maneuvering estimates for the [illegible]

3. (U) FY 1991 Plans:

a. (U) Conduct qualification/shock tests of IPMP MPU. Continue seawater systems development.

b. (U) Continue shock qualification tests those identified as a result of the SSN699 shock testing to be most susceptible to failure under shock on the SSTV, A/B-1, FSS-5, and FSS-8.

c. (U) Complete smoke removal system specifications.

d. (U) Continue [illegible] testing. Manufacture [illegible] propulsors.

e. (U) Conduct and analyze [illegible] at-sea tests. Conduct major cost reduction program.

f. (U) Conduct trials and pre-trial evaluation of R&D components.

g. (U) Conduct NDE to support advanced materials. Conduct foundation acoustic design evaluation/validation.

h. (U) T&E [illegible] model. Continue development of duct acoustic treatment. Conduct quiet bearings qualifications.

i. (U) Fabricate and test Automatic Battery Monitor and approve for production.

j. (U) Complete qualification testing of R-114 prototype.

k. (U) Complete SCS prototype fabrication.

l. (U) Continue HY-130 development efforts transferred from PE 0603561N.

4. (U) Program to Completion: This is a continuing program.

PROGRAM ELEMENT: 0604561N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: SSN-21 Development
PROJECT NUMBER: S1946 PROJECT TITLE: SSN21 Development

D. (U) WORK PERFORMED BY: In-House: DTRC Bethesda, MD; NUSC, Newport, RI; NRL, Washington, DC; NAVSSES, Philadelphia, PA; NCSC, Panama City, FL; NOSC, San Diego, CA; SUPSHIP San Francisco, CA; NSWC, Dahlgren, VA; MINSY, Vallejo, CA; PSNSY, Bremerton, WA; PNSY, Portsmouth, NH; ONR, Arlington, VA. Contractors: GD, Electric Boat Division, Groton, CT; NNS, Newport News, VA; ASC, Virginia; Westinghouse Electric Corporation, Pittsburgh, PA; GE, Lynn, MA,. Fitchburg, MA; Binghamton, NY; and Schenectady, NY; LBNSY, Long Beach, CA; TRF, Bangor, WA; NRL, Orlando, FL; DOE, Oak Ridge, TN; NAVSUP Code 015, Washington D.C.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: Additional funding of +$8,684K will be used for HY-130 development.
2. (U) Schedule changes: None
3. (U) Cost changes: None

F. (U) PROGRAM DOCUMENTATION:
TLR 12/85 DCP 5/88 TEMP 5/88

G. (U) RELATED ACTIVITIES: 0603569N (Advanced Submarine Technology), 0603570N (Advanced Nuclear Reactor Systems and Components), 0604567N (Ship Sub Sys Dev), 0604524N (Submarine Combat Systems), and 0604502N (Submarine Communications).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

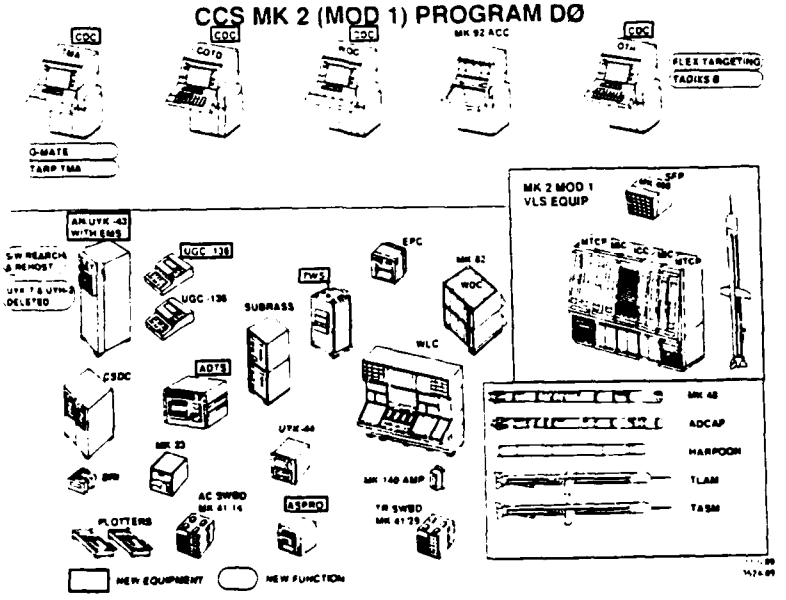
	FY1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
SCN 6(SSN-21)	1,687,700	606,300	3,482,000	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION: This information is contained in FY1991 Congressional Data Sheets.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System (Engineering)
PROJECT NUMBER: S0236 PROJECT TITLE: Attack Submarine Combat Control System Improvement Program (CCSIP)



POPULAR NAME: CCSIP

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		III 9/89		RTF 4Q/89 RTF 3Q/FY93 RTF 2Q/91
Engineering Milestones		CERT 3Q/90		CERT 3Q/92 (MK 2 Mod 0/1) CERT 1Q/94 (MK 2 Mod 2)
T&E Milestones		FAT 12/89		OPEVAL 10/90 MK 2 TECHEVAL 1Q/93 MK 2 OPEVAL 2Q/93
Contract Milestones				
BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract(s)	29,565	53,517	50,759	CONT.
Support Contract(s)	2,771	1,200	3,242	CONT.
In-House Support	10,167	3,372	20,826	CONT.
Other	213	97	190	CONT.
Total	42,716	58,186	75,017	CONT.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System (Engineering)
PROJECT NUMBER: S0236 PROJECT TITLE: Attack Submarine Combat Control System Improvement Program (CCSIP)

B. (U) DESCRIPTION: Soviet attack submarines are expected to incorporate improvements through the 1990's which will make their detection and destruction more difficult. This program counters the evolving threat by supporting engineering development to integrate improved weapons capabilities within the submarine Combat Control System (CCS) MK 1, MK 2, AN/BSY-1 (Combat Control (CC)), and MK 117 Fire Control System. In FY89 and beyond the primary thrust of the CCSIP program is the development and introduction of the CCS Mk 2 Combat Control System. CCS Mk 2 is an evolutionary program that, in conjunction with the AN/BQQ-5E Sonar Suite, will provide for a functionally equivalent combat system onboard SSN 688 Class, SSN 751 Flight (AN/BSY-1 Platforms), and SSBN 726 Class (TRIDENT) submarines. The CCS Mk 2 program makes maximum use of Navy Standards and non-developmental items and replaces obsolete equipment which is no longer in production or has become increasingly difficult to maintain. Typical tasking occurs in the following areas: Develop hardware and software (computer program) to upgrade fleet systems; integrate new capabilities into a single configuration CCS; provide Land Based Test Facilities to support development efforts and test interfacing programs; conduct testing, technical and operational evaluation for MK 117 Fire Control System, Combat Control System (CCS) MK 1, MK 2, and AN/BSY-1 (CC).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued testing of improvements in all programs.
   b. (U) Completed testing of CCS MK 1 Program C4.1.
   c. (U) Continued development of Program C4.2.
   d. (U) Began development of CCS Mk 2 Software Program DO.
   e. (U) Completed CCS Mk 2 System Requirements Review (SRR).
   f. (U) Completed CCS Mk 2 System Design Review (SDR).
   g. (U) Approved CCS Mk 2 System functional baseline.
   h. (U) Delivered Interim C4.2 AN/BSY-1 build April 89.
   i. (U) September 1989 C4.1 NPDM held to approve C4.1 release to fleet.

2. (U) FY 1990 Program:
   a. (U) Continue testing of all programs.
   b. (U) Complete FAT/CERT/SDCT for Program C4.2 (See Paragraph E).
   c. (U) Support TECHEVAL and OPEVAL of Program C4.2 (See Paragraph E).
   d. (U) Monitor performance of CCS MK 2 Program DO prime contractor.
   e. (U) Initiate planning for follow-on CCS Mk 2 Development Contract (D1/D2).
   f. (U) Complete Mk 2 SSR Mods 0/1, 2 and 3 and establish the S/W allocated baseline.
   g. (U) Complete Mk 2 PDR Mod 0/1.

PROGRAM ELEMENT: 0604562N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System (Engineering)
PROJECT NUMBER: S0236 PROJECT TITLE: Attack Submarine Combat Control System Improvement Program (CCSIP)

3. (U) FY 1991 Plans:

a. (U) Complete CCS MK 2, Program D1/D2 specifications and related acquisition documentation to support competitive procurement.

b. (U) Conduct Critical Design Review for CCS Mk 2 Mods 0/1 and 3 Program DO Software.

c. (U) Release Program C4.2 to the Fleet (See Paragraph E).

d. (U) Complete Mk 2 PDR Mods 2 and 3.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NAVSEASYSCOM, Washington, DC; COMOPTEVFOR Norfolk, VA; NUSC, Newport, RI; Naval Underwater Weapons Engineering Station, Keyport, WA; Naval Ship System Combat Engineering Station, Norfolk, VA; NOSC, San Diego, CA; Naval Weapon Support Center, Crane, IN. Contractors: UNISYS, St. Paul, MN; Raytheon, Portsmouth, RI; Lockheed, Austin, TX; LORAL Corporation, Akron, OH; EG&G Washington Analytical Services, Inc., Rockville, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technical changes: None.

2. (U) Schedule changes: None.

3. (U) Cost changes: The increased funding in FY 91 of $1,315 will be used for an independent validation and verification effort for the CCS MK 2 software development program.

F. (U) PROGRAM DOCUMENTATION:

NDCP (S0236-05)	9-88 (CCS Mk 2)
NDCP (S0236-AS)	12-87 (Programs C4 and C5)
NDCP (S0236-04)	8-89 (Program C4.1 MS III)
AP-111-87	9-87
TEMP 234-9	9-88 (CCS Mk 2)

G. (U) RELATED ACTIVITIES:

1. (U) WEAPONS: PE 0604367N, TOMAHAWK Cruise Missile; PE 0604675N, MK 48 Advanced Capability Torpedo; PE 0604601N, Submarine Launched Mobile Mine; and PE 0604370N, SSN 688 Class Vertical Launch System.

2. (U) SENSORS: PE 0604707N, Over the Horizon Targeting; PE 0603708N, Acoustic Performance Prediction; PE 0604503N, Submarine Sonar Improvement; PE 0604502N, Submarine Tactical Communications System; PE 0603504N, Submarine Sonar Development.

3. (U) OTHER: PE 0604524N, AN/BSY-1; to minimize duplicative work and maximize operational and logistic commonality. CCS MK 1 hardware and software components are used in the Combat Control Subsystem of AN/BSY-1.

PROGRAM ELEMENT: 0604562N BUDGET ACTIVITY: 4 - Tactical Programs
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System (Engineering)
PROJECT NUMBER: S0236 PROJECT TITLE: Attack Submarine Combat Control System Improvement Program (CCSIP)

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989	FY 1990	FY 1991	TO	TOTAL
APPN701	ACTUAL	ESTIMATE	ESTIMATE	COMPLETE	PROGRAM
OPN #236	61,221	49,198	62,459	CONT.	CONT.
All Digital Attack Center (ADAC)					

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA:
1986: TOMAHAWK OPEVAL with Program C1.3
1987: Program C1.4 TECHEVAL, ADCAP TECHEVAL/OPEVAL with C4T
1988: CCS MK 1 with Program C4.1 TECHEVAL and OPEVAL
1989: MK 117 with Program C4.1 FOT&E
1990: CCS MK 1 with Program C4.2 TECHEVAL and OPEVAL
(See Paragraph E)

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N Budget Activity: 4
PROGRAM ELEMENT TITLE: SHIP SUBSYSTEM DEVELOPMENT/LBTS

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0857	SHIP SUBSYSTEM DEV/LBTS	16,137	4,894	0	0	238,281
S1803	SHIP CONTRACT DESIGN	39,030	36,499	36,505	CONT.	CONT.
S2037	NFR-90	0	9,336	1,033	CONT.	CONT.
TOTAL		55,167	50,729	37,538	CONT.	CONT.

B. (U) DESCRIPTION OF ELEMENT: Conduct necessary engineering development of contractual packages for acquisition of ships in the Navy's Shipbuilding Program. Support Land Based Test Sites for ship systems to be incorporated in the design and construction of these ships. Support project definition (NATO equivalent of contract design) for the NATO Frigate Replacement for the 1990's (NFR-90). This package constitutes the minimum level of design effort necessary to support the Navy shipbuilding requirements.

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N Budget Activity: 4
PROGRAM ELEMENT TITLE: SHIP SUBSYSTEM DEVELOPMENT/LBTS
PROJECT NUMBER: S0857 PROJECT TITLE: SHIP SUBSYSTEM DEVELOPMENT/LBTS

C. (U) PROJECT DESCRIPTION: This project supports the engineering development of specific selected ship systems, subsystems, or components which are required for the effective design of ships in the Navy's Shipbuilding Program. When Land Based Test Sites (LBTS) are required in the engineering development of these systems or subsystems, this project provides funds for planning and operation of the test sites.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed LSD-41 propulsion system land based testing.
   b. (U) Continued DDG-51 machinery control system development and testing.

2. (U) FY 1990 PROGRAM:
   a. (U) Complete DDG-51 machinery control system development and propulsion system ingegrated testing.

3. (U) FY 1991 PLANS: Not applicable.

4. (U) PROGRAM TO COMPLETION: Program will resume in outyears to support the BFC and possible application of Integrated Electric Drive to DDG-51.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVSSES Philadelphia, PA; NSWSES, Port Hueneme, CA; Philadelphia Naval Shipyard, Philadelphia, PA; DTRC Bethesda, MD. CONTRACTORS: General Electric, Daytona Beach, FL.

F. (U) RELATED ACTIVITIES: Program Element 0603508N (Ship Propulsion Systems); Program Element 0603573N (Electric Drive); Program Element 0603513N (Shipboard Auxiliary System Spt.)

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands): This is a non-acquisition program.
   (U) PROCUREMENT: None
   (U) MILCON: None

H. (U) INTERNATIONAL AGREEMENTS: None.

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N Budget Activity: 4
PROGRAM TITLE: SHIP SUBSYSTEM DEVELOPMENT/LBTS
PROJECT NUMBER: S1803 PROJECT TITLE: SHIP CONTRACT DESIGN

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1803	SHIP CONTRACT DESIGN	39,030	36,499	36,505	CONT.	CONT.

B. (U) DESCRIPTION: This project performs the engineering development of contractual documentation for the acquisition of ships in the Navy's Shipbuilding Program. All ship acquisitions require pre-award design and planning. The end product of the Contract Design Phase is the technical and contractual definition of the ship design (e.g., ship specifications and drawings), with sufficient details for prospective shipbuilders to make a sound estimate of construction cost and schedule.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Completed CV-64(SLEP) contract design.
   b. (U) Continued CV-67(SLEP), TAGOS(SW-A), TAG-45(MIZAR), LHD-5, CRAFT, DDG-51 Flt.2, NFR-90 contract design.
   c. (U) Began MHC-52, TAGS(O) contract design.
   d. (U) Resumed Specification Improvement Program.

2. (U) FY 1990 PROGRAM:
   a. (U) Complete TAG-45(MIZAR), TAGSO contract design.
   b. (U) Continue TAGOS(SW-A), LHD-5, CRAFT, DDG-51 Flt.2, MHC-52, AGOR-24 contract design.
   c. (U) Begin AGOS, AOE-10, TAGSO(ICE) contract design.
   d. (U) Continue Specification Improvement Program.

3. (U) FY 1991 PLANS:
   a. (U) Complete LHD-5 contract design leading to a FY 91 award.
   b. (U) Continue DDG-51 Flt.2, AGOR-24, TAGOS(SW-A), CRAFT, MHC-52, AOE-10, TAGSO(ICE), AGOS contract design.
   c. (U) Begin AR(X) and AGOS contract designs.
   d. (U) Continue Specification Improvement Program.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Systems Engineering Station, Phila., PA, David Taylor Research Center, Bethesda, MD. CONTRACTORS: Gibbs & Cox, New York, NY, Bath Iron Works, Bath, ME, JJMA, Inc., Arlington, VA, Advanced Marine Enterprises, Arlington, VA.

PROGRAM ELEMENT: 0604567N Budget Activity: 4
PROGRAM TITLE: SHIP SUBSYSTEM DEVELOPMENT/LBTS
PROGRAM NUMBER: S1803 PROJECT TITLE: SHIP CONTRACT DESIGN

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology Changes: Not Applicable
2. (U) Schedule Changes: Not Applicable
3. (U) Cost Changes: -7,377 FY91 delays start of DDG-51 Flt III contract design consistent with SCN production; SSN-21 contract design planned for FY 91 deleted for lack of requirement.

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: Program Element 0603564N (Ship Development (Adv.))

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable
(U) PROCUREMENT: None
(U) MILCON: None

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: See project S2037 for NFR-90 description.

J. (U) MILESTONE SCHEDULE:

SHIP	FISCAL YEAR OF AWARD
AGOR-23, AO(J), TAGS-51	FY 88
TAGSO, TAG-45(MIZAR), MHC, TAGOS(SW-A)(LEAD)	FY 90
LHD-5	FY 91
AOE-10, AGOR-24, DDG-51 Flt 2, TAGSO(ICE)	FY 92
AGOS, TAGOS(SW-A)	FY 93
DDG-51 Flt 3, AR(X)	FY 94

FY 1991 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: SHIP SUBSYSTEM DEVELOPMENT/LBTS
PROJECT NUMBER: S2037 PROJECT TITLE: NFR-90

C. (U) PROJECT DESCRIPTION: This project is a cooperative agreement among the NATO nations to develop a frigate replacement for the 1990's (NFR-90). The NFR-90 project is NATO's largest naval cooperative project with the United States as one of the four nations participating in this frigate development effort. Due to the international agreement to develop this ship class, a separate project line has been initiated in FY-90. The goal of this project is to provide a ship with enhanced interoperability between the NATO nations while achieving acquisition and life cycle cost savings.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: See Project S1803.

2. (U) FY 1990 PROGRAM: Continue NFR-90 project definition which is comparable to our preliminary design phase.

3. (U) FY 1991 PLANS: Complete NFR-90 project definition.

4. (U) PROGRAM TO COMPLETION: Project will continue until ship award which will be determined after Project Definition Phase.

E. (U) WORK PERFORMED BY: IN-HOUSE: David Taylor Research Center. CONTRACTOR: U.S. Participant in the ISS is Westinghouse as prime with Designers and Planners, Inc., Arlington, VA, Adtech, Inc., Arlington, VA.

F. (U) RELATED ACTIVITIES: NATO AAW Systems, P.E. 0603319N.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.
(U) PROCUREMENT: None
(U) MILCON: None

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

1. NFR-90:
- A collaborative program for the design of a replacement frigate for the 1990's.
- The program has been in existence since 1981.
- Countries involved are Canada, Netherlands, Spain, and the United States with each country sharing international costs.
- Funding Agreement:

	84	85	86	87	88	89	90	91
DON 0603564N	0.9	2.0	-	-	-	-	-	-
DON 0604567N	-	-	1.0	0.4	3.8	8.6	9.6	1.0
NUNN 060379ON	-	-	3.2	3.2	1.0	-	-	-

PROGRAM ELEMENT: 0604574N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Standard Embedded Computer Resources (SECR)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1353	Standard Hardware System	6,695	12,595	9,762	Cont.	Cont.
X0911	Computer Security	0	1,387	2,110	Cont.	Cont.
X1976	Next Generation Computer	3,710	12,208	14,222	Cont.	Cont.
W0845	AYK-14	(4,449)*	2,988	5,700	6,525	78,702
	TOTAL	10,405	29,178	31,794	Cont.	Cont.

* Funded in 1989 in Program Element 0604203N

B. (U) DESCRIPTION: Standard Embedded Computer Resources include computers, display systems, peripherals, and associated software. These equipments are not stand-alone units. Rather, they are integral building blocks of larger weapons, sensor, and C3I systems. By requiring these large systems to use the same (Standard) equipment, we avoid many difficult logistics support, documentation and training problems throughout their life in the Fleet. This program provides the technical planning and engineering support for development and evolution of the Navy's high performance embedded computer resources. The program includes product improvement of current generation computers AN/AYK-14, AN/UYK-43 and AN/UYK-44; development of the Acoustic Video Processor for ASW applications; development of state-of-the-art mass memory storage devices (MMSD); development of computer security products; development of the next generation computer resource standards; and incorporation of VHSIC technology into the Navy's standard airborne computer, the AN/AYK-14.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Standard Embedded Computer Resources (SECR)
PROJECT NUMBER: S1353 PROJECT TITLE: Standard Hardware Systems

C. (U) DESCRIPTION: To meet evolving needs for higher performance embedded computer resources, product improvements for the AN/UYK-43 and AN/UYK-44 will be implemented, color capabilities for the AN/UYQ-21 display monitors will be developed, and development of the Acoustic Video Processor (AVP) will be continued. Mass memory storage devices (MMSD) and magnetic tape units must also be developed to replace aging units. Virtually all Navy platforms except aircraft use some or all of these equipments and require these enhancements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Evaluated contract proposals and awarded FSED contract for MMSD.
   b. (U) Started Operational Suitability Testing (OST) of AVP in SQQ-89 ASW System.
2. (U) FY 1990 PROGRAM:
   a. (U) Complete AVP FSED.
   b. (U) Continue OST of AVP in SQQ-89 ASW System.
   c. (U) For AVP, transition to production and conduct follow-on OST.
   d. (U) For AN/UYK-43, begin development of high performance central processing unit (CPU), the time-critical co-processor and embedded mass memory.
   e. (U) For AN/UYK-44, begin development of high performance CPU, high bandwidth memory, local area network and fiber optic interfaces.
   f. (U) For AN/UYQ-21 color displays, develop.
   g. (U) For MMSD, evaluate design through FSED and monitor development.
3. (U) FY 1991 PLANS:
   a. (U) For AVP, complete testing and IOC.
   b. (U) For AN/UYK-43, deliver EDM high performance CPUs and pre-production unit co-processors and begin high performance memory design.
   c. (U) For AN/UYK-44, deliver EDM high performance CPUs.
   d. (U) For AN/UYQ-21 color displays, initiate NDI competitive solicitation.
   e. (U) For MMSD, perform independent Government Environmental testing and operational test and evaluation of final product.
   f. (U) For replacement magnetic tape units, investigate requirements and develop RFP.
4. (U) PROGRAM TO COMPLETION:
   a. (U) These are continuing programs.

E. (U) WORK PERFORMED BY: IN-HOUSE: NUSC, Newport, RI; NSWC, Dahlgren, VA; NAVWPNSUPPCEN Crane, IN; FCDSSA, Dam Neck, VA; FCDSSA, San Diego, CA; NOSC, San Diego, CA; NADC Warminster, PA. CONTRACTORS: Johns Hopkins University/Applied Physics Lab, Laurel, MD; Unisys Corp., St. Paul, MN, Pueblo, CO and Clearwater, FL; Diagnostic Retrieval Systems, Oakland, NJ; Control Data Corp., Minneapolis, MN; Hughes, Fullerton, CA; Raytheon, Goleta, CA; Microlithics Inc., Golden, CO.

F. (U) RELATED ACTIVITIES: All Navy non-avionics programs using Standard Embedded Computer Resources, including AEGIS, NTDS, BSY-2, TRIDENT, ACDS, as well as numerous Marine Corps, FMS and other service projects.

G. (U) OTHER APPROPRIATION FUNDS:

APPN		FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE
OPN #332975	UYK-43 Second Source	7,747	3,250	500	Cont.
	UYK-43 Improvement	0	1,700	2,700	Cont.
	UYK-44 Improvement	0	1,200	1,900	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Non

PROGRAM ELEMENT: 0604574N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Standard Embedded Computer Resources (SECR)
PROJECT NUMBER: X0911 PROJECT TITLE: Computer Security

C. (U) DESCRIPTION: This project develops the necessary capabilities to establish secure computer environments in Navy programs. DODD 5200.28 is the authority for determining system trust and mandates that all DOD computer systems processing classified or sensitive data will meet class C2 (Controlled Access Protection) by 1992. This project develops products cooperatively with industry (e.g., methods and models for use by systems developers, performance measurement techniques and guidelines for database management, network, backplane and operating system implementations) which satisfy generalized Navy computer security requirements such as: sanitization and transfer of intelligence information for command and control (SI and GENSER), system monitoring and detection of unauthorized use or intrusion into computer systems, and Multi-Level Security (MLS) for access control for computers and decision aid systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Not applicable.
2. (U) FY 1990 PROGRAM:
   a. (U) Begin development of trusted products for integrated Mission Critical Computer Resources (MCCR).
   b. (U) Begin development of Multi-Level Secure (MLS) Risk Modeling Tools.
   c. (U) Evaluate trusted version of MACH operating system (TMACH) for Navy Desk Top Computer (DTC).
   d. (U) Evaluate MLS issues in Open Systems Architecture.
3. (U) FY 1991 PLANS:
   a. (U) Continue development trusted products for integrated MCCR.
   b. (U) Continue development of MLS Risk Modeling Tools.
   c. (U) Continue evaluation of MLS in Open Systems Architecture.
   d. (U) Begin Computer Security (COMPUSEC) testbed development for integrated hardware and software certification.
   e. (U) Complete evaluation of TMACH for Navy DTC.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.
   a. (U) Continue development of trusted products for integrated MCCR.
   b. (U) Continue development of MLS Risk Modeling Tools.
   c. (U) Continue evaluation of MLS Open Systems Architecture.
   d. (U) Continue COMPUSEC testbed development.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA. MAJOR CONTRACTOR : To be determined competitively.

F. (U) RELATED ACTIVITIES:
PE 0301567G Consolidated Computer Security Program
PE 0602301E Research, Development Test and Evaluation, Defense Agencies.
PE 0602234N System Support Technology

G. (U) OTHER APPROPRIATION FUNDS: None. This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

PROGRAM ELEMENT: 0604574N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Standard Embedded Computer Resources (SECR)
PROJECT NUMBER: X1976 PROJECT TITLE: Next Generation Computer Resources (NGCR)

A. (U) RESOURCES (Dollars in Thousands)

Project Number	Title	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETION	TOTAL PROGRAM
X1976	NGCR	3,710	12,208	14,222	Continuing	Continuing

B. (U) DESCRIPTION: The Next Generation Computer Resources (NGCR) program will establish a set of Navy and industry jointly defined computer hardware and software interface standards and take maximum advantage of ongoing commercial trends and standardization in these three major areas:

MultiProcessor Interconnect	Multisystem Interconnects	Software
Backplane	Local Area Net-SAFENET I	Operating System
High Performance Backplane	Local Area Net-SAFENET II	Database Mgmt. Sys.
Switch Network	High Performance Local Area Network (LAN)	Program Support Environment (PSE)
		Graphics Language and Interface

The NGCR program encompasses or is affiliated with all future embedded computer resources for the full range of Navy MCCR shipboard, aircraft and shore-based systems. NGCR standards will provide for a wide range of functions from data manipulation and communications routing to signal and symbolic processing.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Started the development of certification methodology and procedures.
   b. (U) Started developing a MIL-SPEC for "ruggedized commercial equipment".
   c. (U) Started the Integrated Logistics Support Plan (ILSP).
   d. (U) Established industry/Navy working group for definition of standard for SAFENET II LAN.
   e. (U) Established industry/Navy working group for definition of standard for Operating Systems (OS).
   f. (U) Awarded backplane and SAFENET I & II LANs standards laboratory test model contract.
   g. (U) Initiated OS laboratory test model contract effort.
   h. (U) Continued engineering studies.
   i. (U) Continued industry/Navy working groups definition of interface standards for SAFENET I LAN and backplane.
   j. (U) Published draft of SAFENET I LAN interface standard.
   k. (U) Completed program documents: PMP, AP.
   l. (U) Completed Milestone I.
2. (U) FY 1990 PROGRAM:
   a. (U) Start building SAFENET interim certification capabilities development/operation to support early user (NCCS Afloat and others) program schedules.

b. (U) Begin engineering studies for Switch Network, Data Base Management System (DBMS), Programming Support Environment (PSE), and Graphics Interface standards.

c. (U) Continue industry/Navy working groups for definition of interface standards for backplane, OS, and SAFENET I & II LANs.

d. (U) Continue definition of a MIL-SPEC for "ruggedized commercial equipment".

e. (U) Continue development of ILSP.

f. (U) Award OS standards laboratory test model contracts (engineering analysis, Ada compilation systems).

g. (U) Award backplane and SAFENET I & II LANs laboratory test model contracts.

h. (U) Publish SAFENET I LAN interface standard and handbook.

i. (U) Publish draft interface standards for backplane and SAFENET II LAN.

3. (U) FY 1991 PLANS:

a. (U) Start engineering studies for High Performance LAN (HP LAN).

b. (U) Start backplane and SAFENET I & II LANs systems integration support with user programs.

c. (U) Establish industry/Navy working group to define standards for Switch Network.

d. (U) Transition SAFENET I LAN to a maintained industry standard.

e. (U) Begin plans for Integration and Certification Facility at an existing software support activity.

f. (U) Continue backplane and SAFENET I & II LANs standards laboratory test model contracts.

g. (U) Continue OS standards laboratory test model contracts (engineering analyses, Ada compilation system).

h. (U) Continue development of certification methodology and procedures.

i. (U) Continue Working Groups to define and to publish interface standards; backplane, SAFENET I & II LANs, OS.

j. (U) Continue engineering studies for DBMS, PSE, and Graphics Interface standards.

k. (U) Continue definition of a MIL-SPEC for "ruggedized commercial equipment".

l. (U) Continue SAFENET LAN interim certification testing to support initial standards users.

m. (U) Publish SAFENET II LAN interface standard and handbook.

n. (U) Award OS standards laboratory test model contracts (prototypes).

4. (U) PROGRAM TO COMPLETION:

a. (U) Continue working groups to publish interface standards.

b. (U) Continue Certification Facility Development/Certification process.

c. (U) Publish following Standards: backplane bus; High performance backplane Bus; Switch Networks; High Performance Local Area Network; Network Operating System; database management; and programming support environment standards.

d. (U) Complete Certification Facility definition and place in operation.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Standard Embedded Computer Resources (SECR)
PROJECT NUMBER: X1976 PROJECT TITLE: Next Generation Computer Resources (NGCR)

e. (U) Complete Prototypes for backplane bus, SAFENET I & II, and Operating System standards.

f. (U) Award contracts for test bed for Certification Facilities.

g. (U) Complete SAFENET I & II standards prototypes contracts.

h. (U) This is a continuing program to derive interface standards for the Navy's Next Generation of Computer Resources.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NAVAIRDEVCEN, Warminster, PA; NAVAVIONICCEN, Indianapolis, IN; NAVSWC, Dahlgren, VA; NAVAIRTESTCEN, Patuxent River, MD; NAVWPNCEN, China Lake, CA; NUSC, Newport, RI; NAVWPNSUPPCEN, Crane, IN. CONTRACTORS: Numerous companies participating in the working groups (at their expense). Competitive contracts (to be awarded) with multiple vendors for laboratory test models of selected NGCR standards.

E. (U) COMPARISON WITH REVISED FY 1990/1991 BIENNIAL PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: NONE
2. (U) SCHEDULE CHANGES: NONE
3. (U) COST CHANGES: NONE

F. (U) PROGRAM DOCUMENTATION:

Acquisition Plan	05/89
Program Master Plan	06/89
OR	08/88

G. (U) RELATED ACTIVITIES: The following Program Elements fund the development of broad based computer systems technology and products providing the basis for transition to the NGCR Program under project X1976.
Program Element 0601101E, Defense Research Sciences
Program Element 0602301E, Strategic Technologies
Program Element 0602708E, Integrated Command and Control Technology
Program Element 0603223C, Systems Concepts and Battle Management

H. (U) OTHER APPROPRIATION FUNDS: None. This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:
Milestone I - 2Q FY89
Milestone II - 4Q FY92
Milestone III - 2Q FY96

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Standard Embedded Computer Resources (SECR)
PROJECT NUMBER: W0845 PROJECT TITLE: AN/AYK-14

C. (U) DESCRIPTION: Navy Standard Airborne Computer (AN/AYK-14) project provides for airborne digital computer requirements. The objective is to reduce proliferation of unique Contractor Furnished Equipment computer systems. A standard design, flexible enough to permit its use in a wide variety of applications has been developed. Design flexibility permits technology infusion which keeps pace with new requirements through product improvement. Very High Speed Integrated Circuit (VHSIC) infusion, funded in part by DOD, will provide an ADA machine with 4+ Million Instruction Per second (MIP) capability. The AN/AYK-14(V) is supplied as GFE to Navy weapon systems including the F/A-18, F-14D, V-22, AV-8B, E-2C, EA-6B, SH-60B, EP-3, Automatic Carrier Landing System (ACLS), MK-50 torpedo, CV-FTAS, VP-FTAS and Army JSTARS.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under PE 0604203N)
   a. (U) Delivered and began test of first 32-bit VHSIC processor module.
   b. (U) Completed analysis of other candidate VHSIC insertion upgrades.

2. (U) FY 1990 PROGRAM:
   a. (U) Continue development of VHSIC processor support circuitry.
   b. (U) Start delivery of VHSIC pre-production units.

3. (U) FY 1991 PLANS:
   a. (U) Complete AN/AYK-14 VHSIC improvement developments.
   b. (U) Start production VHSIC deliveries.
   c. (U) Continue follow-on development of state-of-the-art technology infusion for AN/AYK-14(V) in support of user requirements. These include:
      (1). (U) Begin developing 50MHz fiberoptic 32-bit data bus to alleviate F/A-18 input/output deficiencies and serve as the high throughput bus for future generation airborne computer standards.
      (2). (U) Begin developing embedded video processor for interface to new displays to overcome screen refresh latency on F/A-18.
      (3). (U) Qualify a 32-bit AYK-14 computer configuration for the E-2C.

4. (U) PROGRAM TO COMPLETION:
   a. (U) This program completes in FY92 and reverts to sustaining engineering thereafter.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAC, Indianapolis, IN; NADC, Warminster, PA; NOSC, San Diego, CA; NATC, Patuxent River, MD; NSWC, Silver Spring, MD. CONTRACTORS: Control Data Corporation, Minneapolis, MN; UNISYS, St. Paul, MN; UNISYS, Pueblo, CO.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	TO COMPLETE
APN/3,6,8,10,14,17,22	Not Applicable				Continuing

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604577N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Extremely High Frequency Satellite Communications

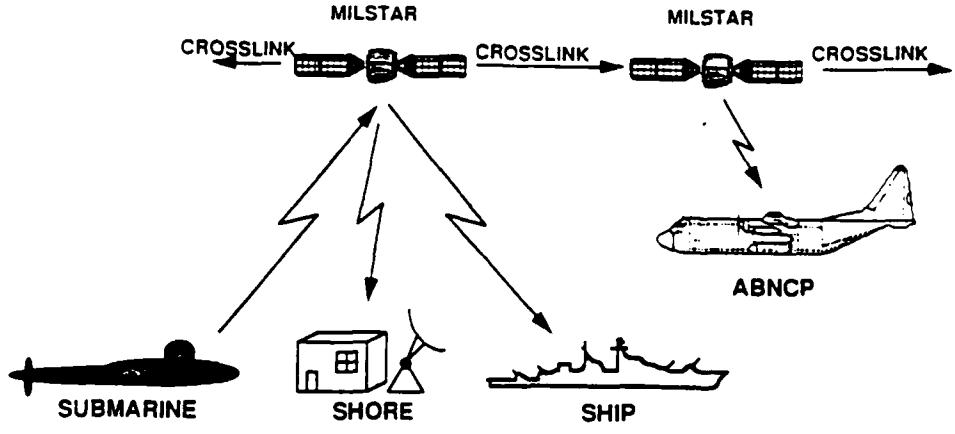
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0728	Extremely High Frequency Satellite Communications Terminals	27,399	20,269	17,579	Cont.	Cont.
X1660	Navy Fleet Satellite Communications Extremely High Frequency Package	4,003	1,999	0	0	170,873
TOTAL		31,402	22,268	17,579	Cont.	Cont.

B. (U) DESCRIPTION: This program develops Navy Extremely High Frequency Satellite Communications terminals and two Navy satellite communication packages. The terminals will be compatible with the joint service Milstar System. The terminals and satellite system meet a fleet requirement for survivable, reliable, wartime, low probability of intercept, anti-jam communications under projected threat environments. The Fleet Satellite Communications Extremely High Frequency Package (FEP) will provide an orbital test and evaluation capability to support Army, Navy and Air Force terminal production decisions prior to Milstar deployment, and provide an early, limited operational capability.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604577N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Extremely High Frequency (EHF) Satellite Communications
PROJECT NUMBER: X0728 PROJECT TITLE: Navy EHF Satellite Comms Program



POPULAR NAME: NESP

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
Program Milestones	MS IIIA		MS IIIB	
Engineering Milestones			Complete 1st Article Test	
T&E Milestones	DT-IIF	DT-IIG/TECHEVAL DT-IIJ/OPEVAL	Tri-Service Interop Test	Milstar DT/OT
Contract Milestones	Limited Prod. Award 10/89		Full Prod. Award 10/91	

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Prog. Total
Major Contract	14,776	8,372	5,991	Continuing
Support Contract	3,338	2,572	2,268	Continuing
In-House Support	9,285	9,325	9,320	Continuing
GFE/ Other	0	0	0	Continuing
Total	27,399	20,269	17,579	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604577N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Extremely High Frequency (EHF) Satellite Communications
PROJECT NUMBER: X0728 PROJECT TITLE: Navy EHF Satellite Comms Program

B. (U) DESCRIPTION: Navy EHF Satellite Communications Program develops terminals to provide wartime communications capability for Command and Control of the fleet. The terminals will provide physically and electromagnetically survivable, worldwide anti-jam and low probability of intercept communications in the current and projected electromagnetic and nuclear threat. The increased capability provided by EHF Satellite Communications terminals is accomplished by use of the wider bandwidths available at extremely high frequencies, narrow antenna beamwidths, spread spectrum techniques, on-board satellite processing and advanced signal processing technology.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Studied Information Exchange Systems (IXS) Interface and Navy Tactical Data System Interface.
   b. (U) Completed Milstar Enhanced Design Verification Model Testing (DT-IIF).
   c. (U) Gained approval for limited production (MS IIIA).
   d. (U) Completed Tri-Service Interoperability Testing (Phase II).
   e. (U) Procured First Article Test (FAT) hardware.
2. (U) FY 1990 PROGRAM:
   a. (U) Complete Phase II Terminal Performance Testing (DT-IG).
   b. (U) Complete TECHEVAL Testing.
   c. (U) Complete Milstar Development Flight Satellite Compatability Testing (DT-IIJ).
   d. (U) Complete OPEVAL.
   e. (U) Commence development of an EHF IXS Interface Unit.
   f. (U) Review MILSTAR modifications for impact on EHF terminals.
   g. (U) Conduct Milstar joint service testing under Milstar joint test plan guidance.
   h. (U) Start limited rate production.
   i. (U) Begin design of operator and maintenance training system.
   j. (U) Complete Tri-Service Interoperability Testing (Phase II).
3. (U) FY 1991 PLANS:
   a. (U) Continue Milstar and Tri- Service Interoperability Testing (Phase IV).
   b. (U) Continue development of EHF IXS.
   c. (U) Continue review of Milstar modifications for EHF impacts.
   d. (U) Continue follow-on testing with on-orbit EHF package.
   e. (U) Commence EHF antenna group engineering changes.
   f. (U) Start First Article Testing.
4. (U) PROGRAM TO COMPLETION:
   a. (U) Complete Milstar testing.
   b. (U) Complete development of emergent Milstar Modifications.
   c. (U) Develop and test gyro engineering changes.
   d. (U) Complete integration of initial training system.
   e. (U) Gain approval and complete full rate production.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604577N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Extremely High Frequency (EHF) Satellite Communications
PROJECT NUMBER: X0728 PROJECT TITLE: Navy EHF Satellite Comms Program

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NUSC, New London, CT; NAVELEXSYSENGCEN, Vallejo, CA; NRL, Washington, DC; NAVSWC, White Oak, MD; NAVELEXSYSENGCEN, Charleston, SC. CONTRACTORS: Raytheon, Sudbury, MA; Booz, Allen & Hamilton Inc., Bethesda, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:
(U) DCP X0728, 4/89.
(U) TEMP Number 784 (Rev. 1), 4/89.
(U) Joint Milstar Communications Control and Operations Concept (JMCCOC) Vol I (1ST Rev.- 6/89) and Vol II (1ST Rev.- 8/89).
(U) Milstar Multi-service TEMP, 2/88.

G. (U) RELATED ACTIVITIES:
(U) PE 0303601F, Air Force Satellite Communications.
(U) PE 0303603F, Milstar.
(U) PE 0303603N, Milstar Joint Terminal Program Office.
(U) PE 0303142A, Extremely High Frequency Communications Terminal.
(U) PE 0602721N, Navy Extremely High Frequency Exploratory Development Program.

H. (U) OTHER APPROPRIATION FUNDS: (Quantities/Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	Total PROGRAM
I. (U) PROCUREMENT				
*OPN #140 (NN107)		12/54,079	35/51,980	Cont.
*OPN #141 (NP109)	2/9,144	5/21,269	5/5,837	Cont.

* Includes completion of first article test funding and procurement of data, submarine report back processors, depot equipment and fleet maintenance activity equipment, in addition to NESP terminals.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: None

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604601N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Mine Development (Engineering)

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0267	Mine Improvements	4,646	4,936	5,481	CONT.	CONT.
S0272	Mine Systems Development	5,381	6,414	6,963	CONT.	CONT.
Total		10,027	11,350	12,444	CONT.	CONT.

B. (u) DESCRIPTION: This program provides for engineering, development, support systems, test models, tests and other Mine Warfare related research and development to counter current and future enemy submarines and surface ships. The Mine Improvements project (S0267) is specifically aimed at improving existing mine subsystems or components to maintain operational effectiveness, quality, and reliability. Efforts include elements such as: sensors, software, power supplies, flight gear, and training systems. The Mine Systems Development Project (S0272) is for development of major subsystems of mines. Current specific elements are the Target Detecting Device MK 71 and the Safety and Arming Device MK 75.

CLASSIFIED BY: OPNAVINST S5513.7B
DECLASSIFY ON: OADR

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604601N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Mine Development (Engineering)
PROJECT NUMBER: S0267 PROJECT TITLE: Mine Improvements

C. (U) DESCRIPTION: Through research and engineering, including modeling and testing, develop capability improvements to mine subsystems and components. Developments may be quick-response to meet an urgent performance requirement, or may be long-term to ensure continued effectiveness and quality of the Navy mine stockpile. Ongoing or planned efforts are: mine subsystem improvements in sensors, power sources, software/logic; for existing and developmental mines.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Completed Technical and Operational Evaluation of the MK 164 Flight Gear Kit (includes Tail Section MK 16).
b. (U) Continued improvements in sensors, software/logic, minefield planning and operational capability.
c. (u) Completed specifications and drawing package for a mine battery utilizing , procured prototype batteries.
d. (u) Continued improvements to the and performance envelope for the ASW mine system.
2. (U) FY 1990 Program:
a. (U) Continue improvements in mine detection sensors, software/logic, minefield planning, and operational capability.
b. (U) Complete specifications for the MK 164 Flight Gear Kit and lithium batteries.
3. (U) FY 1991 Plans: Continue improvements in sensors, power sources, software/logic, minefield planning, and operational capability.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NSWC, White Oak, MD; NCSC, Panama City, FL; and Naval Mine Warfare Engineering Activity, Yorktown, VA. Contractors: Yardney-Whitaker, Waltham, MA.

F. (U) RELATED ACTIVITIES: Mine Systems Development (PE 0604601N-S0272); Improved CAPTOR (PE 0603601N-S2024).

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

CLASSIFIED BY: OPNAVINST S5513.7B
DECLASSIFY ON: OADR

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604601N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Mine Development (Engineering)
PROJECT NUMBER: S0272 PROJECT TITLE: Mine Systems Development

C. (U) DESCRIPTION: QUICKSTRIKE series mines are a family of modern bottom mines adapted from 500/1,000/2,000 lb. general-purpose bombs and a 2,000 lb. MK 65 mine, coupled with associated Safety and Arming (S/A) Devices, Flight Gear, and Target Detecting Devices (TDD). They are capable of rapid preparation for use, and provide the target response, countermeasures resistance, and in-water life required to fulfill existing operational needs. The mines are capable of delivery from a wide variety of aircraft over the full range of their bomb delivery speed/altitude envelopes. This program develops a new Target Detecting Device TDD MK 71 used in the QUICKSTRIKE Mod 3 system. Also included are Safety and Arming Devices, Flight Gear, and test equipment, and development of a system for high volume cargo aircraft and Surface Ship mine delivery.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Completed TECHEVAL of the MK 75 S/A.
b. (U) Awarded Full Scale Development contract for QUICKSTRIKE Mod 3 System/TDD MK 71.
2. (U) FY 1990 Program:
a. (U) Continue FSD of the QUICKSTRIKE Mod 3 System/TDD MK 71.
b. (U) Complete OPEVAL and obtain approval for production (AFP) of the MK 75 S/A.
3. (U) FY 1991 Plans:
a. (U) Complete FSD of the QUICKSTRIKE Mod 3 System/TDD MK 71.
b. (U) Begin TECHEVAL of the QUICKSTRIKE Mod 3 System/TDD MK 71.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NSWC, White Oak, MD and NAVMINEWARENGACT, Yorktown, VA. Contractors: Sparton Defense Electronics, Jackson, MI.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT					
OPN #251	22,406	17,716	*16,096	CONT.	CONT.

* Transitions to WPN procurement

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

CLASSIFIED BY: OPNAVINST S5513.7B
DECLASSIFY ON: OADR

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604602N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NAVAL GUNNERY IMPROVEMENT

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0178	GUN FIRE CONTROL SYSTEMS IMPROVEMENTS.	736	2,254	2,352	CONT	CONT
S1706	BALLISTIC AMMO IMPROVEMENTS	1,426	3,532	4,271	CONT	CONT
S1894	16" NAVAL GUN IMPROVEMENT	5,441	7,717	10,142	CONT	CONT
TOTAL		7,603	13,503	16,765	CONT	CONT

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Naval Gunnery Improvement Program provides for research and development in all areas of Naval Gunfire. Specifically, this program funds all ongoing improvements to naval gunfire control systems, guns and gun ammunition.

CLASSIFIED BY: MULTIPLE SOURCES
DECLASSIFIED ON: OADR

PROGRAM ELEMENT: 0604602N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NAVAL GUNNERY IMPROVEMENT
PROJECT NUMBER: S0178 PROJECT TITLE: GFCS IMPROVEMENT

C. (U) DESCRIPTION: MK 86 Gun Fire Control System (GFCS) provides a high performance, digitally controlled system to control 5"/54 gun mounts for area and self-defense against surface and air targets. Also provides guidance to SM-1 & 2 missiles on guided missile destroyers and nuclear powered cruisers. Improvements will enhance warfighting capability to effectively engage present and future surface and air targets.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued development, fabrication, and test of sidelobe canceller correcting recent problems experienced by fleet ships.
   b. (U) Completed revision of TEMP 172 and submitted for approval.
2. (U) FY 1990 Program:
   a. (U) Establish baseline performance of MK 86 Capability Expansion ORDALT to allow evaluation of current and future system improvements.
   b. (U) Complete test and evaluation of EDM Moving Target Indicator/Low Noise Front End (MTI/LNFE) modification for AN/SPQ-9A.
   c. (U) Complete development of High Speed Maneuvering Surface Target (HSMST) modification for MK 86 to effectvely combat high speed surface targets experienced in Mid-East.
   d. (U) Develop Computer Core Reduction for AN/UYK-7 in MK 86 to allow program upgrade and bridge gap until receipt of additional memory.
3. (U) FY 1991 Plans:
   a. (U) Develop and test product improvement for Video Processor MK 2 of MK 86 Search and Track Radar AN/SPQ-9A to increase detection capability of small radar cross sectional targets.
   b. (U) Develop product improvement for Air Track Radar AN/SPG-60 to increase effectiveness against sea-skimming missiles.
   c. (U) Develop product improvement to add NATO Sea Sparrow Missile System Continuous Wave Illuminator (CWI) to Air Track Radar to provide second channel illuminator/tracking capability to NSSMS for DD 963 class. Eliminates blind zone forward, provides second tracker/illuminator with extended range and small target capability.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWSES, Pt. Hueneme, Ca. CONTRACTORS: Lockheed Electronics, Plainfield, N.J.

F. (U) RELATED ACTIVITIES: Not Applicable

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN	6,485	7,082	11,210	CONT	CONT
O&MN	1,989	1,111	1,235	CONT	CONT

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NOT APPLICABLE

PROGRAM ELEMENT: 0604602N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NAVAL GUNNERY IMPROVEMENT
PROJECT NUMBER: S1706 PROJECT TITLE: BALLISTIC GUN AMMO IMPROVEMENTS

C. (U) DESCRIPTION: This project encompasses the engineering development of 76mm and 5"/54 Low Vulnerability Ammunition (LOVA) propelling charges. These charges will increase ship survivability by minimizing propellant fires and explosions caused by small fragments, shaped charge jets, etc. In addition, this project encompasses development of fuzes which will yield logistic, cost and effectiveness benefits.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted 76mm LOVA Baseline Design Tests.
   b. (U) Completed 5"/54 LOVA super charge baseline tests and initiate Design Verification Tests (DVT).
2. (U) FY 1990 Program:
   a. (U) Conduct 76mm LOVA DVT.
   b. (U) Complete 5"/54 LOVA super charge DVT.
   c. (U) Fabricate 5"/54 super charges.
   d. (U) Initiate technical evaluation of 5"/54 super charges.
3. (U) FY 1991 PLANS:
   a. (U) Conduct 76mm LOVA technical evaluation.
   b. (U) Complete 5"/54 LOVA super charge technical evaluation.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOS, Indian Head, MD; NSWC DAHLGREN, VA. CONTRACTORS: Kisco Co., St. Louis, MO.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604602N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NAVAL GUNNERY IMPROVEMENT
PROJECT NUMBER: S1894 PROJECT TITLE: 16" NAVAL GUN IMPROVEMENTS

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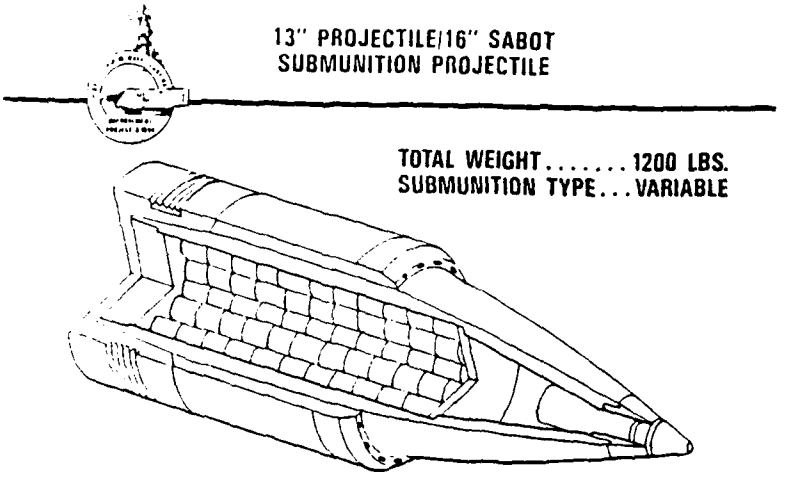


A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES		CDR-3RD		CONTINUING
ENGINEERING MILESTONES	PDR-2ND			CONTINUING
T&E MILESTONE		DTIIA-2ND DTIIB-3RD OTIIA1-3RD		CONTINUING
CONTRACT MILESTONE		EXPENDABLES DELIVERY-2ND		CONTINUING

BUDGET(SK)	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Program Total
MAJOR CONTRACT	0	1,200	3,000	CONTINUING	CONTINUING
SUPPORT CONTRACT	4,921	6,167	6,593	CONTINUING	CONTINUING
IN-HOUSE SUPPORT	400	300	499	CONTINUING	CONTINUING
GFE/ OTHER	120	50	50	CONTINUING	CONTINUING
TOTAL	5,441	7,717	10,142	CONTINUING	CONTINUING

PROGRAM ELEMENT: 0604602N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NAVAL GUNNERY IMPROVEMENT
PROJECT NUMBER: S1894 PROJECT TITLE: 16" Naval Gun Improvments

B. (u) DESCRIPTION: This project provides development of longer range, more effective ammunition, and supporting improvements to the fire control system to increase accuracy and lethality of the 16"/50 gun system. A 13" saboted projectile will be developed to deliver dual purpose submunitions to ranges as great as _ Other submunitions such as the Army developed SADARM, anti-armor and anti-personnel mine, will be evaluated as will chaff and battlefield obscuration smoke. Compatibility with the FCS will be incorporated in the digital upgrade to the FCS.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Conducted propellant charge evaluation, projectile performance and shipboard compatibility tests.
   b. (U) Continued computer program development/documentation.
   c. (U) Conducted Preliminary Design Review of the extended range ammunition and GFCS upgrade.
2. (U) FY 1990 Program:
   a. (U) Complete initial projectile performance and shipboard compatibility tests.
   b. (U) Contract for projectiles to be used in final development testing and technical evaluation.
   c. (U) Develop FCS drawings/documentation.
   d. (U) Conduct Critical Design Review.
3. (U) FY 1991 PLANS:
   a. (U) Complete procurement/fabrication of FC components.
   b. (U) Complete integration of FC components for land-based testing.
   c. (U) Install test gun at White Sands Missile Range for long range projectile performance test.
4. PROGRAM TO COMPLETION: This is a continuing program.

D. WORK PERFORMED BY: In-House: NOS, Louisville, KY; NSWC, Dahlgren, Va.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technical changes: None
2. (U) Schedule changes: None
3. (U) Cost changes: The Department adjustment of +1,199 is for pricing adjustments.

F. (U) PROGRAM DOCUMENTATION:

CM Plan	OCT 86
OR	OCT 86
DCP	OCT 86

PROGRAM ELEMENT: 0604602N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: NAVAL GUNNERY IMPROVEMENT
PROJECT NUMBER: S1894 PROJECT TITLE: 16" Naval Gun Improvments

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604603N Budget Activity: 4
Program Element Title: UNGUIDED CONVENTIONAL AIR LAUNCHED WEAPONS

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY1989 Actual	FY1990 Estimate	FY1991 Estimate	To Complete	Total Program
W1341	Airborne Guns and Ordnance	1,930	8,267	3,678	Cont.	Cont.
W1844	BDU and A/C Interface	0	3,171	4,057	7,894	15,122
Total		1,930	11,438	7,735	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This is a continuing program for improving Navy and Marine Corps air launched weapons. Major items in this program are the 2.75 inch rocket motor and warhead improvements which will become part of the projected Advanced Rocket. This project also responds to fleet requirements for improving airborne gun systems. Project W1844 develops and integrates the Bomb Dummy Unit (BDU-53) for testing and certifying aircraft and aircrews to use the B90 Nuclear Depth/Strike Bomb (NDSB). The scope of work encompasses prototype design and fabrication, laboratory testing, design of production representative items, initial production planning, and BDU aircraft integration efforts.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604603N Budget Activity: 4
Program Element Title: UNGUIDED CONVENTIONAL AIR LAUNCHED WEAPONS
Project Number: W1341 Project Title: AIRBORNE GUNS AND ORDNANCE

C. (U) PROJECT DESCRIPTION: This project funds ongoing effort to modernize air launched weapons. The program consists of 2.75-inch rocket motor, warhead, and launcher improvements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
a. (U) Continued the 2.75-inch rocket M261/267 submunition program, FWE high impulse 2.75-inch rocket motor and NCT anti-ship and anti-material warheads.

2. (U) FY 1990 Program:
a. (U) Continue anti-ship and anti-material warhead NCT program.
b. (U) Complete high impulse 2.75-inch Rocket Motor FWE program.
c. (U) Conduct risk assessment/trade-off analysis for the Advanced Rocket (AR).
d. (U) OPEVAL the 2.75-inch M261/267 Submunition program.

3. (U) FY 1991 Plans:
a. (U) Begin Advanced Rocket FSED.
b. (U) Conduct a TECHEVAL.
c. (U) Commence motor DT/OT.
d. (U) Commence flechette warhead DT/OT.
4. (U) Program to Completion: This is is a continuing program.

E. (U) WORK PERFORMED BY: NWC China Lake, CA; NSWC, Dahlgren, VA; PMTC, Point Mugu, CA; NOS, Indian Head, MD: NWSC, Crane, IN: NATC Patuxent River, MD; Contractors: TBD OTHERS: HQS Air Arm Division, Eglin Air Force Base, FL; and Sandia National Labs, Albuquerque, NM.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

WEAPONS PROCUREMENT, NAVY	FY 89 Actual	FY 90 Estimate	FY 91 Estimate	To Complete
APPN/P-1				
P-1 #70 Machine Gun Ammo	0	0	12,500	Cont.
P-1 #69 2.75-inch Rocket	0	0	14,600	Cont.
Advanced Rocket*	0	0	0	Cont.

* No P-1 assigned.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The following programs are being evaluated under the NATO Comparative Test Program funded with Foreign Weapon Evaluation funds and are into the second year of evaluation: Rocket motor - Canada - Bristol Co.; Warhead - France - Thompson Brandt Co.; Rocket Motor Case - France - SEP Co./Atlantic Research; Warhead - Norway - Raufoss Co.

FY1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604603N Budget Activity: 4
Program Element Title: UNGUIDED CONVENTIONAL AIR LAUNCHED WEAPONS
Project Number: W1844 Project Title: BOMB DUMMY UNIT AND AIRCRAFT INTERFACE

C. (U) PROJECT DESCRIPTION: This project develops a Bomb Dummy Unit (BDU-53) which electrically, mechanically, and ballistically simulates the B90 Nuclear Depth/Strike Bomb (NDSB). The project also provides aircraft integration of the BDU-53 (and thus the B90). The Navy uses the BDU for nuclear certification and training of delivery crews and loading and handling crews. BDUs are also used for aircraft nuclear certification and software verification. This effort is essential to support CNO decision which directs development of the B90.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Not Applicable.

2. (U) FY 1990 Program:
   a. (U) Design trainer, designated the BDU-53, that is electrically, mechanically, and ballistically similar to the B90.
   b. (U) Manufacture and begin environmental testing of 8 BDU-53 Advanced Development Models (ADMs).
   c. (U) Begin procurement of 65 BDU-53 Engineering Development Models (EDMs).

3. (U) FY 1991 Plans:
   a. (U) Begin flight testing of ADMs and EDMs.
   b. (U) Begin aircraft integration effort.

4. (U) Program to Completion:
   a. (U) Complete flight testing and aircraft integration.
   b. (U) Obtain Approval for Full Production (AFP) for BDU-53.
   c. (U) Certify 2 strike aircraft and 2 ASW aircraft for use of BDU-53 (and therefore, B90) operational use.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego; Naval Weapons Evaluation Facility, Albuquerque; Naval Ordnance Station Indian Head Detachment, McAlester; Naval Avionics Center, Indianapolis, IN.

F. (U) RELATED ACTIVITIES: The BDU-53 is developed concurrently with the Department of Energy developed B90.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APPN/P-1					
WPN/#71 Practice Bombs	0	0	0	38,000	38,000

H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604608N Budget Activity: 4-Tactical Programs
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search and Target Designation (IRSTD) System

POPULAR NAME: Infrared Search and Target Designation

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MS IIIA (4Q/FY91)	MS IIIB (1Q/FY95)
Engineering Milestones		FCA/PCA PRR		
T&E Milestones		LBT	DT-IIB/ OT-IIA	TECHEVAL/ OPEVAL
Contract Milestones	EDM #1 Del	EDM #2 Del		

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	4,872	10,227	3,391	Continuing
Support Contract	770	600	600	Continuing
In-House Support	3,845	5,596	6,527	Continuing
GFE/Other	150	150	160	Continuing
Total	9,637	16,573	10,678	Continuing

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search and Target Designation (IRSTD) System

B. (U) DESCRIPTION: The sophistication and diversity of threats facing naval surface combatants are increasing

des.

This program element provides funding for the cooperative U.S./Canadian development of an Infrared Search and Target Designation (IRSTD) System, AN/SAR-8. The AN/SAR-8 is a passive surveillance device

Additionally, the AN/SAR-8 will passively image surface targets for use in formation steaming, navigation, and surface target recognition.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Finalized interface design specification with TAS Mk23/conducted PDR.
b. (U) Integrated sensor with below-decks equipment.
c. (U) Completed planning for land based tests.
d. (U) Delivered EDM #1 to LBT site in early September.

2. (U) FY 1990 Program:

a. (U) Commence and complete land based test system installation and check-out.
b. (U) Continue land based test of EDM #1.
c. (U) Conduct combat system (TAS) integration CDR.
d. (U) Conduct production readiness planning and reviews.
e. (U) Deliver EDM #2.
f. (U) Initiate DDG-51 Combat System integration.

3. (U) FY 1991 Plans:

a. (U) Conduct USN-Canadian land based TAS integration testing.
b. (U) Install EDM unit aboard test ship.
c. (U) Conduct Initial Operational Test and Evaluation (IOT&E) of sensor.
d. (U) Achieve successful MS IIIA decision for LRIP of AN/SAR-8.

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search and Target Designation (IRSTD) System

4. (U) Program to Completion:

a. (U) Conduct TECHEVAL/OPEVAL with SAR-8/SWY-1(TAS MK23/NSSMS)/SLQ-32.
b. (U) Achieve successful MS IIIB decision for full production.
c. (U) Complete DDG-51 combat system integration.
d. (U) Conduct DDG-51 Flight III FOT&E with SPY-1/SAR-8.
e. (U) Conduct LHD-5 combat system integration and conduct FOT&E.
f. (U) Commence PPPI program.
g. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Warfare Center, Dahlgren, VA and White Oak, MD; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Fleet Tactical Analysis Center, Naval Weapons Station, Seal Beach, CA; Naval Weapons Support Center, Crane, IN. CONTRACTORS: Canadian Commercial Corporation (CCC), Ottawa, Ontario, (Canadian Government Contracting Agency); SPAR Aerospace, Toronto; General Electric Company, Syracuse, NY; Scientific-Atlanta, Atlanta, GA; Computing Devices Company, Ottawa, Ontario.

E. (U) COMPARISON WITH AMENDED REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Not Applicable

2. (U) SCHEDULE CHANGES: In order to maintain IOC, the Milestone III scheduled for FY 1991 was changed to Milestone IIIA. This change was necessary because of slippage in the TAS MK 23 integration program. Milestone IIIA will be based on stand-alone performance of the AN/SAR-8; performance in a fully integrated system will be demonstrated prior to Milestone IIIB.

3. (U) COST CHANGES: Not Applicable

F. (U) PROGRAM DOCUMENTATION:

OR: AA-10 approved May 1975.
DCP: Draft in approval process.
TEMP: In draft awaiting release of DCP.
AP: In draft awaiting release of DCP.

G. (U) RELATED ACTIVITIES: TAS MK23 upgrades for integration with AN/SAR-8 on test ship covered in P.E. 0604361N, NATO Sea Sparrow. AN/SAR-8 is a joint development with the Canadian Department of National Defence. There is no duplication of effort within the Navy or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate
O&M,N (AGSAG Q7ST)	0	0	102

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search and Target Designation (IRSTD) System

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- o This is the largest project under the Defense Development Sharing Agreement between U.S. and Canada.
- o Project agreement calls for prime contract cost sharing. (U.S. 67%, Canada 33%)
- o Project currently in FSED.
- o FSED commenced in August 1984.

J. (U) TEST AND EVALUATION DATA: IOT&E planned for FY91.

FY 91 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604609N Budget Activity: 4
Program Element Title: BOMB/FUZE IMPROVEMENTS
Project Number: W1512 Project Title: BOMB/FUZE IMPROVEMENTS

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY1989 ACTUAL	FY1990 ESTIMATE	FY1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1512	BOMB/FUZE IMPROVEMENTS	9,350	13,587	15,347	Cont.	Cont.

B. (U) BRIEF DESCRIPTION: This program responds to operational requirements which reflect the need to introduce major improvements to existing munitions and to develop new armaments to meet the Service's combat needs. FY-90 and FY-91 represents efforts essential to the future utility of conventional ordnance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

ABF:

a. (U) Obtained Navy Operational Requirement.
b. (U) Conducted Preliminary Systems Requirements Review.
c. (U) Conducted mission analysis and systems trade off studies in support of systems specifications for all-up-round (AUR) development.
d. (U) Developed an acquisition plan for ABF.
e. (U) Conducted explosive fill evaluation.

IAM:

a. (U) Completed Inertial Guidance Technology Demonstration (IGTD) flight test.
b. (U) Successfully demonstrated IAM technology.
c. (U) Draft documentation for IAM FSED being prepared.

DSU-30:

a. (U) DSU-30 development terminated.

2. (U) FY 1990 Program:

ABF:

a. (U) Begin Full Scale Engineering Development.
b. (U) Conduct Systems Requirements Review.
c. (U) Milestone IIA NPDM decision.
d. (U) Select explosive fill.

3. (U) FY 1991 Plans:

ABF:

a. (U) Award component-level development contract.
b. (U) Continue Full Scale Engineering Development.
c. (U) Conduct Preliminary Design Review.
d. (U) Complete component level development testing.
e. (U) Finalize aeroshape of both the 500# and 1,000# class weapons.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604609N Budget Activity: 4
Program Element Title: BOMB/FUZE IMPROVEMENTS
Project Number: W1512 Project Title: BOMB/FUZE IMPROVEMENTS

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY:

ABF: IN-HOUSE, Naval Weapons Center, China Lake, CA; Sandia National Laboratory, Albuquerque, NM; Lawrence Livermore National Laboratory, DOE, Livermore, CA; Pacific Missile Test Center, Pt Mugu, CA; CONTRACTORS: TBD
IAM: IN-HOUSE, Naval Weapons Center, China Lake, CA; CONTRACTORS: Boeing Military Airplane Company, Huntsville, AL; Northrop Precision Products, Norwood, MA.
DSU-30: IN-HOUSE, Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, ID; CONTRACTORS: ISC, Lancaster, PA

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) Technology Changes: None
2. (U) Schedule Changes: Milestone II decision delayed five months.
3. (U) Cost Changes: Funds have been reduced by $4,653 in FY 1991 to reflect the schedule delay.

F. (U) PROGRAM DOCUMENTATION:

1. (U) Tentative Operational Requirement (TOR) for Advanced Bomb Family (ABF) dated 28 May 1987.
2. (U) Development Option Paper (DOP) for ABF dated 15 July 1988.
3. (U) Operational Requirement (OR-239-05-89) for ABF dated 03 March 1989.
4. (U) Operational Requirement (OR-228-05-87) for Inertially Aided Munitions (IAM) dated 30 August 1987.

G. (U) RELATED ACTIVITIES: Not Applicable

H. (U) OTHER APPROPRIATION FUNDS: NONE

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

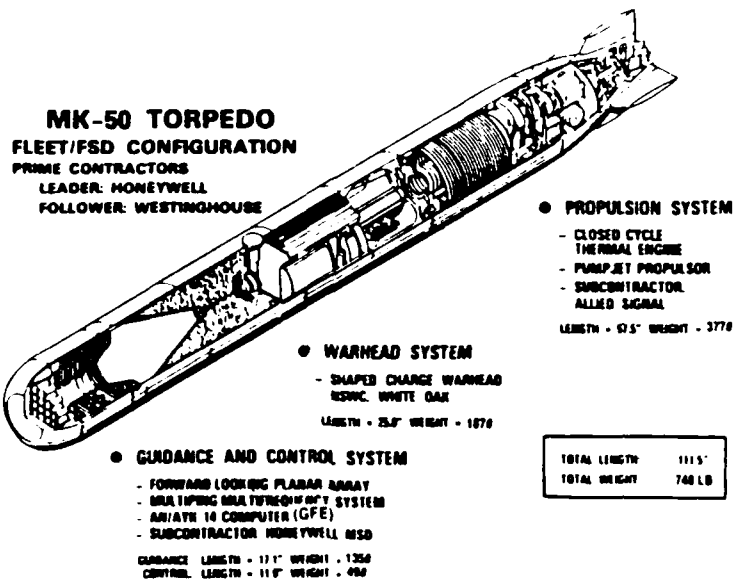
J. (U) MILESTONE SCHEDULE:

1. (U) ABF Milestone II - February 1990
2. (U) ABF Milestone III - 1995

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604610N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo
PROJECT NUMBER: S0199 PROJECT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo)

MK 50 TORPEDO
FLEET/FSD CONFIGURATION



POPULAR NAME: MK 50 TORPEDO

A. (u) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	M/S IIIA 3/89		M/S IIIB	
Engineering Milestones	10/88 Deliver final software	2/90 Deliver final drawings		
T&E Milestones		TECHEVAL Q2/90	OPEVAL Q1/91	
Contract Milestones	LRIP I Award 10/88 Honeywell 12/88 (Westinghouse)	LRIP II Award 11/89 (Honeywell)		

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	88,588	24,800	25,400	910,511
Support Contract	379	156	108	15,987
In-House Support	44,746	33,747	13,530	525,086
GFE/Other	620	435	0	11,233
Total	134,333	59,138	39,038	1,462,817 4,180

CLASSIFIED BY: OPNAVINST S5513.5A
DECLASSIFY ON: OADR

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604610N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo
PROJECT NUMBER: S0199 PROJECT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo)

B. (U) DESCRIPTION: This program element develops a new lightweight torpedo capable of countering the current and future Soviet submarine threat. Improvements in Soviet submarine design and performance (speed, hull strength, maneuverability, depth, smaller active acoustic target size, and lower radiated noise), tactics, and countermeasures capability

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Commenced delivery of 200B (OPEVAL lot) torpedoes.

b. (U) Began production line fabrication of evaluation lot (200B) torpedoes.

c. (U) Completed in-water testing (DT-II) of prototype lot torpedoes.

d. (U) Awarded Westinghouse a contract to build qualification torpedoes.

e. (U) Began in-water tactical logic evaluation of prototype lot (200B) torpedoes.

f. (U) Installed, and made operational, Automatic Test Equipment (ATE) and Support and Test Equipment (S&TE) at OPEVAL Intermediate Maintenance Activity (IMA) at NUWES, Keyport, WA.

g. (U) Completed classroom training of OPEVAL IMA and combatant crews on weapon use and turnaround.

h. (U) Completed, validated and conducted tests of fully operational tactical computer code required for OPEVAL.

i. (U) Conducted in-water evaluation of signal processing and tactics for complex attack scenarios launched from all planned combatant classes receiving MK 50 at IOC.

j. (U) Awarded contracts to Honeywell and Westinghouse for the first Low Rate Initial Production contracts.

k. (U) Completed OT-IIA.

l. (U) Began TECHEVAL (50 test runs, plus data analysis for 200B Series torpedoes).

m. (U) Completed MS IIIA.

PROGRAM ELEMENT: 0604610N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo
PROJECT NUMBER: S0199 PROJECT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo)

2. (U) FY 1990 Program:
   a. (U) Complete TECHEVAL.
   b. (U) Deliver and proof final 200B Series torpedoes (24).
   c. (U) Conduct OPEVAL (166 test runs, plus data analysis).
   d. (U) Receive final Level III drawing package.
   e. (U) Complete second source qualification.
   f. (U) Award contracts to Honeywell and Westinghouse for the second Low Rate Initial Production contracts.
   g. (U) Conduct Physical Configuration Audit.
3. (U) FY 1991 Plans:
   a. (U) Complete Milestone IIIB Decision.
   b. (U) Attain
4. (U) Program to Completion: Complete Technical Data Package.

D. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA (technical direction agent and lead laboratory); NSWC, White Oak, MD (warhead and exploder); NUWES, Keyport, WA and NCSC, Panama City, FL. Contractors: ARL, Penn State University, State College, PA; APL, University of Washington, Seattle, WA; ARL, University of Texas, Austin, TX; Honeywell Inc., Hopkins, MN (prime torpedo contractor); Honeywell Inc., Seattle, WA (subcontractor); Allied-Signal, Fluid Systems Division, Tempe, AZ (subcontractor).

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET
1. (U) Technical changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: The FY 91 increase of $27,629K related to correcting late hardware deliveries by the contractor, poor 200B hardware reliability, untested design changes between 200A and 200B, and immature test equipment. The additional work resulted in delay in TECHEVAL; however, the problems have been corrected and TECHEVAL is now in progress.

F. (U) PROGRAM DOCUMENTATION:

JMSNS/RD	9/80
SDDM (M/S II)	3/84
DCP-173	7/84
DT-1 Report	6/85
DT-IIA Report	5/86
ILSP 133-3 FSD (Rev 2)	6/86
ILSP Production	6/88
TEMP 225 (Rev 6)	7/88
DCP-173	1/89
OT-IIA Report	3/89
SDDM (M/S IIIA)	3/89

PROGRAM ELEMENT: 0604610N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo
PROJECT NUMBER: S0199 PROJECT TITLE: MK 50 Torpedo (Advanced Lightweight Torpedo)

G. (U) RELATED ACTIVITIES: PE 0603610N (Advanced Warhead Development); PE 0603562N (Submarine Tactical Warfare Systems (Advanced)); PE 0602314N (Antisubmarine Warfare Technology).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
MK 50 Torp WPN #44, #45	197,359	271,130	328,266	4,178,861	5,084,966
Initial Spares	262	3,200	5,176	155,800	172,700
MILCON	3,400	0	0	21,200	33,500

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: This information is contained in the FY 1991 Congressional Data Sheet.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0080	Mine Warfare Combat (Engineering)	(3,669)*	0	0	Continue	Continue
C1967	Mine Clearing	(5)*	0	0	Continue	Continue
C1969	Mine Neutralization Equipment	(5,279)**	2,490	3,078	Continue	Continue
C1970	Surf Zone Mine Clearing	(15,329)*	23,839	27,947	31,392	151,190
	TOTAL	**(24,282)**	**26,329**	**31,025**	**Continue**	**Continue**

* Funded in Program Element 0604717M.

** Funded in Program Element 0603729M.

B. (U) DESCRIPTION: This program element covers a wide variety of present and emerging technologies which are projected to contribute to the Marine Corps Mine/Countermine system capability. Largely focused on countermine efforts, this program element will specifically develop systems which will detect or neutralize mines. The dynamic nature and complexity of the countermine problem and its relative urgency necessitates that we consider the advanced development of a variety of systems which will each contribute to achieving overall countermine effectiveness.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C0080 PROJECT TITLE: Mine Warfare Combat (Engineering)

C. (U) DESCRIPTION: This project develops systems to be used for breaching, proofing, and marking lanes through minefields during amphibious and inland operations for the Marine Corps.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Monitor US Army efforts to develop a Remote Cable Release (RCR) for all Linear Demolition Charges (LDC). Participate in joint Full Scale Engineering Development (FSED) effort with US Army on Vehicle Magnetic Signature Duplicator (VEMASID) to include USMC variants, Light Armored Vehicle (LAV) and Amphibious Assault Vehicle (AAV). Product Improvement Program (PIP) for M68/M69 inert LDC.

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded in Program Element 0604717M) Evaluated and approved final Engineering Change Proposal (ECP) on RCR. Conducted Engineering Design Test by contractor and terminated USMC participation in FSED contract for VEMASID. Selected NDI metallic, PMD. Conducted Critical Design Review (CDR) for enhanced M68/M69 inert linear demolition charges.

2. (U) FY 1990 PROGRAM: No funding available.

3. (U) FY 1991 PLANS: No funding available.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCSC, Panama City, FL; NWSC, Crane, IN; NOS, Indian Head, MD. CONTRACTORS: BRDEC, Fort Belvoir, VA.

F. (U) RELATED ACTIVITIES: US Army VEMASID; Program Element 0604808A; Mine/Countermines.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C1967 PROJECT TITLE: Mine Clearing (Advanced)

C. (U) DESCRIPTION: This project will test and evaluate systems to be used for administrative Wide Area Minefield Clearance (WAMC) for the Marine Corps.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Develop an advanced mine clearing system that would permit the deliberate clearance of mines over a wide area.

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded in Program Element 0603729M) Monitored US Army and allied nation programs.

2. (U) FY 1990 PROGRAM: Monitor US Army and allied nation programs.

3. (U) FY 1991 PLANS: Prepare to initiate engineering development of WAMC system to meet USMC requirements in FY 1992.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C1969 PROJECT TITLE: Mine Neutralization Equipment

C. (U) DESCRIPTION: This program will test and evaluate existing mine neutralization systems for both individuals and vehicles, and will provide for the engineering development of new technology for mine neutralization applications.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Engineer Development of the Anti-Personnel Obstacle Breaching System (APOBS) and the Amphibious Assault Vehicle (AAV) Track Width Mine Plow (TWMP). Also included is the development of a mine neutralization vehicle.

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded in Program Element 060329M) Developed APOBS Development Test (DT)/Operational Test I test plan and hardware. Awarded prototype contract for AAV TWMP.

2. (U) FY 1990 PLANS: Initiate DT/OT I testing for APOBS. Initiate and complete DT/OT II testing; and seek a milestone II/III decision for AAV TWMP.

3. (U) FY 1991 Plans: Complete APOBS DT/OT I testing, seek milestone II decision, prepare for DT/OT II test. Develop and release AAV TWMP competitive bid solicitation.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NSWC, White Oak, MD; NCSC, Panama City, FL; NWSC, Crane IN; NOS, Indian Head, MD. CONTRACTORS: Caterpillar Inc, Peoria, IL.

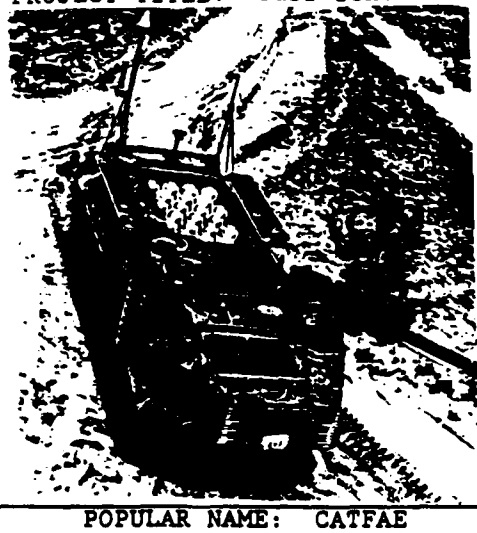
F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C1970 PROJECT TITLE: Surf Zone Mine Clearing (CATFAE)



POPULAR NAME: CATFAE

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
PROGRAM MILESTONES	MCPDM II 2nd Qtr			
ENGINEERING MILESTONES	RD IDR 2nd Qtr	SYS PDR 3rd Qtr RD PDR 4th Qtr	SYS CDR 2nd Qtr RD CDR 3rd Qtr	
T&E MILESTONES				
CONTRACT MILESTONES	RD Award 3rd Qtr	SYS Award 1st Qtr		

BUDGET ($K)	FY 1989	FY 1990	FY 1991	PROGRAM TOTAL TO COMPLETE
MAJOR CONTRACT	9,600	9,800 8,500	10,500 9,600	Continuing
SUPPORT CONTRACT	482	400	400	Continuing
IN-HOUSE SUPPORT	5,247	5,093	7,417	Continuing
GFE/ OTHER		46	30	0
TOTAL	***15,329**	**23,839**	**27,947**	**Continuing**

* Funded under Program Element 0604717M.

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C1970 PROJECT TITLE: Surf Zone Mine Clearing (CATFAE)

B. (U) DESCRIPTION: This project will provide a shoot-on-the-move capability to clear lanes through mine obstacles in the surf zone and beyond the high-water mark. This system consists of 21 rounds, carried by selected Assault Amphibious vehicles. Rounds deploy in single shots or in volleys and use emerging fuel-air explosive technology.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under Program Element 0604717M)

a. (U) Marine Corps Program Decision Meeting (MCPDM) II Decision.

b. (U) Initiated Full Scale Development (FSD) of CATFAE Projectile System.

c. (U) Awarded Projectile contract.

d. (U) Initial Design Review (IDR) on the CATFAE Projectile.

e. (U) Conducted detailed design and fabrication of CATFAE Projectile (FSD Hardware).

f. (U) Issued Request for Proposal (RFP) on System.

2. (U) FY 1990 PROGRAM:

a. (U) Award System contract.

b. (U) Award contract on CATFAE Shipping container.

c. (U) Conduct Preliminary Design Reviews (PDR) on the CATFAE Projectile and System.

d. (U) Take delivery and test first CATFAE FSD Projectiles and Government testing.

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C1970 PROJECT TITLE: Surf Zone Mine Clearing (CATFAE)

3. (U) FY 1991 PLANS:

a. (U) Monitor contractor testing of CATFAE FSD System.

b. (U) Conduct Critical Design Reviews (CDR) on the CATFAE Projectile and System.

c. (U) Take delivery of CATFAE Shipping containers for FSD Projectiles.

4. (U) PROGRAM TO COMPLETION:

a. (U) DT-II testing.

b. (U) Operational Testing - II (OT-II).

c. (U) MCPDM III Decision.

d. (U) Exercise option clauses for Low Rate Initial Production (LRIP) and begin Projectile and System production.

e. (U) Achieve Initial Operational Capability (IOC).

D. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NWC, China Lake, CA; NCSC, Panama City, FL; NSWC, Silver Spring, MD; NWSC, Crane, IN; NWS, Colts Neck, NJ; US Army TECOM, APG, MD. CONTRACTORS: FSD Projectile - Chamberlain Inc., Waterloo, IA; FSD System - TBD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

PROGRAM ELEMENT: 0604612M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Mine/Countermeasures Systems (Engineering)
PROJECT NUMBER: C1970 PROJECT TITLE: Surf Zone Mine Clearing (CATFAE)

F. (U) PROGRAM DOCUMENTATION:

		DATE
a.	(U) ROC Log 213.3.05 for Amphibious Breach Land Mine Countermeasures Systems	20 May 1987
b.	(U) CATFAE Acquisition Plan NCSC 87-01	18 August 1987
c.	(U) CATFAE TEMP (MCDEC-UL-001 TEMP 82) (REV 6)	May 1987
d.	(U) CATFAE Integrated Logistics Support Plan	March 1986

G. (U) RELATED ACTIVITIES: AAV Mine Plow development (C1969B).

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604654N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Dev (Eng)
PROJECT NUMBER: S1829 PROJECT TITLE: Explosive Ordnance Disposal Procedures

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1829	Explosive Ordnance Disposal Procedures	5,216	5,553	6,076	CONT.	CONT.

B. (u) DESCRIPTION: This is a Joint Service Program. DOD assigned development responsibility for Explosive Ordnance Disposal procedures and equipment to the Navy in support of the Joint Services. This program develops the Explosive Ordnance Disposal techniques required for all known domestic and foreign conventional and nuclear ordnance, and Improvised Nuclear Devices and

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 Accomplishments: Acquired and developed procedures for new, sophisticated threat weapons. Buildup
capability.

2. (u) FY 1990 Program:

3. (u) FY 1991 Plans:

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval EODTC, Indian Head, MD. CONTRACTORS: EG&G, Las Vegas, NV.

E. (U) RELATED ACTIVITIES: All conventional or nuclear ordnance related developments, both domestic and foreign, manufactured or improvised.

F. (U) OTHER APPROPRIATION FUNDS: Not applicable.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604656M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Engineering)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1960	LAV-AD*	19,928	(19,666)	(18,019)	(Continue)	(Continue)
C2031	LAV-AG	0	18,977	22,934	31,293	73,204
	TOTAL	19,928	18,977	22,934	31,293	73,204

* Funded in Program Element 0206623M in FY 1990 and outyears.

B. (U) DESCRIPTION: The Light Armored Vehicle-Assault Gun (LAV-AG) will satisfy the Marine Corps requirement for a highly mobile, lightly armored, direct fire weapon system for the Light Armored Infantry Battalion (LAI Bn). The Light Armored Vehicle-Assault Gun (LAV-AG) will complement the LAV-25 and the LAV-AntiTank and significantly enhance the overall employment of the LAI Bn. Design and development efforts involve the integration of the EX-35 105mm cannon with an autoloader and fire control system into a turret for integration into a common LAV chassis.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The Marine Corps has actively monitored/participated in the development and evaluation of various direct fire cannons since 1973. This effort will conduct Full Scale Development (FSD) of a direct fire cannon and appropriate fire controls into a contractor designed turret which will then be integrated into a common LAV chassis.

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Though not specifically funded in FY 1989, efforts directed at determining the most cost effective strategy continued.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604656M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Engineering)
PROJECT NUMBER: C2031 PROJECT TITLE: Light Armored Vehicle-Assault Gun (LAV-AG)

b. (U) Continued development of 75mm cannon/ammunition (with FY 1988 funds).

c. (U) Conducted live fire testing of 75mm air defense round.

d. (U) Completed In-house analysis and recommended the EX35 105mm cannon for use on the LAV-AG.

e. (U) Conducted Market Survey which indicated support for the 105mm program.

f. (U) Completed a Marine Corps Program Decision Meeting (MCPDM) IIB, authorizing Full Scale Development (FSD).

2. (U) FY 1990 PROGRAM:

a. (U) Release Request for Proposal (RFP).

b. (U) Following a formal Source Selection process, choose two contractors to build two prototypes each for the FSD phase.

c. (U) Conduct developmental (DT) and operational test (OT) planning.

3. (U) FY 1991 PLANS:

a. (U) Continue the development/fabrication of the LAV-AG prototypes.

b. (U) Complete DT and OT planning.

4. (U) PROGRAM TO COMPLETION:

a. (U) Conduct DT and OT on the LAV-AG prototypes.

b. (U) Commence Government facilitization for the EX-35 cannon in FY 1993.

c. (U) Conduct a formal Source Selection based on test results and production proposals from the two FSD competitors.

d. (U) Award a production contract to the winner for 154 LAV-AGs.

D. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; PM-LAV, TACOM, Warren, MI; NSWC, Dahlgren, VA; Watervliet Arsenal/Benet Labs, Watervliet, NY. CONTRACTORS: MKI, Inc., Springfield, VA; FSD contractors TBD.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604656M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles (Engineering)
PROJECT NUMBER: C2031 PROJECT TITLE: Light Armored Vehicle-Assault Gun (LAV-AG)

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: After an independent cost estimate by the US Army Tank and Automotive Command, an increase in the estimates of $13.758 million in FY 1991 was determined. This was based on the analogous systems costs of the LAV-25, the Bradley, the M1A1, and LAV-Air Defense. The 105mm cannon estimates were refined by Benet Laboratory and Watervliet Arsenal.

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) Required Operational Capability	July 1989
b. (U) ILSP	July 1989
c. (U) TEMP	August 1989
d. (U) Acquisition Plan	August 1989

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) FSD RFP	October 1989
b. (U) Source Selection	January - May 1990
c. (U) FSD Contracts Awarded	May 1990
d. (U) DT II	December 1991 - May 1992
e. (U) OT II	January - March 1993
f. (U) MCPDM III	January 1994
g. (U) Production Contract Award	February 1994
h. (U) Full Rate Production	FY 1994 - 1996
i. (U) Initial Operational Capability	1st Qtr FY 1996

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604657M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
PROJECT NUMBER: C1699 PROJECT TITLE: Remotely Piloted Vehicle (RPV)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1699	RPV	0	194	204	0	398

B. (U) DESCRIPTION: This project provides for testing of Marine Corps support systems for the RPV System for reconnaissance, surveillance, target acquisition/
designation, and radio relay.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: None.

2. (U) FY 1990 PROGRAM: Unique USMC integrated logistics support and testing per the DoD Joint UAV Program Master Plan.

3. (U) FY 1991 PLANS: Unique USMC integrated logistics support and testing per the DoD Joint UAV Program Master Plan.

4. (U) PROGRAM TO COMPLETION: Continue integrated logistics support and testing per the DoD Joint UAV Program Master Plan.

D. (U) WORK PERFORMED BY: IN-HOUSE: NASC (UAV-JPO) Washington, DC; NADC, Warminster, PA; DARPA, Washington, DC; MICOM, Huntsville, AL. CONTRACTORS: None.

E. (U) RELATED ACTIVITIES: Foreign RPV programs and US lethal programs.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604703N Budget Activity: 6
Program Element Title: Personnel, Training, Simulation & Human Factors
Project Number: R1882 Project Title: Personnel, Training, Simulation, and Human Factors

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Personnel, Training, Simulation and Human Factors	1,011	994	1,069	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program applies advanced technologies to operational requirements in manpower, personnel, training, and human factors. It focuses on adaptive testing, math optimization, manpower forecasting, computer-based simulation, and decision support systems. This effort will improve the alignment of personnel inventory with authorizations, and thus will enhance force readiness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Developed Computerized Adaptive Test (CAT) equating procedures; tested prototype rotation models.

2. (U) FY 1990 Program: Initiate score-equating verification for CAT-ASVAB; develop full-scale sea/shore rotation management model. Evaluate recruiter effectiveness.

4. (U) FY 1991 Plans: Analyze CAT-ASVAB score equating verification data; test/evaluate optimal personnel assignment system for operational use.

5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVPERSRANDCEN, San Diego, CA. CONTRACTORS: B-K Dynamics, Rockville, MD; Advanced Technology, Inc., Reston, VA; Resource Consultants Inc. (RCI), Falls Church, VA.

E. (U) RELATED ACTIVITIES: 0602722A, Personnel and Training; 0602703F, Personnel Utilization Technology; 0603731A, Manpower and Personnel; 0603707N, Manpower and Personnel Systems; 0603732M, Marine Corps Advanced Manpower Training Systems; and 0603704F, Manpower and Personnel Systems Technology.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604704N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: ASW Oceanographic Equipment
PROJECT NUMBER: R1740 PROJECT TITLE: ASW Ocean Survey Systems

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R1740	ASW Oceanographic Survey Systems	1,208	1,231	967	CONT.	CONT.

B. (U) DESCRIPTION: This program provides engineering development of modern oceanographic survey sensor technologies specifically developed in response to Fleet needs for oceanographic data to support acoustic and non-acoustic anti-submarine warfare operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1989 Accomplishments:
a. (U) Initiated Fleet version of Airborne Ice Thickness System.
b. (U) Initiated Fleet version of Air/Sea A-size 3 month buoys.
c. (U) Initiated Joint U.S./Canadian ice penetration probe development.
2. (U) FY 1990 Program:
a. (U) Initiate Fleet version of tail A-size 3 month buoys under Joint U.S./Canadian Defense Development Sharing Program (DDSP).
b. (U) Complete AEM Ice Thickness Measurement System and conduct local testing.
3. (U) FY 1991 Plans:
a. (U) Initiate deep and complete shallow temperature tail drifters.
b. (U) Initiate towed instrumented chain for survey use.
c. (U) Continue development of sensors for ice penetration package.
d. (U) Conduct Arctic Test and Evaluation of Ice Measurement System.
e. (U) Initiate airborne version of temperature-conductivity-depth (AXCTD) probe.
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: None. CONTRACTORS: Sparton of Canada, London, Ontario, Canada; U. S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, Hanover, NH; METOCEAN Data Systems, Ltd., Dartmouth, Nova Scotia, Canada.

E. (U) RELATED ACTIVITIES: PE 0603704N, ASW Oceanography

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: U.S./Canadian Defense Development Sharing Program (DDSP) agreements for joint development of ice penetrator and A-size 3-month buoys.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604707N BUDGET ACTIVITY: 4

PROGRAM ELEMENT TITLE: Over-The-Horizon Targeting (OTH-T)

PROJECT NUMBER: X0798 PROJECT TITLE: Over-The-Horizon Targeting

A. (U) RESOURCES: (Dollars in Thousands)

Number	Project Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0798	OTH-T	2,607	3,221	4,142	Cont.	Cont.
W1784*	TMPC	15,141	*	*		
	Total	17,748	3,221	4,142	Cont.	Cont.

* Project funding moved to 0604367N

B. (U) DESCRIPTION: The OTH-T program performs the critical review and test of the C3 systems supporting the use of extended range weapon systems including the TOMAHAWK Anti Ship Missile (TASM) and HARPOON missile. As the applied agent of the Navy's Warfare Support Architect and Engineer (WSA&E), the OTH-T program evaluates the use of existing and programmed sensor data, weapons control, and C3 support. It assesses deficiencies in interoperability, thereby providing concept definition for improvements to the Navy's Command and Control System (NCCS). The OTH-T program conducts targeting experiments and major systems tests under CNO Operational Test Project K-310. Additionally, it provides the configuration control management for Navy OTH-T systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Developed and distributed the OTH-T current architecture document.

b. (U) Developed C3 system procedures to correct deficiencies identified during the 1988 K310 exercise.

c. (U) Conducted OTH-T interoperability testing for current software C3 systems.

2. (U) FY 1990 PROGRAM:

a. (U) Develop the methodology for OTH-T "Information Management".

b. (U) Maintain configuration control over OTH-T System.

c. (U) Integrate OTH-T systems with related warfare area architectures.

d. (U) Develop OTH-T System-Level Specification documents for use by OTH-T Configuration Control Board members.

e. (U) Conduct OTH-T platform and system improvement tests.

f. (U) Begin participation in the Joint Over-the-Horizon Targeting DOD (T&E) test program.

g. (U) Develop scenario for next K-310 major systems test.

3. (U) FY 1991 PLANS:

a. (U) Maintain configuration control over OTH-T system.

b. (U) Support, analyze, and evaluate Fleet OTH-T exercises measuring improvements to the OTH-T system.

c. (U) Provide on-site Fleet OTH-T system engineering support for exercise development and analysis.

d. (U) Update OTH-T System-Level Specification documents.

e. (U) Conduct OTH-T platform and system improvement demonstrations.

f. (U) Continue participating in the Joint Over-the-Horizon Targeting Program.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NRL, Washington, DC; CONTRACTORS : JHU/APL, Laurel, MD; Tiburon Systems, San Jose, CA.

E. (U) RELATED ACTIVITIES: Program Element 0603763N, WSA&E; Program Element 0604367N, Tomahawk Missile System.

F. (U) OTHER APPROPRIATED FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS : None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604710N Budget Activity: 4
Program Element Title: NAVY ENERGY PROGRAM (ENGINEERING)

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0371	Energy Conser. (ENG)	4,692	2,811	3,455	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This project conducts engineering development of improved energy-efficient systems and practices for ships, facilities, and aircraft. Resulting energy efficiency improvements contribute to improved fleet sustainability, increased combat capability (e.g., greater range, time on station), and reduced costs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Ships - expanded qualified products list of improved anti-fouling paint; initiated T&E of prototype battery energy storage system for DDG-51 FLT III, developed high efficiency air conditioning systems. Aircraft - developed fuel use management aids for current inventory aircraft. Facilities - tested small cogeneration systems; developed energy security technologies.

2. (U) FY 1990 Program: Ships - demonstrate advanced single screw air conditioning plant; qualify battery energy storage system for DDG-51 FLT III. Aircraft - upgrade F/A-18 Flight Performance System from Advisory to Management function; continue hand-held and pre-flight fuel use management systems development. Facilities - assess industrial electrical system improvements.

3. (U) FY 1991 Plans: Ships - monitor and test improved anti-fouling hull paints; test and evaluate advanced air conditioning and auxiliary equipment. Aircraft - extend pre-flight and hand-held fuel use management systems development to top 20 FY 2000 fuel users. Facilities - complete small cogeneration testing.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Annapolis, MD; NADC, Warminster, PA; NCEL, Port Hueneme, CA; NWC, China Lake, CA. CONTRACTORS: York Intl., York, PA; Allison Gas Turbine, Indianapolis, IN; McDonnell Douglas, St. Louis, MO.

E. (U) RELATED ACTIVITIES: Program Element 0603724N, Navy Energy Program (Advanced).

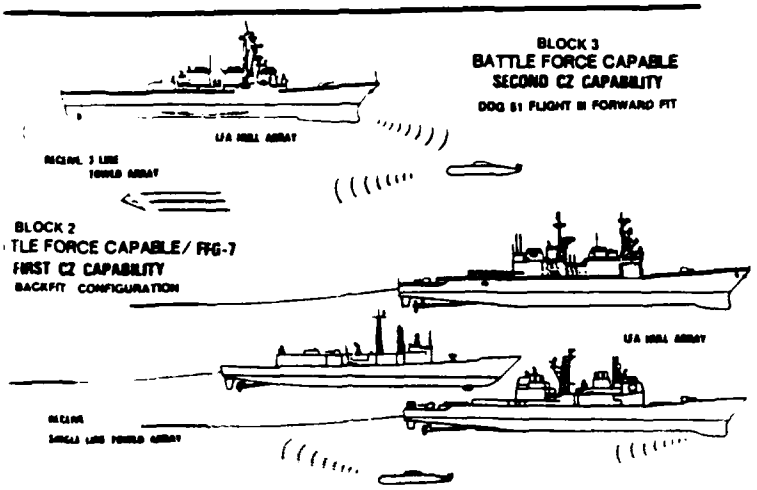
F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface ASW Systems Improvement
PROJECT NUMBER: S1916 PROJECT TITLE: AN/SQQ-89 Improved

AN/SQQ-89 (I) NOTIONAL CONFIGURATIONS



POPULAR NAME: AN/SQQ-89 IMPROVED

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	None	MS II 4/90	DAB Rev 7/91 MS III	BLK (2) FFG 3Q/95 BLK (2) BFC 3Q/97 BLK (3) BFC 3Q/95 (ALRP) 4Q/95 (ALRP)
Engineering Milestones	None	BLK (2)(3) Design Def. 6/90	BLK(2) PDR 1/91 BLK(3) CD 7/91	FCA & PCA BLK (2) FFG 3Q/95 BLK (2) BFC 3Q/97 BLK (3) BFC 2Q/97
T&E Milestones	None	GLOVER PH III 3/90	GLOVER PH IV 3/91	BLK TECH OPEVAL (2)FFG 2Q/95 3Q/95 (2)BFC 2Q/97 3Q/97 (3)BFC 3Q/96 4Q/96
Contract Milestones	None	Award BLKs (2)FSD 6/90 (3)CD 6/90		Awd. Prod. Contract BLKs (2) FFG 3Q/95 (2) BFC 3Q/97 (3) BFC 3Q/95 (ALRP)

BUDGET (SK)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(24,000)	40,000	57,500	CONT.
Support Contract	(1,829)	1,638 (233)	2,274	CONT.
In-House Support	(10,955)	31,834 (8,123)	36,785	CONT.
GFE	(686)	21,465 (3,740)	26,050	CONT.
Total	(37,470)	94,937 (12,096)	122,609	CONT. CONT.

CLASSIFIED BY: OPNAVINST S5513.3A
DECLASSIFY ON: OADR

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface ASW Systems Improvement
PROJECT NUMBER: S1916 PROJECT TITLE: AN/SQQ-89 Improved

B. (u) DESCRIPTION: AN/SQQ-89(V) Surface ASW Combat System will be upgraded to maintain currency with improvements in the Soviet submarine threat of the 1990s and 2000s and to satisfy the performance requirements set forth in OR 062-03-86 and CNO ltrs ser 35/9C580129 of 15 June 1989, 03/9C581028 of 6 July 1989, and 35/9C582702 of 15 September 1989.

will be developed for FFG 7 Class ships and existing Battle Force Capable class ships (CG47/DDG51/DDG993/DD963) which will not have AN/SQS-53C systems procured prior to Block 2 production approval. The Block 2

will be developed for new construction (DDG 51 Flight III and follow-on) BFC class ships. Improved signal processing techniques will be developed to support active classification and expanded target handling in both systems. Block 1 enhancements have been subsumed by both Block 2 and Block 3. In the future, Block 1 will not be addressed independently.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (u) FY 1989 Accomplishments: (Funded under PE 0603553N)

a. (U) Completed installation and checkout of RMES multiple line towed array test tool aboard USS GLOVER.

b. (U) Started formal process for a Milestone II Defense Acquisition Board (DAB) review during third quarter of FY90.

2. (U) FY 1990 Program: (Partly funded under PE 0603553N)

a. (U) Perform Phase III tests using bow mounted
Objective is to demonstate the ability to meet the performance specified in OR 062-03-86 prior to Milestone II. Continue added USS GLOVER sea tests, as required, and critical item tests in support of Block 3 Critical Design technical tradeoff analyses.

b. (U) Conduct Milestone II DAB review. Decisions to be considered are: 1) Block 2 to proceed into FSD with a selected prime contractor team (Leader) and a subcontractor team (Follower) for development of the FFG 7 and existing BFC Class ship systems; and 2) Block 3 to continue with the competitive Critical Design Phase of FSD only.

c. (U) Perform evaluations of prime contractors' FFG proposals.

PROGRAM ELEMENT: 0604713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface ASW Systems Improvement
PROJECT NUMBER: S1916 PROJECT TITLE: AN/SQQ-89 Improved

d. (U) Start procurement of long lead Navy standard equipment to support FSD.

e. (U) Award Block 2 FSD and Block 3 FSD (Critical Design) contracts.

3. (U) FY 1991 Plans:

a. (U) Issue RFP for Block 3 FSD (Development and Test).

b. (U) Conduct DAB Committee review for Block 3 FSD (Development and Test) approval decision. Decision to be considered is to proceed with the FSD Development and Test phase with a selected prime contractor team (Leader) and subcontractor team (Follower) for development of the Block 3 ship system.

c. (U) Select FSD contractor teams and award Block 3 contract.

d. (U) Continue procurement of long lead Navy standard equipment to support Block 3 FSD.

4. (U) Program to Completion:

a. (U) Complete major procurements of long lead Navy standard equipment.

b. (U) Deliver first Block 2 FFG Class system for TECH/OPEVAL (Second Quarter, FY94).

c. (U) Complete TECH/OPEVAL for Block 2 FFG Class system (Milestone III; Third Quarter, FY95).

d. (U) Deliver Block 3 EDM for TECH/OPEVAL and commence shipboard installation (Third Quarter, FY95).

e. (U) Complete TECH/OPEVAL of Block 3.

f. (U) Deliver Block 2 BFC Class system for TECH/OPEVAL.

g. Complete Block 2 BFC system TECH/OPEVAL.

h. Start Block production deliveries as shown below:

ALP	1st Production Delivery
Block 2 (FFG)	Third Qtr, FY97
Block 2 (BFC)	Third Qtr, FY99
Block 3 (BFC)	Third Qtr, FY98 (ALRP)
	Third Qtr, FY99 (AFRP)

i. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NUSC, New London, CT; NOSC, San Diego, CA; Naval Surface Warfare Center, Silver Spring, MD; David Taylor Naval Ship R&D Center, Bethesda, MD. Contractors: GE Co., Syracuse, NY; EDO Corp., College Park, NY; AT&T Inc., Greensboro, NC; Martin Marietta, Baltimore, MD; UNISYS, St. Paul, MN; Raytheon Company, Portsmouth, RI; Westinghouse Electric Corporation, Baltimore, Sykesville, Annapolis, MD, College Station, TX, Santa Isabela, PR; Honeywell Inc., Everett, WA; Allied Bendix Aerospace, Sylmar, CA, San Marcos, CA; Librascope Corp., Glendale, CA; Norden Systems, Mellville, NY; Link Tactical Military Simulation Corp., Silver Spring, MD.

PROGRAM ELEMENT: 0604713N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface ASW Systems Improvement
PROJECT NUMBER: S1916 PROJECT TITLE: AN/SQQ-89 Improved

E. (U) COMPARISON WITH FY 1990/1991 PRESIDENT'S BUDGET
1. (U) Technical changes: None.
2. (U) Schedule changes: FY 1991 increased funding will be used to offset AN/UYS-2 and OJ-653 cost growth and to reduce schedule risk by allowing earlier purchase of other long-lead GFE.
3. (U) Cost changes: +$4,727K (FY 1991).

F. (U) PROGRAM DOCUMENTATION:

TOR	2/85	DCP In Review
DOP	11/85	TEMP In Review
OR	12/85	

G. (U) RELATED ACTIVITIES:
1. (U) PE 0604524N/S1941 (Submarine Combat Systems).
2. (U) PE 0604507" 'Enhanced Modular Signal Processor) and PE 0604574N (Navy Standard Display ystems).
3. (U) PE 0604575N/S1451 (AN/SQS-53C).
4. (U) PE 0603553N (Surface Anti-submarine Warfare).

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.
(U) PROCUREMENT: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0604715N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Warfare Training

A. (U) Resources: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1140	Tactical Advanced Combat Direction Electronic Warfare Mod	3,300	972	0	0	34,425
S1427	Surface Tactical Team Trainer	9,567	7,197	11,025	16,061	75,663
S1436	Surface Warfare Training Analysis	283	0	0	0	3,124
S1834	Landing Craft Air Cushion (LCAC) Operator Trainer	5,187	9,044	1,332	0	23,904
	TOTAL	18,337	17,213	12,357	16,061	137,116

B. (U) DESCRIPTION: This program supports the mission of the Deputy Chief of Naval Operations for Surface Warfare by improving readiness and training. It addresses requirements of the Fleet and the Chief of Naval Education and Training for development of prototype surface warfare training devices to improve training, operational readiness, efficiency and safety, and to reduce training time and costs.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0604715N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Warfare Training
PROJECT NUMBER: S1427 PROJECT TITLE: Surface Tactical Team Trainer

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Surface Tactical Team Trainer	9,567	7,197	11,025	16,061	75,663

B. (U) DESCRIPTION:This project will develop a generic training system to replace obsolete devices, and provide team procedural and tactical training/evaluation in a multi-threat environment for conventional and tactical data equipped ships. These devices will have a direct impact on the Navy's ability to train for battle. The 14A12 Surface ASW trainer replaces obsolete devices currently providing ASW training (i.e. 14A2), exercises the essential procedures of an ASW engagement, and simulates current and future emerging passive and active sensors operating in a common ocean model. The 20A66 ASW Tactical Team Trainer will replace the ASW Coordinated Tactics Trainers (X14A6 AND 14A6) built in the 1960s, and provide multiple platform/multi-threat procedural, tactical, and decision-making training for single units up to battle group size. Each trainer will be composed of multiple ship, submarine, and aircraft "command centers" configured with multi-purpose equipments which will simulate the sensor, weapon, and communication capabilities of the platforms represented, and train up to 300 people per year in coordinated ASW battle group operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Commenced development of the 20A66.
2. (U) FY 1990 PROGRAM:
   a. (U) Contractor software/system testing to be completed, delivered, and installed March 1990.
   b. (U) Continue development of the 20A66 with procurement of preliminary Lot I hardware/software for FLEASWTRACENPAC, San Diego.
3. (U) FY 1991 PLANS:
   a. (U) Continue 20A66 Lot I development with emphasis on software development and initial hardware interfacing.
   b. (U) Complete 20A66 Critical Design Review in early 1991.
4. (U) PROGRAM TO COMPLETION: Program completes in FY 1993.

PROGRAM ELEMENT: 0604715N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Warfare Training
PROJECT NUMBER: S1427 PROJECT TITLE: Surface Tactical Team Trainer

D. (U) WORK PERFORMED BY: IN-HOUSE: NTSC Orlando, Fl. CONTRACTORS: Hughes, Long Beach, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: NONE

2. (U) SCHEDULE CHANGES: NONE

3. (U) COST CHANGES: NONE

F. (U) PROGRAM DOCUMENTATION:

OR	JUN 81
TDRD (REV)	DEC 86
TETAP	NOV 85
TETAP (REV 2)	FEB 87
AP (REV 1)	JUN 87

G. (U) RELATED ACTIVITIES: Not Applicable

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT (U) OPN (BA-7)/#289	16,714	8,616	0	37,023	62,353

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE:

(U) Preliminary Design Review	Mar 90
(U) Critical Design Review	Sep 90
(U) Installation/Testing	Dec 92

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604715N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Surface Warfare Training
PROJECT NUMBER: S1834 PROJECT TITLE: Landing Craft Air Cushion (LCAC) Operator Trainer

C. (U) DESCRIPTION: LCAC Full Mission Trainer, Device 20G6, provides crew operator training (Craftmaster, Engineer, Navigator, Group Commander) in a dynamic environment addressing all phases of craft operations, at significantly reduced costs over use of actual craft.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Continued development of FMT computer programs.
   b. (U) Continued trainer hardware fabrication.
   c. (U) Conducted critical design review.
   d. (U) Achieved contractor acceptance of motion/visual systems.
   e. (U) Installed motion and visual systems on FMT.
   f. (U) Continued hardware/software integration and testing.
2. (U) FY 1990 PROGRAM:
   a. (U) Conclude Device 20G6 detailed hardware/software design.
   b. (U) Continue development/refinement of visual simulation system.
   c. (U) Procure the digital radar landmass system.
   d. (U) Begin hardware/software integration and testing of the motion simulation system.
3. (U) FY 1991 PLANS:
   a. (U) Conduct test and evaluation and trainer acceptance.
   b. (U) Program completes.
4. (U) PROGRAM TO COMPLETION: Program completes in FY 1991.

E. (U) WORK PERFORMED BY: IN-HOUSE: NTSC Orlando, Fl.
CONTRACTOR: Hughes, Herndon, Va.

F. (U) RELATED ACTIVITIES: Not Applicable

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604717M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Engineering)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0079	Combat Service Support (Engineering)	1,424	2,194	1,669	Continue	Continue
C0080	Mine Warfare Combat (Engineering)[a]	3,669	(0)	(0)	Continue	Continue
C1966	Surf Zone Container Handler[b]	(385)	(845)	1,183	2,438	5,000
C1970	Surf Zone Mine Clearing[a]	15,329	(23,839)	(27,947)	(31,392)	(151,190)
C1983	Tactical Fuel Systems[b]	(1,287)	(171)	693	Continue	Continue
	TOTAL	**20,422**	**2,194**	**3,545**	**Continue**	**Continue**

a Funded and discussed in Program Element 0604612M, Marine Corps Mine/ Countermeasures Systems (Engineering).

b Funded and discussed in Program Element 0603729M, Marine Corps Combat Services Support (Advanced).

B. (U) DESCRIPTION: This program provides modernization of engineer tool sets, chests and kits, engineer equipment, and computer-aided construction planning, estimating, and management.

UNCLASSIFIED

PROGRAM ELEMENT: 0604717M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Engineering)
PROJECT NUMBER: C0079 PROJECT TITLE: Combat Service Support (Engineering)

C. (U) DESCRIPTION: This project evaluates Combat Service Support (CSS) Systems for improvements in engineering capability and reduction in integrated logistics support requirements. Some examples are: mechanical sandbag filler; modernization of tool sets; mobile electric power distribution systems; bulk fuel storage; field medical equipment; Marine Corps Combat Field Feeding System (MCCFFS); expeditionary water distribution equipment; and a mobile survivable earthmover.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Revalidated combat excavator requirement and selected US Army's M-9 Armored Combat Earthmover (ACE). Completed testing of the Manual X-Ray Processor. Enhanced reliability of the MXM X-Ray Machine and the clinical laboratory. Procured limited Standard Integrated Command Post System (SICPS). Tested, implemented design changes and printed technical manual for MCCFFS. Initiated development of an individual shelter system. Developed a prototype boot for reducing ankle/leg injuries.

2. (U) FY 1990 PROGRAM: Initiate concept validation of a mechanical sandbag filler. Initiate expeditionary water distribution system development. Initiate program for X-Ray Darkroom. Continue enhancement of the MXM X-RAY machine, Field Medical Clinical Laboratory and SICPS. Continue testing MCCFFS. Begin testing prototype combat boot.

3. (U) FY 1991 PLANS: Fabricate a mechanical sandbag filler. Amphibious testing of ACE. Modernize engineer pioneer tool sets. Test Field Medical Clinical Laboratory and modernize other Field Medical Equipment. Complete MCCFFS design changes. Continue testing prototype combat boot.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Medical Research and Development Command. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604717M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Engineering)
PROJECT NUMBER: C1966 PROJECT TITLE: Surf Zone Container Handler

C. (U) DESCRIPTION: This project will improve handling of containerized supplies and material with emphasis on development of new, strategically and tactically mobile equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded in Program Element 0603729M). Completed statement of work for full scale engineering development prototype container handler and awarded contract. Developed DT-II T&E master plan.

2. (U) FY 1990 PROGRAM: (Funded in Program Element 0603729M). Conduct DT II. Publish test report.

3. (U) FY 1991 PLANS: Conduct OT II. Publish test report.

4. (U) PROGRAM TO COMPLETION: Program complete in FY 1991.

D. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCEL, Port Hueneme. CONTRACTORS: TBD

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604717M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support (Engineering)
PROJECT NUMBER: C1983 PROJECT TITLE: Tactical Fuel Systems (TFS)

C. (U) DESCRIPTION: This project conducts Engineering Development on Tactical Fuel System.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under Program Element 0603729M). Completed the Fuel Additative Subsystem. Initiated the design of the CH-53 Subsystem. Initiated development of the Communication/Manifold System. Initiated development of the Tactical Fuel Testing Portable Laboratory. Continued development of the remaining subsystem.

2. (U) FY 1990 PLANS: (Funded in Program Element 060729M). Continue development of the Tactical Fuel System, CH-53, Communication/Manifold, and Portable Testing Lab.

3. (U) FY 1991 PLANS: Funded in Program Element 0604717M, Marine Corps Combat Service Support (Engineering). Continue development of the remaining subsystems:

a. (U) Complete the development of CH-53 Subsystem.

b. (U) Complete the development of the Fuel Testing Subsystem.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; NCEL, Port Hueneme, CA. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: US Army Program Elements 0603104A, Fuels/Lubricant Development: 0603210A, Aircraft Power/Propulsion; 0604204A, Air Mobility Support Equipment; 0603602A and 0603606A, Land Mine Warfare; and 0603621A, Vehicle Componentry.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604718M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Intelligence Systems (Engineering)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1463	Counterintelligence and Security Equipment	958	972	1,182	Continue	Continue
	TOTAL	**958**	**972**	**1,182**	**Continue**	**Continue**

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This project funds testing of non-developmental items (NDI), counterintelligence equipment, and product improvement of the Counterintelligence Communication system (CCS). A continuing requirement exists to improve Marine Corps equipment in support of human intelligence collection and Technical Surveillance Countermeasures (TSCM).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Continued purchase of NDI counterintelligence equipment to evaluate candidate replacement items for FY 1990 procurement funds. Continued research and development of the CCS PIP.

2. (U) FY 1990 PROGRAM: Same as FY 1989 Program.

3. (U) FY 1991 PLANS: Continue to purchase NDI counterintelligence equipment to evaluate candidate replacement items for FY 1992 procurement.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA (CCS). CONTRACTORS: None.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Engineering)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0053	JTIDS	11,363	3,215	8,678	Continue	Continue
C1929	ATACC	9,741	22,159	3,070	Continue	Continue
C2085	FIREFLEX	0	2,696	2,074	Continue	Continue
	TOTAL	**21,104**	**28,070**	**13,822**	**Continue**	**Continue**

B. (U) DESCRIPTION: This program element provides funds for the engineering development of Marine Corps Command, Control, and Communications Systems which include Marine Tactical Command and Control Systems development and improvements. The projects are aimed toward more effective command and control of tactical forces during both amphibious operations and expeditionary land operations. This concept envisions a fully integrated air/ground tactical command and control systems, designed to meet the unique requirements of amphibious operations.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Engineering)
PROJECT NUMBER: C0053 PROJECT TITLE: Joint Tactical Information Distribution System (JTIDS)

C. (U) DESCRIPTION: This project integrates the high capacity, jam resistant, secure, digital communications capability provided by the JTIDS Class 2H terminal into designated host platforms - Tactical Air Operations Module (TAOM) and Advanced Tactical Command Central (ATACC). The JTIDS integrated host platform will provide the standardization and interoperability communications required to support command and control operations in the Joint/Allied tactical environment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Jointly with the US Air Force, initiated integration designs for the AN/TYQ-23(V)(TAOM)/Module Component Equipment (MCE)) to accommodate interconnection to a JTIDS Module (JM) through tactical digital transmission. Developed interface compatibility between the JM and external agencies using the TADIL-J message standard providing the standardization and interoperability needed to support command and control operations in the Joint/Allied tactical environment.

2. (U) FY 1990 PROGRAM: Continue with FY 1989 objectives.

3. (U) FY 1991 PLANS: Continue with FY 1989 Program objectives. Initiate efforts to integrate ATACC with the JTIDS module.

4. (U) PROGRAM TO COMPLETION: Continue integration and interface effort into TAOM/MCE and ATACC systems.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Washington, DC; MCTSSA, Camp Pendleton, CA; ESD, Hanscom, AFB. CONTRACTORS: Plessey Electronic Systems, NJ; Litton, Van Nuys, CA.

F. (U) RELATED ACTIVITIES: This program will affect designated and envisioned tactical command and control systems having a JTIDS interoperability requirements.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Engineering)
PROJECT NUMBER: C1929 PROJECT TITLE: Advanced Tactical Air Command Central (ATACC)

C. (U) DESCRIPTION: This project will integrate non-developmental items (NDI) (hardware and software) into a replacement system, capable of eliminating the current operational deficiencies of the current AN/TYQ-1, Tactical Air Command Central (TACC), the AN/TYQ-3A, and Tactical Data Communications Central. The ATACC will support the Marine Aircraft Wing's TACC. This competitive, streamlined Ada program will automate and enhance the now manual decision support/mission planning functions of the TACC. Funds are provided for software development and tailoring, documentation and integration of hardware, and operational testing.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Awarded a single, competitive, fixed-price R&D contract with fixed-price production options. Ordered long-lead hardware and commenced rapid prototyping phase. Completed Systems Requirements Review.

2. (U) FY 1990 PROGRAM: Complete Systems Design Review (SDR), Preliminary Design Review (PDR) and Critical Design Review (CDR) for hardware and software. Commence software integration coding. Complete hardware integration. Commence Developmental Testing (DT) during fourth quarter of the fiscal year.

3. (U) FY 1991 PLANS: Complete DT. Complete Functional Qualification Testing (FQT), System Integration Testing (SIT) and Functional Acceptance Testing (FAT). Commence Operational Testing (OT) during fourth quarter.

4. (U) PROGRAM TO COMPLETION: This is a continuing program. OT will be completed during first quarter and a Production Decision reached during second quarter of FY 1992. The start of the production schedule is second quarter FY 1993. Marine Corps Communications and Electronics School, Twentynine Palms, CA will receive the first production system during first quarter FY 1994. Full operational capability (FOC) will be reached during FY 1995.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC and SPAWAR (PMW-176), Washington, DC; MCTSSA, Camp Pendleton, CA. CONTRACTORS: Grumman Data Systems, Springfield, VA.

F. (U) RELATED ACTIVITIES: This is a Marine Corps program and unique to all tactical command and control systems.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M BUDGET ACTIVITY: 4 PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems (Engineering)
PROJECT NUMBER: C2085 PROJECT TITLE: Marine Flexible Fire Support System (FIREFLEX)

C. (U) PROJECT DESCRIPTION: This project provides for the requirements for a digital, automated fire support command and control system as identified in the USMC FIREFLEX Required Operational Capability. A Non-Developmental Item testbed has been established to effectively and efficiently identify needed USMC fire support. Concurrent with the testbed the USMC will participate in the development effort of a modified/multi-service version of Advanced Field Artillery Tactical Data System (AFATDS). This multi-service AFATDS will provide fire support command and control capability to Fire Support Coordination Centers and Fire Direction Centers from Battalion to the Supporting Arms Special Staff at the MAGTF Command Element, and to the Supporting Arms Coordination Center of the Amphibious Command Element.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: (Funded under Program Element 0206626M) Planned and conducted FMF appraisals/demonstrations of existing fire support command and control equipment; began Cost and Operational Effectiveness Analysis (COEA) on identified appraisal/demonstration fire support command and control equipment; completed development of modified software for USMC unique fire support requirements to the currently fielded Army Fire Support Team Digital Message Device (FIST-DMD) software. Signed a Memorandun of Agreement with the Army to participate in AFATDS program.

2. (U) FY 1990 PLANS: Operate USMC FIREFLEX testbed facilities at the three Marine Expeditionary Forces (MEFs), participate in the Multi-Service AFATDS effort. Conduct an FMF appraisal/demonstration of AFATDS Concept Evaluation hardware and software.

3. (U) FY 1991 PLANS: Operate USMC FIREFLEX testbed facilities at the three MEFs; and participate in the Multi-Service AFATDS effort.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC/MCCDC, Quantico, VA; US Army CECOM, Fort Monmouth, NJ; ATCCS Experimentation Site, Fort Lewis, WA; Pacific Northwest Laboratories, Department of Energy, Seattle, WA; USA Fire Support Center, Fort Sill, OK. CONTRACTORS: Atlantic Research Corporation, Professional Services Group, Dumfries, VA, Magnavox Electronic Systems, Fort Wayne, IN, Litton Data Systems, Van Nuys, CA.

F. (U) RELATED ACTIVITIES: FIREMAN, Program Element 0206623M.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604727N Budget Activity: 4 - Tactical Programs
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: Advanced Interdiction Weapons System

Advanced Interdiction Weapons System

POPULAR NAME: AIWS

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS-I 3Q/89		MS-II 2Q/91	MS-IIIA 4Q/94 MS-IIIB 4Q/95
Engineering Milestones				PDR 1Q/92 CDR 2Q/93 PCA 3Q/94
T&E Milestones (Commencement)	DT-I 3Q/89	OT-I 3Q/90		DT-IIA 2Q/92 DT-IIB/C FY93 OT-II FY94
Contract Milestones	DEM/VAL 3Q/89		FSD 3Q/91	PRODUCTION (LRIP) 1Q/95

BUDGET ($K)	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contracts			12,378	Cont.
Support Contract		300	300	Cont.
In-House Support		8,295	12,283	Cont.
GFE/Other				
Total	*	8,595	24,961	Cont.

* FY89: Funded under P.E. 0604727D

Program Element: 0604727N Budget Activity: 4 - Tactical Programs
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: Advanced Interdiction Weapons System

B. (U) BRIEF DESCRIPTION OF ELEMENT: The AIWS Baseline project will provide an air-to-ground weapon to be employed by Navy F/A-18, A-6, AV-8 and A-12 aircraft to attack targets during day, night and in adverse weather conditions. AIWS will have a launch-and-leave capability and provide several target kills per aircraft sortie. AIWS candidates will utilize low cost, off-the-shelf or other service/industry developed hardware and will be produced at recurring hardware unit costs (exclusive of the warhead) not to exceed $50,000 (FY 1985 dollars). The AIWS baseline capability will be achieved by taking advantage of recent advances in guidance and control technologies, low cost, kinematically efficient air vehicles incorporating composite construction, and prior initiatives in signature management. Preplanned product improvement (P3I) is a feature of the AIWS program. AIWS will provide a significant increase in strike warfare capabilities which include strike warfare weapon effectiveness, reduced aircraft vulnerability, affordability to permit training expenditures and a strong inventory. Previous work on AIWS has been conducted in PE 0603306N, PE 0604702D, and PE 0604727D.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: (Funded in PE 0604727D)
   a. (U) Completed source selection.
   b. (U) Milestone I DAB decision.
   c. (U) Commenced DEM/VAL (Three contractors).
   d. (U) Commenced DT-I.
   e. (U) Commenced specification and statement of work for Baseline FSD RFP.
   f. (U) Develop P3I program plan in accordance with DAB direction.
2. (U) FY 1990 Program:
   a. (U) Continue DEM/VAL efforts.
   b. (U) Continue DT-I tests.
   c. (U) Continue FSD planning.
   d. (U) Prepare for Milestone II decision.
   e. (U) Continue P3I planning efforts.
   f. (U) Conduct OT-I Operational Assessment.
3. (U) FY 1991 Plans:
   a. (U) Complete DT-I Evaluation.
   b. (U) Complete OT-I Assessment.
   c. (U) Complete DEM/VAL.
   d. (U) Conduct FSD source selection (Open competition).
   e. (U) Milestone II decision.
   f. (U) Begin Full Scale Development.
4. (U) Program to Completion: This is a continuing program.

Program Element: 0604727N Budget Activity: 4 - Tactical Programs
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: Advanced Interdiction Weapon System

D. (U) WORK PERFORMED BY:

IN-HOUSE: Naval Weapons Center, China Lake, CA., PMTC, Pt. Mugu, CA., NAC, Indianapolis, IN., NAS Pax River, MD, NADC, Warminster, PA., DTRC, MD.

CONTRACTORS: Boeing Aerospace, McDonnell Douglas Aircraft/Hughes, Texas Instruments/LTV.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNICAL CHANGES: Baseline AIWS includes GPS capability (accuracy).
2. (U) SCHEDULE CHANGES: Late Milestone I DAB decision resulted in Low Rate Initial Production decision being delayed one quarter.
3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

JMSNS	12/85
OR approved	3/88
ACQ Plan signed by COMNAVAIR	7/88
SCP signed	3/89
TEMP signed	4/89
ADM signed	6/89

G. (U) RELATED ACTIVITIES:

P.E. 0604602F HAVE SLICK Technology Demonstration.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604761N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Intelligence Engineering

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0809	E/O Sensor	2,011	668	1,001	Cont.	Cont.
T0772	FME	6,217	5,117	1,537	Cont.	Cont.
	TOTAL	8,228	5,785	2,538	Cont.	Cont.

B. (U) DESCRIPTION:

(U) The Electro-Optic (E/O) Sensor project develops unique equipment packages capable of collecting and analyzing information about foreign-employed electro-optic hardware. The purpose is to obtain fine-grained intelligence information and scientific and technical data for use in assessing such hardware.

(U) Foreign Materiel Acquisition and Exploitation (FME) project funds laboratory analysis

to acquire high interest The FME program also supports systems
Exploitation of those sytems

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604761N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Intelligence Engineering
PROJECT NUMBER: R0809 PROJECT TITLE: Electro-Optic Sensors Development

C. (U) DESCRIPTION: The Electro-Optic (E/O) Sensor project develops unique collection equipment configurations capable of collecting and analyzing information about electro-optic hardware. The purpose is to obtain fine-grained intelligence information and scientific and technical data for use in assessing

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 ACCOMPLISHMENTS:
   a. (u) Continued to meet changing collection requirements.
   b. (u) Initiated development programs for the

2. (u) FY 1990 PROGRAM:
   a. (u) Continue improvement program for
   b. (u) Develop programs for
   Additional information available at a higher classification.

3. (u) FY 1991 PLANS:
   a. (u) Continue development programs for

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Weapons Center, China Lake, CA; Naval Research Laboratory, Washington, D.C.; Naval Air Development Center, Warminster, PA; Naval Surface Warfare Center, Silver Spring, MD; and Naval Ocean Systems Center, San Diego, CA. CONTRACTORS: Texas Instruments, Ridgecrest, CA; Martin Marietta, Orlando, FL; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; Solid Photography Inc., Melville, NY; and Martin Electronics, Inc., Orlando FL.

F. (U) RELATED ACTIVITIES: Program Element 0603522N, Advanced Submarine Surveillance Equipment Program; and Program Element 0603792N, Surface Electromagnetic/Optical Systems (Advanced), are ongoing related engineering development programs.

G. (U) OTHER APPROPRIATIONS FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604761N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Intelligence Engineering
PROJECT NUMBER: T0772 PROJECT TITLE: Foreign Materiel Acquisition/Exploitation

C. (U) DESCRIPTION: The foreign materiel acquisition and exploitation project provides high leverage cost benefit through acquisition of foreign weapons and sensor systems and the subsequent exploitation of those systems to determine potential vulnerabilities and countermeasures.

D. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 ACCOMPLISHMENTS:
   a. (u) Continued
   Specific targets were:
   (1). (u)
   (2). (u)
   (3). (u) Examples of applied military technology (micro-electronics, lasers, computers).
2. (S) FY 1990 PROGRAM:
   a. (S) Continue
   Specific targets are:
   (1). (U) (Special Access program).
   (2). (U) (Special access program).
   (3). (U)
   (4). (U)
   (5). (U)
3. (U) FY 1991 PLANS:
   a. (U) Continue

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Research Laboratory, Washington D.C.; Naval Underseas System Center, Newport, RI; Naval Ship Research and Development Center, Carderock, MD.; Naval Underwater Weapons Systems Engineering Station, Keyport WA; Naval Air Development Center, Warminster, PA; Naval Weapons Support Center, Crane, IN; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Surface Weapons Center, Dahlgren VA. CONTRACTORS: LTV/Vought Aerospace, Dallas, TX.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604771N Budget Activity: 4
Program Element Title: Medical Development (Engineering)
Project Number: M0933 Project Title: Medical/Dental Equipment Development

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0933	Medical/Dental Equipment Development	2,998	4,169	3,999	Cont.	Cont.

B. (U) DESCRIPTION: Supports the engineering development of medical/dental equipment which will significantly enhance the ability of the Medical Department to complete its mission. Specifically, the equipment developed in this program will improve the treatment of casualties with resuscitation fluids and blood in operational areas, facilitate the rewarming of casualties in the cold and permit rapid diagnosis in the field.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Continued engineering development of REFLUPS; continued the test and evaluation of the REFLUPS and begin engineering support capability.

2. (U) FY 1990 Program: Complete the development of the REFLUPS for production of intravenous solutions. Begin development of REFLUPS for production of blood wash solutions and direct hookup to blood washing systems. Begin development of the field diagnostic imaging system; including miniaturization and continue engineering support capability.

3. (U) FY 1991 Plans: Complete the development of the REFLUPS; continue the development of the field diagnostic imaging system; begin the development of a radiofrequency-based device to rewarm hypothermic casualties and continue engineering support.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In House: Naval Ocean Systems Center, San Diego, CA; Naval Aerospace Medical Research Laboratory, Pensacola, FL. Contractors: Sterimatics Corp., Bedford, MA; MSB, Inc., Norwalk, CT

E. (U) RELATED ACTIVITIES: This program is coordinated through the Armed Services Biomedical Research Evaluation and Management Committee. Work on the REFLUPS is a tri-Service effort that is jointly funded by the Army and Navy. Work on the field diagnostic imaging system is a combined effort with the Army.

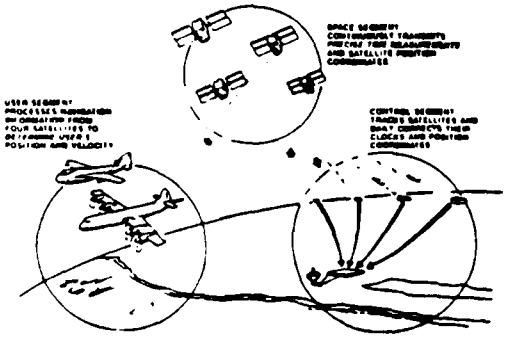
F. (U) OTHER APPROPRIATION FUNDS: Not Applicable

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: NAVSTAR Global Positioning System (GPS)
PROJECT NUMBER: X0921 PROJECT TITLE: NAVSTAR GPS Equipment

NAVSTAR GPS PROGRAM SEGMENTS



POPULAR NAME: NAVSTAR GPS

A. (U) SCHEDULE/BUDGET INFORMATION: (DOLLARS IN THOUSANDS)

SCHEDULE	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	IOC 3QTR	M/S IIIB 6/90		
Engineering Milestones				
T&E Milestones	DT-IIC Begin OT-IIC	Complete OT-IIC	Begin OT-III	Complete OT-III
Contract Milestones				

BUDGET (SK)	FY 1989	FY 1990	FY 1991	Program Total To complete
Major Contract	11,180	20,595	26,241	320,733 90,901
Support Contract	1,400	2,770	2,510	31,359 14,281
In-House Support	25,123	20,406	23,645	377,908 74,083
GFE/ Other	2,004	0	0	2,004 0
Total	39,707	43,771	52,396	732,004 179,265

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: NAVSTAR Global Positioning System (GPS)
PROJECT NUMBER: X0921 PROJECT TITLE: NAVSTAR GPS Equipment

B. (U) DESCRIPTION: GPS is an active and passive radio positioning and navigation system that provides users with worldwide, all-weather, three-dimensional position, velocity and precise time data based on a constellation of 18 or more satellites. GPS provides a common navigation grid for land, air and sea units for coordinated operations. Navy's portion of the GPS program develops user equipment and provides for the integration and testing of this equipment on each class of aircraft, ship and submarine, as well as for the planning necessary to support the equipment when introduced into the fleet. Additionally, the Navy is developing clock technology supporting the GPS Satellite and Ground Control segments.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Began integration engineering on the MH-53E and EA-6B aircraft.

b. (U) Continued integration engineering on the VH-60, P-3C UDIII, EP-3E, S-3B, HU-25A, E-6A, E-2C aircraft and SSN 637, T-AGS 38, CV/CVN, SWCL, LCAC, CG-26, LST 1179 and FFG-7 ships.

c. (U) Completed integration engineering on HH-65A, ES-3A, SH-60B, SH-60F aircraft and WMEC-270 ships.

d. (U) Continued systems integration in the AN/WSN-5, Carrier Navigation System (CVNS), Electrostatic Stabilized Gyro Navigation (ESGN), AN/ASN-130/139, Combat Direction System (CDS), and AN/SSN-2.

e. (U) Completed systems integration in the Standard Attitude Heading Reference System (SAHRS) and LTN-72.

f. (U) Commenced cesium standard clock technology test and analysis. Delivered qualified units to the Air Force for Block II satellites.

g. (U) Commenced government testing of ground masers.

h. (U) Commenced and completed TECHEVAL on CG 26, LST 1179, FFG 7, SSN 637 and SWCL ship classes. Commenced OPEVAL.

i. (U) Continued development of the Digital to Analog Converter (DAC).

j. (U) Continued efforts in the areas of satellite signal generator systems engineering, integration design support and data reduction, user equipment design analysis/planned improvements and platform test support.

2. (U) FY 1990 PROGRAM:

a. (U) Begin integration engineering on the P-3A/B, OV-10, KC-130F, and F/A-18 aircraft.

b. (U) Continue integration engineering on the P-3C UDIII, EA-6B, VH-3D, MH-53E, E-6A, S-3B aircraft.

c. (U) Complete integration engineering on the E-2C, HU-25A, VH-60, EP-3E aircraft and SSN 637, FFG-7, T-AGS 38, CV/CVN, LCAC, CG-26, LST-1179 and SWCL ships.

d. (U) Continue systems integration in the CDS and AN/ASN-130/139.

e. (U) Complete systems integration in the AN/SSN-2, ESGN, CVNS and AN/WSN-5.

f. (U) Complete cesium standard and ground maser clock technology test and analysis.

g. (U) Continue efforts in the areas of satellite signal generator systems engineering, integration design support and data reduction, user equipment design analysis/planned improvements and platform test support.

PROGRAM ELEMENT: 0604777N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: NAVSTAR Global Positioning System (GPS)
PROJECT NUMBER: X0921 PROJECT TITLE: NAVSTAR GPS Equipment

h. (U) Begin test and evaluation of non-developmental item (NDI) aircraft mini-receivers.
i. (U) Complete development of DAC.
j. (U) Complete OPEVAL and achieve Milestone IIIB.

3. (U) FY 1991 PLANS:
a. (U) Begin integration engineering on the EP-3E update, HC-130H, C-2A, HH-60H UD, A-6E, F-14A/D aircraft.
b. (U) Continue integration engineering on the VH-3D, KC-130F, OV-10D, EA-6B, S-3B, MH-53E and F/A-18 aircraft.
c. (U) Complete integration engineering on the P-3C UDIII, P-3A/B, and E-6A aircraft.
d. (U) Continue systems integration in the CDS.
e. (U) Complete systems integration in the AN/ASN-130/139.
f. (U) Continue effort in the areas of satellite signal generator systems engineering, integration design support and data reduction, user equipment design analysis/planned improvements and platform test support.
g. (U) Continue test and evaluation of NDI aircraft mini-receiver.

4. (U) PROGRAM TO COMPLETION:
a. (U) Complete aircraft integration engineering during FY 92-FY 94 on: VH-3D, MH-53E, VP-3, HC-130H, OV-10, C-2A, EA-6B, S-3B, A-6E, F-14A/D, US-3, CH-53E, EP-3E UD, ES-3A UD, AH-1J/T/W, KC-130F, P-3C UDIV UD, HH-60J UD, SH-60B UD, SH-60F UD, F/A-18, C-9B, VC-4, VC-11, C-20, UC-12, SH-3H, HH-60H UD, and UH-1N.
b. (U) Complete aircraft integration engineering FY 95 and beyond on: AV-8, SH-2F, SH-2G, RH-53D, CH-53A/D, CH-46, T-44, RP-3, F-16N, H-57, T-34, T-45 and CT-39.
c. (U) Complete satellite signal generator systems engineering, integration design support and data reduction, user equipment design analysis/planned improvements and platform test support.
d. (U) Complete test and evaluation of the NDI aircraft mini and embedded receivers.
e. (U) Complete systems integration in CDS.

D. (U) WORK PERFORMED BY:
IN-HOUSE: Air Force Systems Command (Space Systems Division), Joint Program Office, Los Angeles, CA; NAVAIRDEVCEN, Warminster, PA; NAVAIRTESTCEN, Patuxent River, MD;
CONTRACTORS: Rockwell International (Collins Government Avionics Division), Cedar Rapids, IA; Grumman Aerospace Corp., Long Island, NY; The Boeing Company, Seattle, WA; McDonnell Douglas, St. Louis, Missouri.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: MS IIIB rescheduled to June 1990 from Sept. 1989.
3. (U) COST CHANGES: +9,694 in FY-91 commences integration of GPS into A-6E, F-14D and C-2A aircraft.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: NAVSTAR Global Positioning System (GPS)
PROJECT NUMBER: X0921 PROJECT TITLE: NAVSTAR GPS Equipment

F. (U) PROGRAM DOCUMENTATION:

o Joint Acquisition Plan	May 1984
o Multi-Service TEMP	Nov 1987
o Joint ILS Plan	Sep 1986
o Navy Training Plan	May 1988
o DCP #133	May 1986

G. (U) RELATED ACTIVITIES:
- o Program Element 0603203F (Advanced Avionics for Aircraft)
- o Program Element 0603601F (Conventional Weapons Technology)
- o Program Element 0305164F (NAVSTAR GPS User Equipment)

These are Air Force program elements that contribute to the development and test of GPS receivers and associated peripheral equipment.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

(U) APPN/BLI	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN #98	11,213	10,702	9,710	57,100	145,759
APN 1	350	1,392	4,050	85,699	91,491
APN 5	1,556	1,700	8,100	414,948	426,304
APN 7	1,505	2,900	4,147	9,216	17,768
SCN	1,523	1,522	1,434	7,296	11,775

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604780M BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Joint Interoperability of Tactical Command and Control Systems, Marine Corps (JINTACCS)
PROJECT NUMBER: C1079 PROJECT TITLE: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1079	JINTACCS	960	1,965	1,104	Continue	Continue

B. (U) DESCRIPTION: This program supports USMC participation in the JCS sponsored JINTACCS program which provides for development of joint message standards and procedures and insures interoperability between command and control elements of the USMC, other services, agencies, and CINCs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Continued interoperability testing and complete Message Text Formatting (MTF) Computer Aided Instructions (CAI). Developed applications to use the Joint Central Database System (CDBS) for TDS maintenance and incorporated NATO MTFs in USMCTF software and documentation.

2. (U) FY 1990 PROGRAM: Continue interoperability testing and applications to CDBS.

3. (U) FY 1991 PLANS: Continue interoperability testing. Complete work applications to CDBS.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: MCRDAC, Quantico, VA; MCTSSA, MCB, Camp Pendleton, CA. CONTRACTORS: Eagle Technology, Dumfries, VA; NSR Co., Colorado Springs, CO.

E. (U) RELATED ACTIVITIES: JTIDS, TAOM.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fixed Distributed System (FDS)
PROJECT NUMBER: X1312 PROJECT TITLE: Fixed Distributed System

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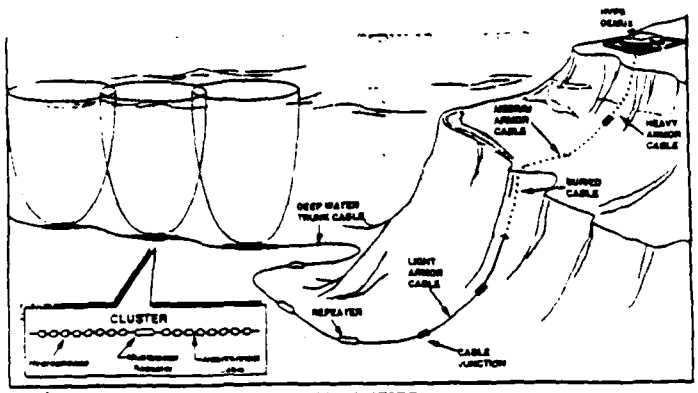
FDS Underwater Surveillance System



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POPULAR NAME: FDS

A. (u) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1989	FY 1990	FY 1991	TO COMPLETE
Program Milestones				
MS-II	9/89			
MS-IIIA				2Q FY95
IOC Full System				
MS-IIIB				3Q FY96
Engineering Milestones				
PDR (U/W Segment)	1/89			
CDR (U/W Segment)		1/90		
PDR (Shore Segment)			2/91	
CDR (Shore Segment)				2Q FY92
T&E Milestones				
*DT-1A	(PH 3)-11/89			
DT-1B		11/90		
DT-2A		6/90		
DT-2B (Phase 1/Phase 2)			2/91	
DT-2C				
DT-2D/OT-2A				
DT-2E (TECHEVAL)				
OT-2B (OPEVAL)				
Contract Milestones				
FDS (U/W contract)/(Shore contract) DEC FY90/1Q FY92				

BUDGET ($K)	FY 1989*	FY 1990	FY 1991	PROG TOTAL
Major Contract	(83,250)	121,114	189,388	CONT.
Support Contract	(7,233)	7,579	8,332	CONT.
In-House Support	(8,318)	12,253	12,196	CONT.
GFE	(219)	268	260	CONT.
Total	(99,020)	141,214	210,176	CONT.

* FY 88 and FY 89 previously under PE 0603784N

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fixed Distributed System (FDS)
PROJECT NUMBER: X1312 PROJECT TITLE: Fixed Distributed System

B. (u) DESCRIPTION: The Fixed Distributed System (FDS) is part of the Integrated Undersea Surveillance System (IUSS) that provides the

FDS is a

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (u) FY 1989 Accomplishments:

2. (u) FY 1990 Program: Initiate competitive acquisition for SSIPS FSED contract; Release final design for

PROGRAM ELEMENT: 0604784N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fixed Distributed System (FDS)
PROJECT NUMBER: X1312 PROJECT TITLE: Fixed Distributed System

cable; Conduct CDR for FDS

3. (U) FY 1991 Plans: Conduct

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA; NCEL, Port Hueneme, CA; NRL, Washington, DC. Contractors: AT&T Technologies, Inc., Greensboro, NC; AT&T/Bell Laboratories, Whippany, NJ; GE, Syracuse, NY; IBM Corporation, Manassas, VA; TRW, Inc., McLean, VA; AMRON, INC., Falls Church, VA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technical changes: None.
2. (U) Schedule changes: The increased funding of 5,618 will be used to ease proposed schedule slippages in the Full Scale Development of the Underwater Segment due to FY 90 budgetary actions.
3. (U) Cost changes: None.

F. (U) PROGRAM DOCUMENTATION:

Milestone I Decision	13 May 1986
Navy Decision Coordination Paper (NDCP)	13 May 1986
Test and Evaluation Master Plan (TEMP)	25 Aug 1986
Integrated Logistic Support Plan (ILSP)	Jan 1986
Acquisition Plan #87-28, FDS	19 Aug 1988
Acquisition Plan #84-12, SOSUS	23 Aug 1985
ILSP Revised	Mar 1989
TEMP Revised	13 Feb 1989
Acquisition Strategy Report	May 1989
Milestone II Decision	22 Sep 1989
Decision Coordination Paper (DCP)	10 May 1989

PROGRAM ELEMENT: 0604784N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fixed Distributed System (FDS)
PROJECT NUMBER: X1312 PROJECT TITLE: Fixed Distributed System

G. (U) RELATED ACTIVITIES: PE 0204311N, Integrated Undersea Surveillance Systems (IUSS); PE 0204311N, Surveillance Direction System (SDS).

H. (U) OTHER APPROPRIATION FUNDS:

APPN /P-1	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
MCON (VARLOCS)	0	18,500	1,350	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605151M BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Marine Corps
PROJECT NUMBER: C0030 PROJECT TITLE: Studies and Analysis, Marine Corps

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0030	Studies/Analysis	1,291	1,420	2,243	Continue	Continue

B. (U) DESCRIPTION: This program provides an analytical foundation for Marine Corps Concept Based Requirements System. Results of Mission Area Analyses are integrated into Marine Air Ground Task Force (MAGTF) Master Plan providing a blueprint for improvements to doctrine, training, force structure, and weapons systems. The program also provides analytical support for resolution of current problems identified by the operating forces.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Completed ten studies/analyses. Initiated eight studies including: Casualty Rates, Class III Consumption Factors, Combat Active Replacement Factors, Communications/Computer Systems Architecture, and Light Armored Infantry Battalion Force Structure Studies.

2. (U) FY 1990 PROGRAM: Initiate ten studies/analyses including: Training Range & Facilities, Maritime Prepositioning Ship (MPS) Reconfiguration, Over-the-Horizon Communications Intelligence and Fire Support.

3. (U) FY 1991 PLANS: Initiate eight to twelve studies/analyses including MAGTF Ops in Nuclear-Biological-Chemical (NBC) Environment, Multiple Launch Rocket System (MLRS) in General Support Artillery Role, Tank Vulnerability without anti-tank weapons (TOWS).

4. PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: MAGTF Warfighting Center, MCCDC, Quantico, VA; Marine Corps and other Service Top Level Schools; FMF Units. Navy Labs. CONTRACTORS: TBD by competitive contracting.

E. (U) RELATED ACTIVITIES: Program Element 0605153M, Marine Corps Operations and Analysis Group, which provides supplementary analytic capability.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N Budget Activity: 6
Program Element Title: Studies and Analysis Support, Navy

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0106	Naval Medical Support Capability	92	94	103	Cont	Cont
R0132	CNO Program Analysis and Evaluation	2,683	481	964	Cont	Cont
R0133	National Academy of Sciences/Naval Studies Board	1,095	419	749	Cont	Cont
R0147	CNO Operational Strategy and Tactical Effectiveness Analysis	1,275	653	1,196	Cont	Cont
R2040	Soviet Ship Vulnerability (SSVP) Program	0	414	770	Cont	Cont
TOTAL		5,145	2,061	3,782	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides analytical support to the Secretary of the Navy and the Chief of Naval Operations as a basis for major policy, planning, and acquisition program execution decisions. It also provides analytical tools for evaluating effectiveness of U.S. weapons against Soviet ships and submarines.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N Budget Activity: 6
Program Element Title: Studies and Analysis Support, Navy
Project Number: M0106 Project Title: Naval Medical Support Capability

C. (U) PROJECT DESCRIPTION: The Navy Medical Command has an ongoing need for evaluation of resource management techniques. This project provides an essential management tool to examine and investigate biomedical operations, functions, allocations of resources, personnel training, detailing, and other problems that may affect the relevancy, effectiveness, and efficiency of medical support of the Navy and Marine Corps.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Completed technical report on predictors of corpsmen success in Basic Underwater Demolition/SEALS.
b. (U) Completed assessment of medical requirements for special warfare operations and issue technical report.
c. (U) Initiated/completed data collection (MD preceptors, IDCs, staff, patients) to assess fixed MTF certification process and obtain fleet IDC baseline.

2. (U) FY 1990 Program:

a. (U) Identify performance criteria and develop protocols to assess training, utilization, and socialization issues.
b. (U) Initiate data collection.

3. (U) FY 1991 Plans:

a. (U) Initiate/complete follow-up data collection to assess fixed MTF certification process and obtain fleet IDC baseline.
b. (U) Complete data collection and issue technical reports.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: Naval Health Research Center, San Diego, CA; Naval School of Health Sciences, Bethesda, MD.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N Budget Activity: 6
Program Element Title: Studies and Analysis Support, Navy
Project Number: R0132 Project Title: CNO Program Analysis and Evaluation

C. (U) PROJECT DESCRIPTION: This project provides analytical support to CNO and SECNAV in evaluation of overall balance within total Navy programs. Includes such tasks as (a) evaluation of force capabilities and requirements, (b) analysis of effectiveness of systems under development, and (c) SECDEF directed parametric cost analyses of major Navy programs. Deliverables consist of formal, structured documents containing or leading to conclusions and/or recommendations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued research and analysis, providing results in support of Navy program decision making. Areas of research included sealift enhancement capability, manpower quality to unit readiness, ordnance sustainability, and surface ship readiness measures. Initiated research to evaluate Navy manpower mix and opportunities for restructuring, and to forecast and model Navy combat casualty rates.

b. (U) Supported Soviet Ship Vulnerability program.

c. (U) Continued independent parametric cost analysis. Conducted analyses in areas of airframe cost estimating relationships (CERs) and undersea weaponry; update ship installation and integration cost models and develop an avionics procurement support cost estimating model.

2. (U) FY 1990 Program:

a. (U) Conduct analyses over a broad range of issues -- from the assessment of application for new technology to the development and testing of improved tactics for today's forces.

b. (U) Research to include continuing efforts to enhance understanding and analysis of a variety of sustainability and readiness programmatic issues.

3. (U) FY 1991 Plans: Conduct analyses covering a broad range of topics.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: Contractors: PRESEARCH Inc., Arlington, VA; Stanley Associates, Arlington, VA; ERC, McLean, VA; Synergy Inc., Washington, D.C.; RCI, Vienna, VA.

F. (U) RELATED ACTIVITIES: Program Element 0605153M, (Marine Corps Operations Analysis Group); Program Element 0605151M, (Studies and Analysis Support, Marine Corps); Program Element 0605154N, (Center for Naval Analyses, Navy).

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152 Budget Activity: 6
Program Element Title: Studies and Analysis Support, Navy
Project Number: R0133 Project Title: National Academy of Sciences/ Naval Studies Board

C. (U) PROJECT DESCRIPTION: As mutually agreed upon between the Chief of Naval Operations and the President of the National Academy of Sciences and with appropriate attention to the influence of the domestic economy, national objectives, social imperatives and anticipated military requirement, the Board for Naval Studies will conduct and report upon surveys and studies in the field of scientific research and development applicable to the operation and function of the Navy. Reports consist of a briefing to the Assistant Secretary of the Navy (Research, Engineering and Systems) and the Chief of Naval Operations and staff, and written technical reports at the conclusion of each stage of the study (at least annually) as an archival contribution of the Board. This program funds specific studies in support of the Secretary of the Navy in high priority areas, dealing with policy matters and planning and acquisition decisions.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Completed the study on implications of emerging technology for the Navy of the twenty-first century. Issued final report.
b. (U) Continued studies on implications of emerging technologies.
c. (U) Provided support for C. H. Davis Lecture series.
d. (U) Continued studies on opportunities for research.
e. (U) Conducted studies in the field of scientific research and development applicable to the Navy.

2. (U) FY 1990 Program:

a. (U) Conduct studies in the field of scientific research and development applicable to the Navy.
b. (U) Provide support for Naval Hydrodynamics Symposium series.
c. (U) Continue studies on research opportunities.

3. (U) FY 1991 Plans: Continue to conduct studies of concern to the Navy.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA. Naval Postgraduate School, Monterey, CA; Naval War College, Newport, RI. Contractors: National Academy of Sciences, Washington, D.C.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N Budget Activity: 6
Program Element Title: Studies and Analyses Support, Navy
Project Number: R0147 Project Title: CNO Operational Strategy and Tactical Effectiveness Analyses

C. (U) PROJECT DESCRIPTION: This project provides CNO and SECNAV direct analyses of Navy policy, strategy acquisition, and program planning in meeting the following objectives: (a) producing study results impacting upon important programs/issues, (b) identifying and evaluating policy and strategy alter-natives and doctrine, and (c) evaluating the capabilities of programmed forces to accomplish missions assigned to the Navy. Deliverables consist of formal, structured documents containing or leading to conclusions and/or recommendations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:

a. (U) Continued studies on Navy program planning issues in force structures, fleet combat operations, readiness, sustainability, logistics support, C3, surveillance, intelligence, manpower, personnel, and training. Performed further research/assessments of ship, aircraft and base readiness resources to readiness measures and achievements.

b. (U) Analyzed a variety of sustainability issues.

c. (U) Initiated research to evaluate the Navy's recruiting strategy and to develop an analysis of capabilities for input to JCS net assessment process.

2. (U) FY 1990 Program:

a. (U) Address Navy program planning issues important to the development of Navy programs for FY 1992 and beyond.

b. (U) Conduct analyses to improve the effectiveness of current weapon, systems, help decision makers to select realistic, more effective new systems and continue development of resources to readiness measurement.

c. (U) Further work is planned in such areas as combat logistics, force planning, and personnel selection and retention.

3. (U) FY 1991 Plans: Continue efforts to conduct studies and perform analysis evaluating concepts and strategies, defining requirements, assessing capabilities, reviewing program alternatives and analyzing program and planning issues.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: Contractors: PRESEARCH, Inc., Arlington, VA; MATHTECH, Inc., Falls Church, VA; Synergy Inc., Washington, D.C.

F. (U) RELATED ACTIVITIES: PE 0605153M, Marine Corps Operation Analysis Group; PE 0605151M, Studies and Analysis Support, Marine Corps; PE 0605154N, Center for Naval Analyses, Navy.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N Budget Activity: 6
Program Element Title: Studies and Analysis Support, Navy
Project Number: R2040 Project Title: Soviet Ship Vulnerability Program

C. (U) PROJECT DESCRIPTION: This project assesses effectiveness of U.S. Navy weapons against Soviet ships and submarines. It develops and upgrades analytical methods and models for evaluating weapon lethality against Soviet targets and for predicting Soviet ship/submarine vulnerability. It provides information needed for warhead design during acquistion processes, in-service weapon upgrades, weapon loadout requirements, and for tactical applications of weapons.

D. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: (Funded in Project R0132)
   a. (u) Initiated target descritions(TDs)
   b. (u) Completed terminal weapon effectiveness assessment (TWEA)
   c. (u) Provided Joint Technical Coordination Group/Munition Effectiveness with TWEA
   d. (u) Initiated and updated submarine vulnerability evaluation model (SUBVEM), Ship Vulnerability Model (SVM), Shock Model and Mine Lethality Model.
2. (U) FY 1990 Program:
   a. (u) Initiate TDs
   b. (u) Initiate TWEA
   c. (u) Update Flooding Model
3. (U) FY 1991 Plans:
   a. (U) Initiate TDs
   b. (U) Initiate TWEA
   c. (U) Continue to update SVM and SUBVEM methodology.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVWPNCEN, China Lake, CA; NAVSWC, Dahlgren, VA; NAVSWC, White Oak, MD; and DTRC, Carderock, MD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605153M BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Marine Corps Operations Analysis Group, Center for Naval Analysis (MCOAG) (CNA)
PROJECT NUMBER: C0031 PROJECT TITLE: Marine Corps Operations Analysis Group

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0031	MCOAG	5,508	4,667	4,549	Continue	Continue

B. (U) DESCRIPTION: The MCOAG conducts operations research, systems analyses and cost effectiveness studies in the areas of field exercises, operations, tests, weapons systems, tactics, equipment, and manpower utilization.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Provided analytical support for FY 1991 Marine Corps Amphibious Warfare Appraisal (MCAWA), Cost and Operational Effectiveness Analysis (COEAs), doctrine/organization/tactics evaluation, manpower/force structure issues and field representatives.

2. (U) FY 1990 PROGRAM: Provide analytical support for FY 1992 Program Objective Memorandum development and issues. Planned growth from 27 to 28 analyst-years of effort. Continue COEAs as required.

3. (U) FY 1991 PLANS: Provide analytical support for program objective issues for the amendment to FY 1993 budget with mission area analyses. Continue COEAs as required.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: CONTRACTORS: Center for Naval Analyses.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605154N Budget Activity: 6
Program Element Title: Center for Naval Analyses, Navy
Project Number: R0148 Project Title: Center for Naval Analyses, Navy

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0148	Center for Naval Analyses, Navy	21,589	27,909*	26,196	Cont	Cont

* (U) Starting FY 1990, CNA's portion of PE 0605152N, Studies and Analysis Support, PE 0605865N, Operational Test and Evaluation Capability, and PE 0605853N, Management and Technical Support were consolidated into this program element.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Center for Naval Analyses (CNA) is the Department of the Navy's only Federally Funded Research and Development Center. CNA provides independent, objective, and expert analyses based on its unique access to sensitive data and the hands-on exposure to fleet operations gained through its world-wide field program. Because of rapid advances in technology, changes in the fleet, the increasing complexity of weapon systems, and the pressure to cut budgets the Navy has a greater need for analyses that are both sophisticated and timely. CNA is uniquely qualified to meet that need. The Center conducts a wide range of projects that provide two fundamental services to the Navy: (1) on-site analyses for fleet commanders to improve tactics and readiness of existing forces, and (2) analyses for Navy headquarters decision-makers with responsibility for systems acquisition, program planning and budgeting, and manpower management. CNA's capabilities cover a broad range of research areas, including: (a) System testing and fleet employment; (b) Warfare capability assessment; (c) Strategy, plans, and operations; (d) Readiness and sustainability; (e) Logistics; (f) Warfare modeling; (g) Manpower and training; (h) System evaluation and acquisition; (i) Resource management; (j) Technology assessment; (k) Methodology development; (l) Tactical development and evaluation; and (m) Operational testing and evaluation.

(U) CNA's analyses have resulted in substantial improvements in fleet effectiveness and significant cost avoidance. Examples of documented cost avoidances are:

- o Reductions in Recruit Training Center attrition ($20M/yr)
- o Elimination of unnecessary reports (10 manyears/yr)
- o Revised testing at intermediate maintenance facilities ($45M)
- o Changes in surface ship maintenance schedules ($150M/yr)
- o Revision of F/A-18 modification program ($10M/yr)
- o Evaluation of DDG-51 sparing program (up to $370M)

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: CNA efforts in FY 1989 included work in all the above noted research areas. Some examples are:

a. (U) Compiled and published an authoritative record of the roles of the USN/USMC in responding to international crises in the Third World.

b. (U) Provided a conceptual assessment of the threat that Soviet submarines operating in the eastern Pacific would pose to U.S. military and

commercial shipping there and to the U.S. West Coast, Hawaii, and Alaska.

c. (U) Expanded analysis support to master plans for developing responsive acquisition strategies for ASW, AAW, C3I, and STW/ASUW warfighting areas.

d. (U) Evaluated the family of computer models used to support the ASW warfare appraisal. Recommended areas in which improvements to the models should be made, and provided technical oversight to the improvement process.

e. (U) Developed and refined criteria for use in selecting research and development programs to ensure that these programs are affordable, technically feasible, and appropriate to projected threats.

f. (U) Assisted in planning, carrying out, and analyzing operational tests for advanced air vehicles.

g. (U) Recommended interim spares requirements budgeting and allowance methodologies that will permit development of supply support for new systems on basis of readiness objectives.

h. (U) Identified factors contributing to the improvement of Navy recruiting and reduction of Navy enlisted attrition.

i. (U) Analyzed current problems associated with recruiting/retaining Navy physicians and nurses.

j. (U) Evaluated Fleet capabilities to perform battle damage repair of ships and aircraft in forward areas.

k. (U) Supported the evaluation of Pacific Fleet logistics concepts of operation during PACEX 89 .

2. (U) FY 1990 Program: In addition to the research areas noted above, CNA will continue initiate efforts to address concerns of Congress and respond to legislation in areas such as Net Assessment, Operational test and evaluation, and warfare area appraisals, master plans, and investment strategies. Some specific examples of research areas are:

a. (U) Develop and apply methodology in support of net assessments, that reflect independent, accurate and objective comparisons of forces. Also develop and maintain an accurate data base to support net assessment.

b. (U) Develop and apply methodology in support of master plans, and investment strategies that allows clear rationale and justification for specific programs budgets, schedules and quantities and that provides basic for establishing funding priorities.

c. (U) Develop and refine critieria for use in selecting research and development programs, to ensure that these programs are affordable, technically feasible, appropriate to projected threats, and consistent with sound operational and tactical principles.

d. (U) Evaluations of new systems during operational testing, to ensure that scarce procurement funds are spent on programs that will perform as required.

e. (U) Develop and apply improved techniques for assessing the combat effectiveness of proposed weapon systems and for evaluating methods of improving fleet readiness and sustainability within budget constraints.

f. (U) Assessment of methods of recruiting, training, and retraining Navy personnel in the face of a declining manpower pool and increased demands for skilled personnel in the private sector.

g. (U) Provide an independent objective forum through which the senior leadership of the USN/USMC can benefit from expert non-governmental advice on complex and contentious issues.

Program Element: 0605154N Title: Center for Naval Analyses, Navy

h. (U) Execute a JCS mandated cost and operational effectiveness assessment of the proposed long-range conventional standoff weapon.

3. (U) FY 1991 Plans: Address issues of major importance to the Navy's leadership in the research areas noted above, particularly in areas of interest to the Congress. CNA's research program is updated quarterly and specific studies conducted in FY 1991 will be identified at the start of each quarter. The frequent review of CNA's program ensures that it is coordinated with other Navy research and that it addresses critical, high-priority issues requiring CNA's innovative and objective approach. In the recent budgetary climate the Navy must rely even more on CNA in its effort to maximize effectiveness from available resources.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: Contractor: The Center for Naval Analyses is administered under a contract with the Hudson Institute. Hudson's main Office is situated in Indianapolis, Indiana, while the Center for Naval Analyses is located in Alexandria, Virginia.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) ENGINEERING CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Program Element 0605153M, Marine Corps Operations Analysis Group, Program Element 0605155N, Fleet Tactical Development and Evaluation, and Program Element 0605856N, Strategic Technical Support.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605155N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fleet Tactical Development and Evaluation (TAC D&E)
PROJECT NUMBER: R0151 PROJECT TITLE: Tactical Development and Evaluation

A. (U) RESOURCES:

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0151	TAC D&E	15,118	14,290	14,936	Cont.	Cont.

B. (U) DESCRIPTION: This Program Element supports all naval warfare task areas and provides technical and analytical support to develop and evaluate tactics during fleet operations and exercises. Results are new/improved tactics for application in various mixes of force structures and weapon systems, including newly introduced systems, in various threat scenarios which add directly to warfighting effectiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: With analysis support provided by this program, fleet commanders developed new tactics for:

a. (U) SSN's executing ASW and ASUW missions.

b. (U) Coordinated surface/air ASW operations.

c. (U) Mine Countermeasures.

d. (U) Electronic warfare.

e. (U) AAW and air defense countermeasures.

f. (U) Air and surface ASUW

g. (U) Enhancing and supporting Tactical Decision Aid (TDA) software for desk-top computers.

2. (U) FY 1990 PLANS: Develop new/advanced tactics for:

a. (U) SSNs executing ASW and ASUW Missions.

PROGRAM ELEMENT: 0605155N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fleet Tactical Development and Evaluation (TAC D&E)
PROJECT NUMBER: R0151 PROJECT TITLE: Tactical Development and Evaluation

b. (U) Coordinated Battle Group (BG) ASW.

c. (U) Battleship BG operations.

d. (U) Coordinated air and surface ASUW and strike warfare.

e. (U) Anti-ship cruise missile targeting and countermeasures.

f. (U) Torpedo defense.

g. (U) AAW.

h. (U) Refine TDA software for desk-top computers.

3. (U) FY 1991 PLANS: Develop new/advanced tactics for:

a. (U) Shallow water ASW.

b. (U) Coordinated ASW.

c. (U) Integrated outer air battle.

d. (U) Integrated strike & amphibious C3I.

e. (U) Mine warfare countermeasures.

f. (U) ASMD hard/soft kill.

g. (U) Detect/locate new generation Soviet submarines.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVTACSUPPACT, Silver Spring, MD; OPTEVFOR, Norfolk, VA; NAVAIRDEVCEN, Warminster, PA; NOSC, San Diego, CA; CONTRACTORS: CNA, Alexandria, VA; OMNI Analysis Inc., San Diego, CA.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

PROGRAM ELEMENT: 0605155N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Fleet Tactical Development and Evaluation (TAC D&E)
PROJECT NUMBER: R0151 PROJECT TITLE: Tactical Development and Evaluation

3. COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Program Element 0603711N, "Tactics Development Support".

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605156M BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Marine Corps Operational Test and Evaluation (MCOTEA)
PROJECT NUMBER: C0033 PROJECT TITLE: Operational Test and Evaluation Support (OT&E)

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0033	OT&E	740	851	958	Continue	Continue

B. (U) DESCRIPTION: Supports MCOTEA field representatives for Marine Corps OT&E and OT&E performed by Fleet Marine Force Commanders and Technical Support Activities and provides separate funds for OT&E of systems for procurement by the Marine Corps to include test planning, operational testing, and preparing independent evaluation reports.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Wrote test plan for DWTS. Conducted OT&E of the Digital Wideband Transmission System (DWTS) and joint testing of NAVSTAR Global Positioning System (GPS) and MINTERM; completed testing on Portable Collection Protective System (PCPS) and published Independent Evaluation Reports (IERs).

2. (U) FY 1990 PROGRAM: Conduct OT&E Lightweight 155mm, and publish IERs. Joint testing of C-17. Write test plans for LAV-AD, Anti-personnel Obstacle Breaching System (APOBS), Joint Services Imagery Processing System (JSIPS), Advanced Tactical Air Command Central (ATACC) and High Frequency Communications Center (HFCC).

3. (U) FY 1991 PLANS: Conduct OT&E on LAV-AG, CHAP, APOBS, HFCC, JSIPS, and ATACC; and publish IERs. Write test plans for Catapult Fuel Air Explosive (CATFAE).

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN HOUSE: MCOTEA and MCRDAC, Quantico, VA and various naval and Army laboratories. CONTRACTORS: None.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605803N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Electromagnetic (EM) Effects and Spectrum Control
PROJECT NUMBER: X0706 PROJECT TITLE: Electromagnetic Interference (EMI) and Radio Frequency Control

A. (U) RESOURCES: (Dollar in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0706	EMI&RF CONTROL	2,002	3,438	3,642	CONT.	CONT.

B. (U) PROJECT DESCRIPTION: This project develops advanced technology to identify and eliminate Electromagnetic Interference (EMI) sources from Navy systems and platforms.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Initial R&D efforts with regard to the Adaptive Electromagnetic Control System (AEMCS), which included fleet demonstration, were unsuccessful in fulfilling fleet operational requirements. Cancelled AEMCS.

b. (U) Started development of marine chemical agents that reduce erosion of gaskets used in ships, aircraft, and weapons.

c. (U) Scoped and planned an effort to develop self-activating electronic blankers.

d. (U) Studied feasibility of using expert systems (ES) and advanced signal processing to minimize effects of EMI on combat system operations.

2. (U) FY 1990 PROGRAM:

a. (U) Continue development of chemicals to reduce corrosion.

b. (U) Start developing self-activating blankers, and the application of ES and advanced signal processing to immunize radar receivers to EMI.

c. (U) Start to develop criteria and methodologies to quantify the effect of EMI on the combat effectiveness of Navy systems.

d. (U) Start developing Force Level Frequency Management Program (FLFMP) to assist Battle Group Commanders control EMI using frequency management.

3. (U) FY 1991 PLANS:

a. (U) Continue development of chemicals to reduce corrosion.

b. (U) Continue development of self-activating blankers and advanced signal processing to immunize radar receivers to EMI.

c. (U) Develop an automated capability to quantify and evaluate systems degradation of Navy warfighting capability due to EMI.

d. (U) Continue development of FLFMP.

e. (U) Provide automated capability for EMI evaluation.

4. (U) Program to Completion: Complete chemical corrosion, FLFMP activating blanker and advanced signal processing for radars. The continuing program will exploit advanced technology, including electro/fiber optics to minimize EMI in antenna design and remote sensor improvements and to predict and monitor the EM environment and system susceptibility.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSWC, Dahlgren, VA; NAVOCEANSYSCEN, San Diego, CA; NRL, Washington, DC; NUSC, New London, CT.

E.(U) RELATED ACTIVITIES: None.

F.(U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G.(U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605804N Budget Activity: 6
Program Element Title: Technical Information Services
Project Number: R0835 Project Title: Technical Information Services

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Technical Information Services	2,823	2,553	2,977	Cont	Cont

B. (U) DESCRIPTION: Through evaluation and feedback by Navy scientists and engineers, this program influences industry's $5 billion investment in Independent Research and Development (IR&D), and supports dissemination of IR&D benefits. Statute requires firms to present IR&D programs for evaluation; results help set reimbursement. The program identifies technology gaps IR&D could address, and multiplies the benefits of industry efforts. It supports technology transfer to business and local governments according to law and policy--P.L. 96-480, OMB Circ. A109, Federal Technology Transfer Act of 1986--through Navy Acquisition R&D Information Centers, publications, domestic technology transfer, review of patents and inventions; offices for research and technology transfer assistance; and promotion of cooperative R&D agreements (CRDAs).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Developed programs to match Navy mission areas and IR&D projects to concentrate effort, strengthen evaluation, disseminate results. Initiated domestic tech transfer program. Held TransFair (symposium). Executed two CRDAs.

2. (U) FY 1990 Program: Maintain IR&D on-site review efforts. Increase Navy tech transfer via cooperative R&D agreements. Publicize patents; administer delegation of CRDA authority.

3. (U) FY 1991 Plans: Sample linked data bases to promote tech transfer by labs. Develop plan for computerized IR&D evaluation system development/installation. Conduct technical on-site review of IR&D programs of newly reporting foreign companies.

4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA; DTRC, Bethesda, MD; NWSC, Dahlgren, VA; NUSC, New London, CT; and NADC, Warminster, PA.

E. (U) RELATED ACTIVITIES: Coordinated/conducted with Army and Air Force; policy guidance from Under Secretary of Defense (Acquisition).

F. (U) OTHER APPROPRIATION FUNDS: This is a *non*-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Management and Technical Support

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0231	ASW System Support	0	3,801	4,097	CONT.	CONT.
R0905	Naval Warfare Tactical Analysis	3,502	2,992	3,945	CONT.	CONT.
R1767	NWC Center for Naval Warfare	1,268	1,256	1,362	CONT.	CONT.
T1038	Acoustic & Non-Acoustic Analysis Support	308	*	*	*	*
Total		5,078	8,049	9,404	CONT.	CONT.

* Project T1038 transferred to 0605856N, Strategic Technical Support, after FY 1989.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program provides analytical and management support across the entire spectrum of Naval warfare. The program provides ASW Systems analysis for COMSPAWARSYSCOM and supports activities of the CNO Strategic Studies Group at the War College. Program element is required for development of annual warfighting appraisals of each Naval Warfare Task area, and a summary appraisal integrating individual warfare tasks. These establish requirements, priorities and tradeoffs used as a baseline for biennial Program Objective Memorandum (POM) decision making.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Management and Technical Support
PROJECT NUMBER: R0231 PROJECT TITLE: ASW Systems Support

C. (U) DESCRIPTION: The project develops and reviews Navy's ASW Investment Strategy. Analyses are conducted to define ASW requirements, assess ASW programs and performance, and make cost/performance tradeoffs among ASW system concepts. Efforts support definition of warfare requirements and development of ASW architectures.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Completed structural and qualitative analysis of future option CVBG. Completed first input to ASW Master Plan with high fidelity models. Performed annual master plan and architectural option analyses and model improvements. Completed first interim report of ASW Future Naval Force Requirements study. Conducted ASW appraisal and supported the ASW Integrated Assessment Team. Developed and assessed overall C3I overlay for area ASW (Theater, Region, Sector - TRS). Completed analysis of area ASW architecture and TRS options.

2. (U) FY 1990 Program: Continue high speed/high fidelity model development. Continue annual analysis of ASW Master Plan. Perform architecture option analyses and model improvements. Complete Area ASW architecture. Complete development of top level models incorporating C3/C3CM models. Incorporate national sensors in campaign level models. Complete cost analysis model for ASW. Complete second interim report of ASW Future Naval Force Requirements study. Complete final investment strategy.

3. (U) FY 1991 Plans: Perform annual master plan and architectural option analyses and model improvements. Complete cost analysis of systems in cross warfare mission areas. Perform first annual system level cost analysis of ASW Investment Strategy. Review and evaluate system engineering models for advanced systems. Complete structural and qualitative analysis of SLOC protection force and ASW Architecture.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NUSC, Newport RI (lead Lab). Contractors: CNA, Alexandria, VA; Systems Planning and Analysis, Arlington, VA.

F. (U) RELATED ACTIVITIES: All ASW Naval warfare efforts. There is no unnecessary duplication of effort in the Navy or the DoD.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Management and Technical Support
PROJECT NUMBER: R0905 PROJECT TITLE: Naval Warfare Tactical Analyses

C. (U) DESCRIPTION: The project provides analytical and management support to the DCNO (Naval Warfare) as Warfare Task Sponsor for ASW, AAW, STW, ASUW, C3I, EW, Amphibious, Mine, Chemical, Strategic, Space, and Special Warfare. The project conducts continuing analyses of Navy's capabilities and limitations in execution of these missions. Master plans are developed as blueprints for defining problems and requirements for the next FYDP in each warfare task. A Summary Warfare Appraisal integrates all individual warfare task appraisals.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Expanded analytical support for annual appraisals. Conducted major revisions to existing master plans. Continued OSPREY REINDEER at increased funding levels. Supported CNA warfare analyses/tactical modeling. Incorporated cost analysis and warfighting impact as elements of tradeoff decisions.

2. (U) FY 1990 Program: Continue all annual appraisals and OSPREY REINDEER. Continue major master plan updates at the rate of one to three warfare tasks per year. Fully integrate specific warfighting impact analyses as a major element of tradeoff decisions. Transfer CNA warfare analyses/tactical modeling to PE 0605154N in FY 1990 and later.

3. (U) FY 1991 Plans: Continue all efforts as in FY 1990. Complete integration of CNA tactical modeling into planning process.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NOSC, San Diego, CA; NCSC, Panama City, FL; COMINWARCOM, Charleston, SC; NSWC, Dahlgren, VA; NRL, Washington, DC; NADC, Warminster, PA. Contractors: The Aerospace Corporation, El Segundo, CA; System Planning and Analysis, Arlington, VA.

F. (U) RELATED ACTIVITIES: All Naval warfare efforts. There is no unnecessary duplication of effort within the Navy or the Department of Defense.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: Management and Technical Support
PROJECT NUMBER: R1767 PROJECT TITLE: Naval War College (NWC) Strategic Studies Group Support

C. (U) DESCRIPTION: The project analyzes overall Naval Strategy and provides recommendations to CNO and fleet commanders for improvements in both strategy and means of strategy execution. This effort uniquely joins strategic and tactical concepts and tests the integrated concepts through wargaming. Objectives of the effort are to provide improvement in visibility of missions and roles of fleet forces and generate Naval strategy and campaign alternatives.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Program: Provide support to SSG at planned levels and at reduced levels to CNWS. Provide campaign option support in response to CNO and Fleet tasking, addressing the employment of Naval Forces not only in the context of Global War, but also in regional crises and contingencies. Assess impact on force structure and strategy of global economic strategic War Games. Continue development of coordination between strategy and technology through integration of emerging technologies into war game/research. Continue bi/multilateral programs. Continue intelligence support to maritime campaigns.

2. (U) FY 1990 Plans: Conduct year two of the five-year annual Global War Game Series. Continue all other FY 1989 activity.

3. (U) FY 1991 Plans: Conduct year three of the five-year annual Global War Game Series. Continue all other FY 1990 activity.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: Naval War College (NWC). Contractors: Sonalysts, Inc., Waterford, CT.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Strategic Technical Support

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0100	Biomedical Support for Submarine Systems	700	1,167	1.229	CONT.	CONT.
R0128	Management and Technical Support. Strategic	3,116	3,857	3,849	CONT.	CONT.
T1038	Acoustic and Non-Acoustic Analysis Support	0	972	1,209	CONT.	CONT.
TOTAL		3,816	5,996	6,287	CONT.	CONT.

B. (U) DESCRIPTION:

M0100 Biomedical Support for Submarine Systems - Provides biomedical knowledge necessary to increase effectiveness and enhance performance of critical submarine tasks with particular emphasis on development and assessment of improved visual and auditory sonar techniques to improve the operator's ability to detect, track and classify multiple targets. Recent rapid improvements in enemy operational capabilities now require reestablishment of this project to obtain maximum performance from all components of submarine sonar systems.

R0128 Management and Technical Support, Strategic - Develops strategic and theater nuclear concepts, determines technology requirements, defines systems and options, evaluates system mixes, evaluates and establishes requirements for strategic force survivability against anti-submarine and anti-ballistic missile threats, conducts Sea Launched Ballistic Missile/Sea Launched Cruise Missile targetting application and deployment studies, examines reentry system requirements in support of sea-based strategic and theater nuclear systems, and establishes Navy Strategic Command, Control and Communications requirements. It includes assessment of future strategic and technology environments, the implications of that environment on national security policy, grand national strategy, maritime strategy, and consequential force requirements and employment policies for strategic forces. This project provides unique support necessary to produce optimum future naval contributions to strategic and theater nuclear forces.

T1038 Acoustic and Non-Acoustic Analysis Support - Provides analysis of acoustic and non-acoustic data for ASW systems. Analyses are provided by NISC to exploit specific submarine characteristics by revised tactics or new ASW Systems.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: M0100 PROJECT TITLE: Biomedical Support Submarine Systems

C. (U) DESCRIPTION: This project increases effectiveness and enhances performance of critical submarine tasks. The project upgrades target acquisition, identification, and tracking capabilities to maximize effectiveness of defensive and offensive systems. Also, man-machine interface in auditory and visual systems will be evaluated concentrating on improved accuracy, speed, and efficiency to detect, classify and identify multiple targets. Emphasis is on assessing and developing new visual and auditory techniques that improve operator skills.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Studied human response to varying light frequencies and intensities and auditory signal recognition enhancements for sonar operators.

2. (U) FY 1990 Program: Report optimal saturation and brightness for NTDS coding of visual displays. Determine detection and classification thresholds for analog vs. digitized modifications of contact signals. Determine effect on target detection of various ways to display background noise.

3. (U) FY 1991 Plans: Determine output limiting parameters that least degrade operator performance. Determine optimal temporally and spectrally based signal processing techniques for improved detection, classification and tracking. Determine the effect of color names on cognitive sonar task performance. Determine waterfall display performance effects of 1, 2, and 3 bit quantization of background noise. Evaluate new sonar headsets. Report filter bandwidth effects on binaural enhancement. Report at-sea test results of binaural display technique.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NAVSUBMEDRSCLAB, New London, CT. Contractor: None.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATION COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: R0128 PROJECT TITLE: Management and Technical Support, Strategic

C. (U) DESCRIPTION: This project provides analytical support to CNO, SECNAV, JCS, and OSD in evaluation of strategic and theater nuclear issues within Navy program and overall balance within strategic forces. The project also provides evaluation of force capabilities and requirements, analysis of systems under development, trade-off analysis, and future national policy and strategy.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Assessed trade-offs relating to weapon configuration, targeting policy, ASW threat and operational requirements of current and future sea-based strategic and strategic related nuclear forces and C3I assets. Analyzed weapon systems requirements related to relocatable targets. Conducted wargame seminars to train senior staff in nuclear implementation procedures. Strategic Think Tank rechartered as Strategic Policy Analysis Group with similar effort under CNO direction. Completed inital phases of STRAT PLAN 21 assessment.

2. (U) FY 1990 Program: Continue to assess trade-offs relating to weapon configuration, targeting policy, ASW threat and operational require- ments for current and future sea-based strategic and strategic related nuclear forces and C3I assets; Strategic Policy Analysis Group effort. Evaluate sea-based strategic and strategic related nuclear forces.

3. (U) FY 1991 Plans: Continue to assess trade-offs relating to weapon configuration, targeting policy, ASW threat and operational requirements for current and future sea-based strategic and strategic related nuclear forces and C3I assets; Strategic Policy Analysis Group effort. Evaluate sea-based strategic and strategic related nuclear forces.

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: Naval Surface Weapons Center; Center for Naval Analyses. Contractors: Academy for Interscience Methodology; Mitre Corporation; Science Applications International Corporation; Johns Hopkins University/APL.

F. (U) RELATED ACTIVITIES: PE 0603311F, Advanced Strategic Missile Systems (technology exchange); PE 0101221N, Fleet Ballistic Missile System; PE 0101228N, Trident; PE 0604363N, Trident II; PE 0605864F, Test and Evaluation.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N BUDGET ACTIVITY: 3-Strategic Programs
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: T1038 PROJECT TITLE: Acoustic and Non-Acoustic Analysis Support

C. (U) DESCRIPTION: This project provides data collection and analysis for exploitation of acoustic and non-acoustic sensor data in support of sensor and weapons system development. The project also supports development of effective ASW tactics and

Program provides analysis, unique hardware and software development for processing sensor data at Naval Technical Support Center (NTIC).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: (funded under 0605853N): NTIC Developmental distributed acoustic processing architecture was identified for the NTIC laboratory to provide an increase in acoustic data processing efficiency.

2. (U) FY 1990 Program: NTIC will begin implementation of a fully digital architecture for acoustic signal processing.

3. (U) FY 1991 Plans: Incorporate into the acoustic laboratory architecture to

4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NTIC. Contractors: ESL Inc.

F. (U) RELATED ACTIVITIES: PE 0604784N - Fixed Distributed System (FDS); PE 0204311N - Integrated Undersea Surveillance System; PE 0204313N - Surveillance Towed Array Sensor System.

G. (U) OTHER APPORPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: U.S./JAPAN,

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605857N **Budget Activity** 6
Program Element Title: International RDT&E

A. (U) **RESOURCES:** (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0115	**Supreme Allied Commander Atlantic, Undersea Research Centre (SACLANTCEN)**					
		1,236	1,351	1,473	Cont	Cont
R0149	**International Cooperative RDT&E**					
		1,851	1,686	2,569	Cont	Cont
TOTAL		3,087	3,037	4,042	Cont	Cont

B. (U) **BRIEF DESCRIPTION OF PROGRAM ELEMENT:** Provides program management, execution and support to include travel to a large variety of cooperative naval R&D programs with allied nations. The program implements recent initiatives mandated by Congress, OSD and the Navy to eliminate duplicative R&D by sharing defense technology and weapons development costs with allied and Latin American nations. This Congressional mandate is under Title 10, United States Code, Section 2407, "Acquisition of Defense Equipment Under Cooperative Projects". Resources used for program development which includes the following analysis; cost, requirements, technical development risk assessment, technology base impact, technical security risk assessment, industrial base impact; procurement analysis through U.S. acquisition (FAR) and foreign acquisition regulations, work share/cost share analysis, intellectual property rights (domestic and foreign) analysis, balance of payments provisions, and project management administration arrangements; participation in the NATO exchange groups to support the DOD directed Armaments Groups; Senior National Representative (SNR) meetings; Exchange Scientist Program (ESP); resources to cover professional training for essential language skills for the ESP Program; resources to manage The Technical Cooperation Program (TTCP). This project differs from the NATO Cooperative R&D program (PE 0603790D) in that it involves interaction with all allied and friendly nations and it deals with the technology available in these countries, as opposed to the hardware development efforts being pursued in the NATO Cooperative R&D program. The objective of the International Cooperative RDT&E program is to share R&D costs and gain needed economics of scale to reduce unit costs of weapon systems. The program includes the resources for a variety of bilateral and multilateral Data Exchange Agreements (DEA); requirements analyses for potential joint International RDT&E programs and Memorandum of Understanding (MOU) development to execute these programs. It also covers the salary and administrative support to the U. S. contingent at the NATO Supreme Allied Commander Atlantic, Undersea Research Centre, La Spezia, Italy and the Cooperative Geophysical Research programs with Brazil, Argentina and Chile.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605857N **BUDGET ACTIVITY:** 6
PROGRAM ELEMENT TITLE: International RDT&E
PROJECT NUMBER: R0115 **PROJECT TITLE:** Supreme Allied Commander Atlantic Undersea Research Centre (SACLANTCEN)

C. (U) **DESCRIPTION**: This project supports staff and equipment requirements for U.S. scientific contingent at NATO Supreme Allied Commander Atlantic, Undersea Research Centre at La Spezia, Italy. It also supports scientific and technical collaboration in fields of oceanography, underwater acoustics, numerical modeling and other ASW-related research between the Centre and U.S. Navy scientists. The Centre's technical program is focused on integrating latest technologies in advanced ASW systems that can be employed by NATO nations at low cost and with minimum delay. U. S. personnel compose about 20% of the staff.

D. (U) **PROJECT ACCOMPLISHMENTS AND PLANS**: The scientific staff are working to accomplish these overall goals. U.S. personnel compose about 20% of this staff.

1. (U) **FY 1989 ACCOMPLISHMENTS**:
   a. (U) Continued advanced research/development programs in military oceanography, underwater acoustics and systems development.
   b. (U) Continued to advise/assist SACLANT, NATO Naval Commanders and NATO nations in area of ASW operations.

2. (U) **FY 1990 Program**:
   a. (U) Continue oceanographic/acoustic research and ASW studies.
   b. (U) Complete MILOC acoustic survey "RESOLUTE SUPPORT" final report.

3. (U) **FY 1991 PLANS**:
   a. (U) Continue oceanographic/acoustic research/ASW studies.
   b. (U) Widen scope of research program to include Mine Countermeasure (MCM) - related projects.

4. (U) **PROGRAM TO COMPLETION**:
   a. (U) This is a continuing program.

E. (U) **WORK PERFORMED BY**: IN-HOUSE: Supreme Allied Commander Atlantic, Undersea Research Centre, La Spezia, Italy; NUSC, New London, CT; NOARL, Stennis Space Center, MS. CONTRACTORS: n/a

F. (U) **RELATED ACTIVITIES**: NATO provides project funding.

G. (U) **OTHER APPROPRIATION FUNDS**: This is a non-acquisition program.

H. (U) **INTERNATIONAL COOPERATIVE AGREEMENTS**: NATO SACLANT ASW Research Centre Chapter 31 Oct 1962.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605857N **Budget Activity:** 6
Program Element Title: International RDT&E
Project Number: R0149 **Project Title:** International RDT&E

C. (U) **PROJECT DESCRIPTION**: Project provides salaries, training for language skill for the ESP Program, administrative, travel, and technical support including work share/cost share analysis, intellectual property rights analysis, funding and technical assessment memoranda, and project management for IACP Office. Program manages and executes MOU preparation and negotiations involving program development and financial management of OSD funds, over 300 MWDDEAs, IEPs and TTCP with 20 allied nations and the Exchange Scientists and Engineers Program. International R&D process is coordinated by bilateral SNR fora with all major allied navies, multilateral fora NNAG.

D. (U) **PROGRAM ACCOMPLISHMENTS AND PLANS**: Equitably develop/deploy most effective, and interoperable equipment/technology for U.S./allied forces.

1. (U) **FY 1989 Program Accomplishments**:
   a. (U) Developed and negotiated 5 MOU with allies nations to develop technology, weapon systems and equipments and acquired allied technology through licensed production in the U.S.
   b. (U) Expanded cooperative R&D efforts to achieve 10% of Navy's R&D budget in international collaborative efforts.
   c. (U) Managed/provided financial support for Navy participation in OSD NAC, FWE, and NCTP and Congressional initiatives.

2. (U) **FY 1990 Program**:
   a. (U) Continue FY 1989 plans.
   b. (U) Expand participation in exchange of technology and on-site examination of Latin American R&D efforts.

3. (U) **FY 1991 Plans**:
   a. (U) Continue FY 1989/1990 plans.
   b. (U) Seek areas for closer cooperation with Latin America to reduce expenditures of RDA resources.

4. (U) **Program to Completion**:
   a. (U) This is a continuing program.

E. (U) **WORK PERFORMED BY**: In-house: NOS,Indian Head, MD;

F. (U) **RELATED ACTIVITIES**: OSD provides project funding on the following: PE 0605111D FWE; PE 0605130D NCTP; and PE 0603790D NAC.

G. (U) **OTHER APPROPRIATED FUNDS**: This is a non-acquisition program.

H. (U) **INTERNATIONAL COOPERATIVE AGREEMENTS**: N/A

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N BUDGET ACTIVITY:6

PROGRAM ELEMENT TITLE: RDT&E,N Laboratory & Facilities Management Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0135	OCNR Management Support	43,751	43,292	48,794	Cont.	Cont.
R1855	Science/Engineering Training Support	402	533	898	Cont.	Cont.
M0104	NAVMED Management Support	6,181	6,636	7,453	Cont.	Cont.
X0832	DNL Management Support	1,424	1,386	2,510	Cont.	Cont.
	TOTAL	51,758	51,847	59,655	Cont.	Cont.

B. (U) DESCRIPTION: This program supports the Office of the Chief of Naval Research, small non-overhead distributing Navy R&D activities, and Medical Research Units. It pays salaries, rent, utilities, printing, supplies, materials, and other day-to-day costs that are necessary to support these Navy activities that administer and execute the Navy's R&D program. The vast majority of these costs are fixed costs which primarily support scientists and engineers working on the Navy Technology Base. For the Director of Navy Laboratories (DNL) activities, this program funds costs, such as severance pay, not chargeable to overhead or to customers.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Laboratory and Facilities Management Support
PROJECT NUMBER: R0135 Project TITLE: OCNR Management Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0135	OCNR Management Support	43,751	43,292	48,794	Cont.	Cont.

B. (U) DESCRIPTION: This project supports the Navy's entire Technology Base mission. OCNR sponsors scientific advances which benefit all Navy mission areas, including anti-submarine warfare and anti-air warfare, and supports the fleet's ability to operate from a position of technological superiority. OCNR provides management and direction for the entire Navy Technology Base. Functions performed include: (1) Scientific and technical direction of the nationwide Category 6.1 basic research program with colleges, universities, and Navy laboratories; (2) scientific and technical direction of the 6.2 exploratory development program through the Navy's R&D laboratories and centers; (3) management, resource formulation, program assessment and contract negotiation/administration of the entire Navy research and exploratory development program; (4) program management and administrative support to selected research programs of SDIO, DARPA, CNO, and SBIR; (5) coordination of the Navy's Tech Base program within the context of total DoD/Government; (i.e., National Science Foundation, National Academy of Sciences) R&D initiatives in order to obtain maximum scientific advances. OCNR Management Support pays for the salaries, rent, utilities, supplies, and other fixed costs at OCNR Headquarters and field offices.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: The project funded basic costs at OCNR headquarters, the ONR European Office (London), the ONR Liaison Office Far East (Tokyo), and field detachments.

2. (U) FY 1990 PROGRAM: The project will continue to provide support for the OCNR headquarters, the ONR European Office (London), the ONR Liaison Office Far East (Tokyo), and field detachments.

PROGRAM ELEMENT: 0605861N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Laboratory and Facilities Management Support
PROJECT NUMBER: R0135 PROJECT TITLE: OCNR Management Support

3. (U) FY 1991 PLANS: The project will continue to provide for basic costs of the OCNR headquarters and its field activities in support of the entire Navy Technology Base mission. Specifically, it pays salaries of scientific and engineering personnel who direct the execution of the Navy's basic research (Category 6.1) and exploratory development (Category 6.2) programs at the nation's universities/colleges and Navy laboratories. In addition to its Navy Tech Base mission, OCNR provides important program management and administrative support to SDIO, DARPA, CNO, and SBIR. Almost all the funds in this project are fixed costs, such as salaries, headquarters building rent, communication, etc.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Office of the Chief of Naval Research, Arlington, VA; ONREUR, London, England; ONRFE, Tokyo, Japan; ONRDET Boston, MA; and ONRDET Bay St. Louis, MS. CONTRACTORS: Not applicable.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Program Element (PE) 0605862N (RDT&E Instrumentation and Material Support), which funds investment items for the activities covered in this program element.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable. This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Laboratory and Facilities Management Support
PROJECT NUMBER: R1855 PROJECT TITLE: Science/Engineering Training Support

C. (U) DESCRIPTION: Project consists of long term professional education and training for Navy civilian scientists and engineers to maintain and update essential skills and develop new expertise as needed.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

2. (U) FY 1989 ACCOMPLISHMENTS: Provided long-term professional training and education for 85 persons.

3. (U) FY 1990 PROGRAM: Plan to provide long-term professional training and education for at least 50 persons.

4. (U) FY 1991 PLANS: This is a continuous level of effort.

5. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: Not applicable.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) Not applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N BUDGET ACTIVITY: 6

PROGRAM ELEMENT TITLE: RDT&E Laboratory and Facility Management Support

PROJECT NUMBER: M0104 PROJECT TITLE: Naval Medical Management Support

C. (U) DESCRIPTION: This continuing program funds certain program-wide management and operational costs at the Naval Medical Research and Development Command and specified Naval Medical Laboratories that do not distribute overhead. Funds are used for general administrative expenses including salaries of support personnel, centralized technical services, common support costs under host-tenant agreements, routine maintenance and repair of buildings, and costs of laboratory support provided by other agencies/commands.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: (a) Provided management support for operations at Naval Medical Research and Development Command, three in-house laboratories, and two detachments. (b) Provided increased support for further development of the Naval Medical Research Institute Detachment in Lima, Peru. (c) Provided increased support for the Manila laboratory to acquire suitable office and research spaces and to install protection armor on research and transportation vehicles.

2. (U) FY 1990 PROGRAM: Continue to provide management support for those activities identified in paragraph E below.

3. (U) FY 1991 PLANS: Continue to provide management support for those activities identified in paragraph E below.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Medical Research and Development Command Headquarters, Bethesda, MD; Naval Dental Research Institute, Great Lakes, IL; U.S. Naval Medical Research Unit No. 2, Manila, RP; U.S. Naval Medical Research Unit No. 2 Detachment, Jakarta, Indonesia; U.S. Naval Medical Research Unit No. 3, Cairo, Egypt; Naval Medical Research Institute Detachment, Peru.

F. (U) RELATED ACTIVITIES: Program Element 0605862N, RDT&E Instrumentation & Material Support, funds investment items and general purpose equipment for activities in this program element.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) Not applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N BUDGET ACTIVITY:6
PROGRAM ELEMENT TITLE:RDT&E,N Laboratory and Facility Management
PROJECT NUMBER:X0832 PROJECT TITLE:DNL Management Support

C. (U) DESCRIPTION: This project supports centrally managed interlaboratory projects at the Navy R&D Centers such as the Navy Laboratory CAD-CAM Support Group, the Navy Laboratory Computer Committee, the Engineering Software Support Group, R&D center strategic planning, the Navy Weapon System Software Development Group, and other residual costs resulting from disestablishment or reduction-in-force actions (severance pay/relocation costs).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY1989 ACCOMPLISHMENTS: Provided support to the centrally managed interlaboratory projects and for residual costs.

2. (U) FY1990 PROGRAM: COntinue to provide support as described above.

3. (U) FY 1991 PLANS: Continue to provide support as described above.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: David Taylor Research Center, Bethesda, MD; Naval Surface Warfare Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA; Naval Underwater Systems Center, Newport, RI; Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; and Naval Ocean Systems Center, San Diego, CA.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N BUDGET ACTIVITY: 6

PROGRAM ELEMENT TITLE: RDT&E,N Navy Instrumentation and Material Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0137	OCNR Instrumentation and Material Support	4,591	3,874	5,618	Cont.	Cont.
M0105	NAVMED Instrumentation and Material Support	3,626	3,064	4,882	Cont.	Cont.
S0353	NAVSEA Instrumentation and Material Support	1,085	918	1,506	Cont.	Cont.
W0566	NAVAIR Instrumentation and Material Support	1,779	1,505	2,666	Cont.	Cont.
X0799	SPAWAR Instrumentation and Material Support	105	102	320	Cont.	Cont.
X0833	DNL Instrumentation and Material Support	1,976	1,672	1,079	Cont.	Cont.
X1957	Large Cavitation Channel	20,020	15,754	5,940	Cont.	Cont.
	TOTAL	33,182	26,889	22,011	58,759	127,070

B. (U) DESCRIPTION: This program element funds investment costs at certain Navy research, development, test and evaluation laboratories and facilities. These laboratories and other facilities are involved in diverse activities with the RDT&E,N appropriation, such as, oceanographic and atmospheric research and development, medical R&D with involvement in research of new methods of combat casualty care, energy conservation, weapons testing, personnel-related research and development, the Navy space program, and a number of other programs. This program supports technology base general purpose research equipment requirements at the Naval Oceanographic and Atmospheric Research Laboratory (NOARL).

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY
PROGRAM ELEMENT: 0605862N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Instrumentation and Material Support
PROJECT NUMBER: R0137 PROJECT TITLE: OCNR I&M Support

C. (U) DESCRIPTION: This project provides for the acquisition and installation of essential general purpose research equipment at NOARL for oceanographic, acoustic, and atmospheric research and development programs, for ADP/support equipment and equipment alterations for the Office of the Chief of Naval Research (OCNR), and for general purpose research equipment and minor construction at the Navy Personnel Research and Development Center (NPRDC).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: NOARL obtained research equipment to support RDT&E,N efforts in remote sensing, ocean forecasting, active and passive acoustic capabilities, mapping, charting, and geodesy, and mine/special warfare. Equipment for OCNR offices/detachments was supported.

2. (U) FY 1990 PROGRAM: NOARL will purchase measurement systems capable of making subsurface acoustic environmental measurements and oceanographic mesoscale variability studies. Equipment in support of remote sensing, mapping, charting, and geodesy, polar oceanography, and atmospheric sciences will be obtained. Equipment for OCNR offices/detachments will be supported.

3. (U) FY 1991 PLANS: NOARL will purchase specialized acoustic processing equipment and underwater measurement devices to support a number of different technology base experimental programs. Processing upgrades will be purchased for the Deep Towed Acoustic Geophysical System which is used to determine sub-bottom acoustic parameters. New equipment and upgrades will be provided for ocean and atmospheric data assimilation and graphic visualization devices. Equipment for OCNR offices/detachments will be supported.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NOARL, Stennis Space Center, MS; NOARL Atmospheric Directorate, Monterey, CA; NPRDC, San Diego, CA; OCNR, Arlington, VA. CONTRACTORS: TBD.

F. (U) RELATED ACTIVITIES: PE 0605861N (RDT&E,N Laboratory and Facilities Management Support), and Navy R&D technology base programs in oceanography, acoustics, and atmospheric science being performed by NOARL.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1991 RDT,E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0605862N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE:RDT&E Instrumentation and Material Support
PROJECT NUMBER:M0105 PROJECT TITLE: Naval Medical Instrumentation and Material Support

C. (U) DESCRIPTION: This program funds the procurement of new and replacement general purpose analytical and research support equipment, minor construction, alterations, equipment installation, and first destination transportation costs of newly purchased equipment for the Naval Medical Research and Development Command Headquarters, eight Medical Research Laboratories, and three Detachments. The program also provides funds to meet Congressionally mandated standards for Laboratory Animal Facilities.

D. (U) ACCOMPLISHMENTS:

1. (U) FY 1989 ACCOMPLISHMENTS: Provided support for upgrading aging laboratory spaces. Replaced or upgraded obsolete equipment. Provided new technology analytical instrumentation. Upgraded electrical/utilities systems. Provided security upgrade for overseas laboratory and detachments. Continued upgrading all laboratory animal facilities toward USD(R&E) directed goal of meeting American Association for Accreditation of Laboratory Animal Care (AAALAC) standards or Animal Welfare Act requirements.
2. (U) FY 1990 PROGRAM: Continue to provide support as described above.
3. (U) FY 1991 PLANS: Continue to provide support as described above.
4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Medical Research and Development Command Headquarters, Bethesda, MD; Naval Aerospace Medical Research Laboratory, Pensacola, FL; Naval Biodynamics Laboratory, New Orleans, LA; Naval Dental Research Institute, Great Lakes, IL; Naval Health Research Center, San Diego, CA; Naval Medical Research Institute, Bethesda, MD; Naval Submarine Medical Research Laboratory, Groton, CT; U.S. Naval Medical Research Unit No. 2, Manila, RP; U.S. Naval Medical Research Unit No. 2 Detachment, Jakarta, ID; U.S. Naval Medical Research Unit No. 3, Cairo,EG; Naval Medical Research Institute Detachment, Lima, PE; and Naval Medical Research Institute Toxicology Detachment, WPAFB, OH.

F. (U) RELATED ACTIVITIES: P.E. 0605861N (RDT&E Laboratory and Facility Management Support).

G. (U) OTHER APPROPRIATED FUNDS: Not applicable.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation and Material Support
PROJECT NUMBER: S0353 PROJECT TITLE: NAVSEA Instrumentation and Material Support

C. (U) DESCRIPTION: Funding in this project is used for procurement of needed safety and station equipment; first destination transportation; and the hulk program providing storage, basic configuration and maintenance of RDT&E ship hulks.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Procured needed safety and station equipment; completed conversion of ex-SOUTHERLAND DD-743 for HARPOON support; provided technical, engineering and management service for target hulk pool; and provided basic hulk modifications.

2. (U) FY 1990 PROGRAM: Procure needed safety and station equipment; first destination transportation; convert ex-CLAMP ARS-33 and ex-TENINO ATF-115 to increase pool capabilities; provide technical, engineering and management services for target hulk pool; provide basic hulk modifications.

3. (U) FY 1991 PLANS: Procure needed safety and station equipment; first destination transportation; provide technical, engineering, and management services for target hulk pool; provide modifications to meet user requirements.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Pacific Missile Test Center, Pt. Mugu, CA

F. (U) RELATED ACTIVITES: Over-the-Horizon Air Weapons Systems.

G. (U) OTHER APPROPRIATION FUNDS: Not applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation and Material Support
PROJECT NUMBER: W0566 PROJECT TITLE: NAVAIR Instrumentation and Material Support

C. (U) DESCRIPTION: This is a continuing project that supports energy conservation and environmental-related projects at various Navy Research, Development, Test and Evaluation activities.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: (a) Provided funding for four energy projects in areas of insulation, utility controllers, vibration predictive maintenance, and wind farm studies. (b) Provided funding for environmental protection projects to clean up hazardous wastes and provide for containment of spills.

2. (U) FY 1990 PROGRAM: Continue to provide support as described above.

3. (U) FY 1991 PLANS: Continue to provide support as described above. The increase in funding will support compliance with Congressionally directed tasks related to energy conservation and environmental management.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Evaluation Facility, Albuquerque, NM; Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center, Pt Mugu, CA; Atlantic Undersea Test and Evaluation Center, Andros, Bahama.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation and Material Support
PROJECT NUMBER: X0799 PROJECT TITLE: SPAWAR Instrumentation and Material Support

C. (U) DESCRIPTION: This project provides for shipping newly procured research and development materials from the manufacturers to the first destination (First Destination Transportation Costs).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Provided First Destination Transportation funding as prescribed above.

2. (U) FY 1990 PROGRAM: This is a continuing level of effort.

3. (U) FY 1991 PLANS: This is a continuing level of effort.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: Not applicable.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

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FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation and Material Support
PROJECT NUMBER: X0833 PROJECT TITLE: DNL Instrumentation and Support

C. (U) DESCRIPTION: Provides supplemental support for Surveillance Test and Integration Center (STIC), formerly the Acoustic Research Center, San Diego, CA. Supports procurements which do not qualify for the Asset Capitalization Program (ACP) or direct project funding at other SPAWAR R&D Centers.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS: Supported the Surveillance Test and Integration (STIC) and R&D Centers' planning network.

2. (U) FY 1990 PROGRAM: Continue to provide support as described above.

3. (U) FY 1991 PLANS: Reduce support to STIC but continue to provide support for inter-laboratory projects.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Oceans Systems Center, San Diego, CA; David Taylor Research Center, Bethesda, MD.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1991 RDT&E NAVY DESCRIPTIVE SUMMARY

Program Element: 0605862N Budget Activity: 6
Program Element Title: RDT&E,N Instrumentation and Material Support
Project Number: X1957 Project Title: Large Cavitation Channel

A. (U) RESOURCES: (Dollars in Thousands)

Popular Name	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Large Cavitation Channel	20,020	15,754	5,940	58,759	127,070

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project provides a pressure-controlled water channel (similar to windtunnel) at the David Taylor Research Center. The channel will be used for acoustic and hydrodynamic testing of large scale models of surface ships, submarines, and torpedoes. At present, propellers and other propulsors are tested in cavitation tunnels using small model sizes in the absence of the hull and appendages. In the past, it has been possible to account for the influence of the hull on the model propeller tests, by using an extensive background of practical experience. Now, however, high performance hulls, appendages, and propulsors are being designed to meet special requirements, such as reduced noise, reduced vibration, anc high efficiency, to which existing data and experience do not apply. Present test techniques have failed to predict or resolve problems of cavitation erosion and vibration and noise problems. These particular failures have increased costs and delayed for a year or more bringing some ships into full service. The cavitation channel will provide the capability to measure the acoustic and hydrodynamic performance of hull, propulsor, and appendages as an integrated package. Thus, model tests in the channel will reliably predict full scale performance, which will enable quieter and more efficient ship designs to be developed while avoiding the above mentioned problems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. Completed LCC acoustic trench concrete work.
   b. Initiated insertion of stainless steel channel in acoustic trench.
   c. Completed all civil improvements.

Program Element: 0605862N Budget Activity: 6
Program Element Title: RDT&E,N Instrumentation and Material Support
Project Number: X1957 Project Title: Large Cavitation Channel

2. (U) FY 1990 Program:
   a. Complete installation of all channel control systems.
   b. Complete installation of channel structure.

3. (U) FY 1991 Plans:
   a. Complete channel contract.
   b. Conduct calibration and "shakedown" tests.
   c. Initiate propeller tests.
   d. Operate the LCC with property leasing agreements.

4. (U) Program to Completion:
   a. Continue operation of the LCC and make final purchase payment.
   b. Continue model testing.

D. (U) WORK PERFORMED BY: In-House: David Taylor Research Center, Bethesda, MD Contractor: CBI NA-CON, INC, Memphis, TN.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology Changes: None.
2. (U) Schedule Changes: Channel operation date slipped from October 1990 to August 1991.
3. (U) Cost Changes: +5,910 to fund lease-hold improvements and annual rental payments.

F. (U) PROGRAM DOCUMENTATION:

Acquisition Plan	July 1986
Contract Award Documents	July 1987

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable. This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE:

Awarded contract	July 1987
Complete channel fabrication	September 1989
Complete channel installation	September 1990
Complete acceptance testing	January 1991
Complete initial calibration	April 1991
Commence channel operation	August 1991

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Ship and Aircraft Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0354	RDT&E Ships Support	7,878	9,828	14,421	Cont.	Cont.
W0568	RDT&E Aircraft Flight Hours	12,692	11,607	13,061	Cont.	Cont.
W0569	RDT&E Aircraft Support	48,809	51,870	57,775	Cont.	Cont.
R1999	Oceanographic Research Ship Support	14,568	0	0	0	29,994
	Total	83,947	73,305	85,257	Cont.	Cont.

B. (U) DESCRIPTION: This continuing program provides support for ships and platforms required to accommodate Research, Development, Test and Evaluation (RDT&E) of new systems. It also supports aircraft at field activities not operating under the Uniform Funding Policy; provides for the depot level rework of aircraft, engines, and components for the entire Navy inventory of RDT&E aircraft; and supports ships, platforms and aircraft bailed to contractors for accomplishment of Navy RDT&E projects. Costs covered under this element include fuel, supplies, equipment, repair, aviation depot level repairables, Special Flight Test Instrumentation Pool equipment, and overhaul of ships and aircraft, as well as organizational, intermediate, and depot maintenance of ships and aircraft in the Navy inventory for RDT&E. The RDT&E ships and aircraft inventory is required to adequately test new and improved weapon systems, to keep abreast of the current threat and increase the warfighting capability of the fleet.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Ship and Aircraft Support
PROJECT NUMBER: S0354 PROJECT TITLE: RDT&E Ships Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0354	RDT&E Ships Support	7,878	9,828	14,421	Cont.	Cont.

B. (U) DESCRIPTION: This project provides for operation and maintenance of platforms used as Sea Based Test Sites in support of the Navy RDT&E program. These are USS DOLPHIN (AGSS 555), the Floating Instrumentation Platform (FLIP), and the Oceanographic Research Buoy (ORB). Beginning in FY 90, EX-USS DECATUR (DDG-31) will be supported by this line as the Self-Defense Test Ship (SDTS). Testing aboard these platforms reduces the number of fleet units required to support RDT&E efforts. A major cost of this project is regularly scheduled ship overhauls. The USS DOLPHIN will be overhauled during FY 92-93. The remainder of the funds are used for purchase of supplies and equipment, fuel and petroleum products, repairs and supporting modifications. Most costs are fixed and are associated with simply having these platforms in the inventory. A lesser portion varies with the tempo and type of ship operations and provides for system improvements and replacement planning. The nature of the operation is determined by the overall Navy R&D testing program. The current and projected Anti-Ship Cruise Missile (ASCM) threat requires self-defense weapon systems capable of adequately countering the ASCM into the year 2000. The National Defense Authorization Act for FY 87, section 910, "Testing of Certain Weapons System and Munitions," requires live-fire lethality testing of major weapons systems. Operational and safety constraints limit realistic live-fire lethality testing with manned U.S. Navy ships and thus drive the requirement for having an afloat, unmanned, remotely controlled Self-Defense Test Site (SDTS) (USS DECATUR will be converted to the SDTS). The SDTS plans call for testing Rolling Airframe Missile (RAM), Close-In-Weapons System (CIWS), NATO Sea Sparrow, and future short-range AAW systems against realistic threat presentations in an at-sea environment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) DOLPHIN supported near ocean bottom operations, gravity measuring experiments, and RDT&E concerning wake detection, sonar propagation, underice navigation, and mine detection.

b. (U) FLIP/ORB conducted underwater acoustic and noise phenomena research to support ASW needs.

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PROGRAM ELEMENT: 0605863N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Ship and Aircraft Support
PROJECT NUMBER: S0354 PROJECT TITLE: RDT&E Ships Support

2. (U) FY 1990 PROGRAM:

a. (U) DOLPHIN will support near ocean bottom operations and RDT&E concerning sonar propagation, laser bottom imaging, magnetic field antenna submerged submarine to aid communications, and other acoustic research in deep ocean. DOLPHIN will conduct tests of DARPA initiative for automated detection and classification of submarine mine avoidance system.

b. (U) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs. Concept studies and planning efforts for a FLIP replacement will be conducted.

c. (U) DECATUR will start conversion with available funds to Self-Defense Test Ship (SDTS) including dry docking and hull preservation, purchase of all long lead items (e.g., propulsion outdrives, electrical generators and bow thruster), reactivation of all HM&E equipment required for the SDTS Mission, structural modifications to support installation of propulsion and weapon system equipment, and preparation of documentation for new and modified shipboard systems.

3. (U) FY 1991 PLANS:

a. (U) DOLPHIN will continue to support near ocean bottom operations and other RDT&E programs testing advanced submarine structures, sensors, weapons and machinery systems. DOLPHIN will serve as test platform for DARPA initiative on off-board sensors.

b. (U) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs. Feasibility studies and planning for new FLIP replacement will continue.

c. (U) DECATUR will continue conversion to SDTS with installation of propulsion machinery, Rolling Airframe Missile (RAM) weapon system including MK-23 TAS radar and SLQ-32(V)II electronic countermeasures suite, shipboard control system, autopilot, and associated controls. Also planned is the installation and checkout of communications equipment and video monitoring systems including encrypted video links.

4. (U) PROGRAM TO COMPLETION:

a. (U) DOLPHIN will have a Regular Overhaul late FY 1992 through FY 1993.

b. (U) DOLPHIN will support near ocean bottom operations and other RDT&E programs testing advanced submarine structures, sensors, weapons, and machinery systems.

c. (U) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs. Design and procurement of a FLIP replacement will continue.

d. (U) DECATUR will conduct SDTS sea trials in FY 1992 and RAM weapon system testing in FY 1993. Upon completion of RAM testing in FY 1993 the SDTS will be available for other short range AAW systems testing as required.

e. (U) This is a continuing program.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: RDT&E Ship and Aircraft Support
PROJECT NUMBER: S0354 PROJECT TITLE: RDT&E Ships Support

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA; Pacific Missile Test Center, Point Mugu, CA; Supervisor of Shipbuilding, Seattle, WA; Mare Island Naval Shipyard, Vallejo, CA; Naval Ocean Systems Center, San Diego, CA; David Taylor Research Center, Carderock and Annapolis, MD. CONTRACTORS: Applied Research Laboratories, Austin, TX; Charles Stark Draper Laboratories, Cambridge, MA; Woods Hole Oceanographic Institute, Woods Hole, MA; University of California, San Diego, CA; Johns Hopkins University Applied Physics Laboratory, Laurel, MD.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: USS DOLPHIN overhaul rescheduled from FY 90/91 TO FY 92/93.
3. (U) COST CHANGES: The Department adjustment of -$4,635 in FY 91 is to properly budget for the rescheduled overhaul in FY 92/93 of USS DOLPHIN.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: DECATUR - Program Element 0604369N, (Rolling Airframe Missile)

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not applicable.

J. (U) MILESTONE SCHEDULE:
FY 90 Start DECATUR conversion to SDTS
FY 92 DECATUR sea trials
FY 93 Complete RAM testing on DECATUR
FY 92 Start DOLPHIN ROH
FY 93 Complete DOLPHIN ROH

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605863N Budget Activity: 6
Program Element Title: RDT&E Ship and Aircraft Support
Project Number: W0568 Project Title: RDT&E Aircraft Flight Hours

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0568	RDT&E ACFT FLT HOURS	12,692	11,607	13,061	Cont.	Cont.

B. (U) DESCRIPTION: This project provides for the operational costs (fuel, oil, lubricants, consumables, and organizational and intermediate level maintenance) of Navy aircraft used in support of RDT&E. The funds provide for pilot training/qualification and support of aircraft hours required by RDT&E projects.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENT: Flew a total of 9600 flight hours pilot training/qualification and for testing support of RDT&E projects.

a. (U) Provided the maintenance and support for aircraft required by RDT&E Projects.

2. (U) FY 1990 PROGRAM: Plan to fly 9,850 flight hours in FY 90.

a. (U) Continue providing the maintenance and support for aircraft required by RDT&E Projects.

3. (U) FY 1991 PLANS: Plan to fly 9,850 flight hours in FY 91.

a. (U) Continue providing the maintenance and support for aircraft required by RDT&E Projects.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; Pacific Missile Test Center(non-range), Point Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Air Engineering Center, Lakehurst, NJ; and Naval Weapons Evaluation Facility, Albuquerque, NM.

E. (U) COMPARISON WITH REVISED FY 90/91 PRESIDENT'S BUDGET;

1. (U) TECHNOLOGY CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605863N Budget Activity: 6
Program Element Title: RDT&E Ship and Aircraft Support
Project Number: W0568 Project Title: RDT&E Aircraft Flight Hours

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Not Applicable.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605863N Budget Activity: 6
Program Element Title: RDT&E Ship and Aircraft Support
Project Number: W0569 Project Title: RDT&E Aircraft Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
	RDT&E ACFT SPT					
W0569		48,809	51,870	57,775	Cont.	Cont.

B. (U) DESCRIPTION: This project provides for the depot level maintenance and rework of 202 RDT&E,N aircraft required to accommodate test and evaluation of weapons systems in development. It also supports engines, Individual Material Readiness List (IMRL) equipment, Flight Test Instrumentation Pool Equipment, Aviation Depot Level Repairables (AVDLRs), and bailed aircraft support.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENT:

a. (U) Seventeen aircraft were reworked.

b. (U) The following programs were supported: AVLDRs for 202 aircraft in the RDT&E inventory, Flight Test Instrumentation Pool Equipment, and bailed aircraft to contractors (40 aircraft) including consumables.

2. (U) FY 1990 PROGRAM:

a. (U) Nineteen aircraft will be reworked.

b. (U) The following programs will be supported: AVDLRs for 202 aircraft in the RDT&E inventory, Flight Test Instrumentation Pool Equipment, and bailed aircraft to contractors (40 aircraft) including consumables.

3. (U) FY 1991 PLANS:

a. (U) Twenty-three aircraft will be reworked.

b. (U) The following programs will be supported: AVDLRs for 202 aircraft in the RDT&E inventory, Flight Test Instrumentation Pool Equipment, and bailed aircraft to contractors (40 aircraft) including consumables.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605863N Budget Activity: 6
Program Element Title: RDT&E Ship and Aircraft Support
Project Number: W0569 Project Title: RDT&E Aircraft Support

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Test Center, Patuxent River, MD, Naval Air Development Center, Warminister, PA; Naval Coastal Systems Center, Panama City, FL; Pacific Missile Test Center (non-range), Point Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Air Engineering Center, Lakehurst, NJ; the following Naval Air Rework Facilities: North Island, San Diego, CA; Pensacola, FL; Cherry Point, NC; Jacksonville, FL; Norfolk, VA; Alameda, CA. CONTRACTORS: Sikorsky Aircraft Division, Stratford, CT; Grumman Aerospace Corporation, Bethpage, NY; Bell Helicopter, Ft. Worth, TX.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not applicable

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: The adjustment of -$1,092 in FY91 will backlog the purchase of special flight intrumentation pool items and delay IMRL replacement.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0541	AUTEC	48709	49649	55507	Cont	Cont
W0653	PMTC	99349	98867	105612	Cont	Cont
W0654	NATC	76603	77274	83238	Cont	Cont
W0655	NAPC	23281	23424	25906	Cont	Cont
W0657	NWC	69274	68652	75666	Cont	Cont
Total		317216	317866	345929	Cont	Cont

B. (U) DESCRIPTION: This program provides institutional support for the five test and evaluation activities that make up the Navy portion of the DoD Major Range and Test Facility Base (MRTFB). These five activities are: The Atlantic Undersea Test and Evaluation Center, Andros Island, Bahamas; the Pacific Missile Test Center, Pt. Mugu, CA; the Naval Air Test Center, Patuxent River, MD; the Naval Air Propulsion Center, Trenton, NJ; and the Naval Weapons Center, China Lake, CA. Between them, these test and evaluation activities are chartered to have the capability and capacity to perform the full spectrum of development and operational test and evaluation required by Navy research and development programs. Adequate test and evaluation is vital in providing effective weapon systems to counter an ever changing threat. This program also provides operation and maintenance support for the Santa Cruz Radar Cross Section (RCS) range, which measures the RCS of ships or boats in the sea environment.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element: Test and Evaluation Support
Project Number: W0541 Project Title: Atlantic Undersea Test and Evaluation Support Center

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0541	AUTEC	48,709	49,649	55,507	Cont.	Cont.

B. (U) DESCRIPTION: The mission of the Atlantic Undersea Test and Evaluation Center (AUTEC) is to advance submarine and Anti Submarine Warfare (ASW) technologies. AUTEC includes the Weapons Range, Fleet Operational Readiness Accuracy Check Site, and acoustic range capabilities. The Weapons Range provides three-dimensional (undersea, surface, air) precision tracking capability in support of ASW development test and evaluation and operational test and evaluation. The Fleet Operational Readiness Accuracy Check Site provides the capability to accurately calibrate and align electronic, optical, acoustic, and navigational systems installed on submarines and surface ships. A Naval Underwater Systems Center detachment at West Palm Beach, Florida, provides logistic support, test planning, and scheduling liaison with range users.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Initiated acquisition of a distributed data/communication system.
b. (U) Continued Operational Security improvements.
c. (U) Initiated the design configuration for a deep water torpedo noise measurement system.
d. (U) Sustained the capability to conduct range test and evaluation by funding required level of maintenance.

2. (U) FY 1990 PROGRAM:
a. (U) Maintain and repair physical plant; purchase critical marine spares; perform marine craft maintenance; continue contract administration support and rental payments to Bahamian government.
b. (U) Continue Operational Security improvements.
c. (U) Initiate torpedo noise measurement system fabrication.
d. (U) Continue a distributed data/communication system.
e. (U) Initiate planning for Torpedo Launch Tube.

3. (U) FY 1991 PLANS:
a. (U) Maintain and repair physical plant; maintain adequate marine spares and marine craft readiness; Operational Security and Global Positioning System (GPS) maintenance and operations; contract administration and facility rental.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0541 Project Title: Atlantic Undersea Test And Evaluation Support Center

b. (U) Initiate, fabricate and install a Torpedo Launch Tube onboard an AUTEC vessel to support new development weapon vehicles.
c. (U) Continue the distributed data/communication system.
d. (U) Initiate Operational Security physical security upgrades.
e. (U) Continue Torpedo Noise Measurement System Installation.

4. (U) PROGRAM TO COMPLETION:
a. (U) Maintain and repair physical plant; support Operational Security and Golble Positioning System mairtenance and operations; support underwater cable maintenance; contract administration and facility rental.
b. (U) Complete Operational security improvements and physical security upgrades.
c. (U) Remove the acoustic array at Site 1.
d. (U) Initiate acoustic countermeasures in weapons Test & Evaluation testing.
e. (U) Complete the distributed data/communication system.
f. (U) Complete Torpedo Noise Measurement System capabilities.
g. (U) Complete Torpedo Launch Tube installation.
h. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Technical services are performed by the Naval Underwater Systems Center, Newport, RI; and Naval Oceanographic Office, Bay St. Louis, MO. CONTRACTORS: The maintenance and operation of the AUTEC is being performed by GE Government Services, Cherry Hill, NJ. Imperial Aviation, West Palm Beach, FL,, a subcontractor to GE Government Services, provides aircraft and maintenance services.

E. (U) COMPARISON WITH REVISED BY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Program Element 0604940D, Test Instrumentation Development.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0653 Project Title: Pacific Missile Test Center

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0653	PMTC	99,349	98,867	105,612	Cont.	Cont.

B. (U) DESCRIPTION: Pacific Missile Test Center provides range support to DOD and other government agencies for launching, tracking and collecting data in guided and ballistic missiles, satellite and space vehicle research, development test and evaluation, and training programs. Range support includes: metric tracking of test objects; command, control, and destruct for range safety purposes; range clearance; meteorological services; range scheduling; communications; frequency interference control and analysis; and data reduction. This project will provide support for the maintenance and operation of an ocean environment Radar Cross Section (RCS) Facility.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Awarded contract and provided initial funding for Telemetry Processing System (TPS).

b. (U) Continued higher gain metric radar antennas to improve radar tracking performance.

c. (U) Continued Operational Security (OPSEC) improvements; procured secure communications switch and communications screen room.

d. (U) Initiated procurement of development console for state-of-the-art displays in the range tracking and control rooms.

e. (U) Procured three airborne telemetry systems for the Extended Area Test System (EATS)aircraft.

f. (U) Initiated procurement action on no-break power and mass storage systems for the range computer systems

g. (U) Initiated procurement of UYK-43 computers and UYQ-21 console emulators for the PMTC Naval Tactical Data System (NTDS).

h. (U) Awarded contract for telemetry receiver installation and automation at Laguna Park and San Nicolas Island.

i. (U) Procured upgraded R-cubed units for EATS and Mobile Sea Range (MSR).

j. (U) Sustain the capability to conduct combat range test and evaluation.

2. (U) FY 1990 PROGRAM:

a. (U) Maintain and repair physical plant; meet demands for more realistic over-the-horizon testing; technical training for personnel to maintain their technical skills; operations security administration and other support functions.

b. (U) Continue OPSEC improvements; procure TV surveillance system and OPSEC Radio Frequency (RF) equipment.

c. (U) Complete the instrumentation on the second EATS aircraft.

d. (U) Complete the procurement of real-time TPS.

e. (U) Initiate the design definition for the replacement of the real-time and post-flight computers in the range data processing center. Award contract for computer no-break power system.

f. (U) Continue procurement of upgraded Naval Tactical Data System (NTDS) consoles for range surveillance, clearance, and control.

g. (U) Initiate support for an ocean environment RCS Facility.

h. (U) Continue range operations control room modernization.

i. (U) Initiate preparation of procurement documentation for underwater fiber optics link with San Nicolas Island.

3. (U) FY 1991 PLANS:

a. (U) Maintain and repair physical plant; expand over-the-horizon test areas; OPSEC implementation; and sustain range operations, development and support.

b. (U) Continue Operational Security voice and data link improvements.

c. (U) Continue range control room modernization.

d. (U) Continue procurement of the real-time and post-flight computers in the range data processing center.

e. (U) Continue procurement of NTDS consoles and computer.

f. (U) Implement OPSEC MILCON Project.

g. (U) Continue support for an ocean environment RCS Facility.

h. (U) Procure underwater fiber optics link.

4. (U) PROGRAM TO COMPLETION:

a. (U) Sustain capabilities with physical plant upgrades; continue OPSEC and Global Positioning System (GPS) support; over-the-horiz n test support; Electronic Warfare (EW) threat simulation over an ocean range and continued range operations, development and support functions.

b. (U) Complete OPSEC improvements program.

c. (U) Complete EATS airborne and computer improvements.

d. (U) Replace the computer in the range data processing center supporting non-realtime data processing.

e. (U) Complete fiber optic cable system linking Point Mugu to Vandenberg AFB, San Nicolas Island, Santa Cruz Island and San Clemente Island.

f. (U) Complete range operational control room update.

g. (U) Complete NTDS consoles and computer procurements.

h. (U) Continue support for an ocean environment RCS Facility.

i. (U) Complete wideband fiber optic/microwave data/communication lines.

j. (U) This a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Pacific Missile Test Center, Point Mugu, CA, and Naval Air Station, Point Mugu, CA (including outlying field, San Nicolas Island). CONTRACTORS: Dynalectron Corporation, Santa Barbara, CA; Computer Sciences Corporation, Los Angeles, CA; Litton Industries, Los Angeles, CA; Sperry Univac, New York, NY; and SRS, Camarillo, CA.

E. (U) COMPARISON WITH REVISED 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0653 Project Title: Pacific Missile Test Center

3. (U) COST CHANGES: The adjustment of -$8,082 will delay improvement and modernization initiatives.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Pacific Missile Test Center provides inter-range support to the Western Space and Missile Center, White Sands Missile Range, Kwajalein Missile Range, and the Satellite Control Facility on strategic missile and space programs.
Program Element 0604940D, Test Instrument Development.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 89 Actual	FY 90 Estimate	FY 91 Estimate	To Completion	Total Program
(U) MILCON	350	0	420	N/A	770

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: N/A.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0654 Project Title: Naval Air Test Center

A. (U) Resources: (Dollars in Thousands)

PROJECT NUMBER	TITLE: NATC	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0654		76,603	77,274	83,238	Cont.	Cont.

B. (U) DESCRIPTION: The Naval Air Test Center (NATC) performs development test and evaluation of the total aircraft weapon system, including mission systems, equipment, subsystems, components, related support systems, and integrated logistic support elements; provides technical advice and assistance to the Naval Air Systems Command, the Board of Inspection and Survey, other agencies and contractors; assists other Research, Development, Test and Evaluation and Operational Test and Evaluation activities; and conducts in-house technical projects. This project funds facility costs not chargeable to the user. The Naval Air Test Center has extensive airfield, range, and simulation laboratories.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Received and integrated V-22 cockpit into Manned Flight Simulator facility. Dome construction completed and accepted by Navy. Accepted motion base display system and man-rated motion base system.

b. (U) Placed into operation three streams for Real-Time Telemetry Processing System(RTSS); and streams four and five have been delivered.

c. (U) Initiated procurement and integration of the Range Electronic Warfare System hardware.

d. (U) Awarded various procurements for the Chesapeake Atlantic Tracking System.

e. (U) Continued Operational Security (OPSEC) improvements.

f. (U) Sustained the capability to conduct test and evaluation through required maintenance funding.

g. (U) Continued real time telemetry procurement.

2. (U) FY 1990 PROGRAM:

a. (U) Complete procurement of Manned Flight Simulator (MFS) System Radar Target Generator.

b. (U) Procurement of upgrades for Compuscene IV System components.

c. (U) Procurement of fifth Wide II Projector and various dome hardware.

d. (U) Complete installation of RTSS streams four, five and six.

e. (U) Procurement of various telemetry data systems communication improvements and recording devices.

f. (U) Procurement of Target computer control for Surface Targets.

g. (U) Procurement and installation of various Range Electronic Warfare System components.

h. (U) Continue procurement and installation of various Chesapeake Atlantic Tracking System components.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0654 Project Title: Naval Air Test Center

i. (U) Continue procurement and installation of various OPSEC improvements.

j. (U) Procurement of various test and evaluation data processing equipment.

k. (U) Sustain support for maintenance and repair (including comprehensive airfield renovation); increase support of simulation capabilities; provide realistic targets and threat Electronic Warfare(EW) emitters; OPSEC implementation; range operations and support functions.

3. (U) FY 1991 PLANS:

a. (U) Continue procurement of various lightning direct effects and instrumentation hardware improvements for the High Energy Physics Laboratory.

b. (U) Continue procurement and integration for improvements of Target Command and Control System Program.

c. (U) Continue procurement and installation of various Chesapeake Atlantic Tracking System components.

d. (U) Initiate procurement for Range Computation and Control System and continue improvements for the Range Operations Center.

e. (U) Continue procurement of various test and evaluation data processing equipment.

f. (U) Continue OPSEC improvements program.

g. (U) Continue support for maintenance and repair (including comprehensive refurbishment of airfield runway); increase support of simulation capabilities; provide realistic targets and threat EW emitters; range operations and support functions.

h. (U) Continue improvements of the Range Electronic Warfare System.

i. (U) Continue improvements in Test and Evaluation Data Processing Program.

j. (U) Continue improvements in range support aircraft instrumentation.

4. (U) PROGRAM TO COMPLETION:

a. (U) Sustain capabilities with maintenance and repair; new simulation test facilities; provide realistic targets and threat EW emitters; OPSEC; coverage into the Atlantic Ocean areas; range operations and support functions.

b. (U) Complete OPSEC Improvement Program.

c. (U) Continue refurbishment of airfield runway program.

d. (U) Continue improvements of the Chesapeake Atlantic Tracking System.

e. (U) Continue improvements of the Range Electronic Warfare System.

f. (U) Continue improvements of the High Energy Physics Laboratory.

g. (U) Continue improvements of Target Systems Program.

h. (U) Continue improvements in Test and Evaluation Data Processing Program.

i. (U) Continue improvements in Range Operations Systems.

j. (U) Continue improvements in range support aircraft instrumentation.

k. (U) This is a continuing program.

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0654 Project Title: Naval Air Test Center

D. (U) WORK PERFORMED BY: IN-HOUSE: Pacific Missile Test Center, Point Mugu, CA; Naval Air Propulsion Center, Trenton, NJ; Naval Weapons Center, China Lake, CA; and Naval Research Laboratory, Washington, DC. CONTRACTORS: Southern Maryland Electric, Hughesville, MD; Dynalectron Corporation, Santa Barbara, CA; Grumman Corporation, St. Louis, MO; Universal Fuel, Lexington Park, MD; and M. C. Avano, Inc., Huntington, NY.

E. (U) COMPARISON WITH REVISED BY 1990/1991 PRESIDENT'S BUDGET:
1. (U) TECHNOLOGY CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: The adjustment of -$8,237 will delay improvement and modernization initiatives.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Naval Air Test Center provides R&D support for Naval Aviation Squadrons VX-1 and VQ-4; supports development of surface effects vehicle projects for a variety of users; provides R&D support for Naval Electronic Systems Command Detachment and Naval Surface Weapons Center.
Program Element 0604940D, Test Instrument Development.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
(U) MILCON	4229	955	427	N/A	1,382

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0655 Project Title: Naval Air Propulsion Center

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0655	NAPC	23,281	23,424	25,906	Cont.	Cont.

B. (U) DESCRIPTION: The mission of the Naval Air Propulsion Center (NAPC) is to test and evaluate air breathing gas turbine propulsion systems, their components and accessories, and fuels and lubricants; and to perform applied research and development leading to new propulsion systems, correction of design deficiencies, and service problems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Performed System Rehabilitation and Maintenance (SRAM) including the following: Instrumentation and measuring equipment; procured equipment to keep plant operational and for engine and engine equipment testing; started design for installation of gas coolers into Small Engine Test Area (SETA) exhaust ducting; office automation; and Health Monitoring System Repair.

b. (U) Sustained the capability to conduct test and evaluation.

c. (U) Initiated the procurement of control room and test cell instrumentation upgrades.

2. (U) FY 1990 PROGRAMS:

a. (U) Sustain capabilities with maintenance and repairs; support for test and evaluation of engine propulsion systems, fuels and lubricants; and other technical support functions.

b. (U) Continue with procurement of new, improved test cell data acquisition and analysis systems.

c. (U) Procure advanced measurement systems to meet technological advances in aircraft propulsion systems.

d. (U) Initiate control room improvements safety alarms, engine monitoring controls and data analysis area.

e. (U) Provide refrigeration capacity to fully support increase in test workload.

3. (U) FY 1991 PLANS:

a. (U) Sustain capabilities with maintenance and repairs; support test capabilities in engine propulsion, fuels and lubricants; and the basic core support functions.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0655 Project Title: Naval Air Propulsion Center

b. (U) Continue cell data acquisition and analysis systems, control room and safety improvements.
c. (U) Provide improved test cell data acquisition systems.
d. (U) Replace engine and facility condition monitoring system.
e. (U) Provide updated or dedicated instrumentation systems.

4. (U) PROGRAM TO COMPLETION:
a. (U) Sustain capabilities with maintenance and repairs; test capabilities including continuation of plant automation, test plant support equipment, instrumentation and measurement equipment, transmission and test cell cooling improvements; and replacement of machine shop equipment to maintain plant readiness over 90%.
b. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN HOUSE: Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; and David Taylor Research Center, Bethesda, MD. CONTRACTORS: A-Z Maintenance Corporation, Trenton, NJ; Public Services Gas and Electric Company, Trenton, NJ; and Baron Information System, New York, NY.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0657 Project Title: Naval Weapons Center

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
W0657	NWC	69,274	68,652	75,666	Cont.	Cont.

B. (U) DESCRIPTION: The Naval Weapons Center (NWC)(Ranges), China Lake, CA, is the principal Navy National Range facility for the test and evaluation of air-to-air and air-to-ground weapons, and parachute and aircraft escape systems. This range further provides the test facilities (Electronic Warfare Threat Environment Simulation) (EWTES)) for the test and evaluation of electronic countermeasure systems in the Navy. EWTES is equipped to simulate foreign sea-based electronic threat systems. This project pays for all costs not directly identified with a specific user program in accordance with DoD Instruction 3200.11.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Continued Operational Security(OPSEC) improvements.

b. (U) Continued limited Radar Cross Section(RCS) improvements to only sustain existing capabilities; Electronic Warfare Test and Evaluation System(EWTES) instrumentation update; Integrated Target Control System(ITCS) reliability and interoperability upgrade; improvements to ordnance test capabilities, and aircraft/missile range Time Space Position Indication(TSPI) instrumentation.

c. (U) Sustained capability to conduct range test and evaluation.

d. (U) Initiated a real-time data communications project on the aircraft/missile range to augment the over-saturated underground cable system.

e. (U) Initiated a project to integrate Golbal Positioning System(GPS)/TSPI equipment with EWTES.

f. (U) Enhanced the mini-supercomputer capacity to carry out real-time telemetry data processing.

2. (U) FY 1990 PROGRAM:

a. (U) Sustain capabilities with physical plant maintenance and repairs, additional personnel, and spare-part support for the Integrated Naval Air Defence System(INADS) investments at EWTES, OPSEC support functions, maintenance spare part inventories and modern calibration equipments, and other basic support functions.

b. (U) Continue OPSEC improvements.

c. (U) Initiate improvements to the range real-time processing system.

d. (U) Continue development/procurement of photo/electro optical systems to allow enhanced video/visual tracking capabilities.
e. (U) Continue frequency extension at the RCS facility.

f. (U) Provide improvements for static propulsion data acquisition; warhead optical instrumentation and environmental hydroshaker installation.
g. (U) Continue target control improvements to meet realistic target presentations.

3. (U) FY 1991 PLANS:
a. (U) Continue maintenance and repair to assure test capabilities are maintained; INADS, OPSEC and other test and evaluation support.
b. (U) Complete EWTES communication systems and continue with INADS integration.
c. (U) Continue photo/electro optical tracking instrumentation .
d. (U) Continue target control improvements.
e. (U) Continue RCS upgrades.
f. (U) Continue static propulsion data acquisition system and warhead optical instrumentation.
g. (U) Continue range real-time processing system upgrades.

4. (U) PROGRAM TO COMPLETION:
a. (U) Sustain capabilities with physical plant upgrades; spare parts augmented; INADS operation and continued range and other test and evaluation operations and support; maintenance costs to continue as threat simulators are installed.
b. (U) Complete OPSEC investments.
c. (U) Complete range real-time processing systems upgrades.
d. (U) Upgrade EWTES with stand-alone telemetry receiving station.
e. (U) Develop and initiate a night-time precision TSPI capibility for night-time instrumented test operations.
f. (U) Complete computer and analysis software upgrades at the RCS facility.
g. (U) Continue update program for static propulsion data acquisition systems, warhead test optical instrumentation, and environmental testing of ordnance.
h. (U) Initiate and complete OPSEC physical security.
i. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; and Naval Air Facility, China Lake, CA. CONTRACTORS: VITRO, Ridgecrest, CA; Raytheon, Ridgecrest, CA; IBM, Los Angeles, CA; General Dynamics, San Diego, CA; General Dynamics, San Diego, CA; Kentron, Mission Beach, CA; General Electronic Corporation, Los Angeles, CA; and Computer Sciences Corporation, Ridgecrest, CA.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test and Evaluation Support
Project Number: W0657 Project Title: Naval Weapons Center

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET

1. (U) TECHNOLOGY CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: The adjustment of -$3,614 will defer facility maintenance and repair items including the paving of several road systems. Improvement and Modernization programs will be delayed.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: NWC supports TRIDENT rocket static firing tests; tests of major naval aircraft weapons systems and electronic warfare systems; Naval Aviation Squadron VX-5; air and ground launched missile systems; and test and evaluation of aerodynamic decelerators.
Program Element 0604940D, Test Instrumentation Development.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Completion	Total Program
(U) MILCON	5,360	0	0	N/A	5,360

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605865N Budget Activity: 6
Program Element Title: Operational Test and Evaluation Capability
Project Number: R0831 Project Title: Operational T&E Force Support

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0831	Operational Test and Evaluation Force	8,944	5,000	6,472	Cont.	Cont.

B. (U) DESCRIPTION: This PE provides Commander, Operational Test and Evaluation Force general support funding for the planning, conducting, and reporting of operational test and evaluation of Navy weapon systems acquisition projects, as directed by the Chief of Naval Operations, and the development and validation of tactics to enhance tactical employment of the systems. Reports are made directly to the Chief of Naval Operations and the Secretary of the Navy. Operational Test and Evaluation of new weapon systems and the development and evaluation of tactics are required by Secretary of Defense directives and by Public Law 98-94, among others. The level of effort is projected to continue to increase due to more stringent requirements from the Congress and the Secretary of Defense for more realistic operational test and evaluation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Issued operational test evaluation reports to the CNO and SECNAV reflecting Operational Test results, conclusions, and recommendations in support of production decisions and Fleet introduction decisions for major new weapons systems.

2. (U) FY 1990 PLANS: Continue to operationally test and evaluate Chief of Naval Operations projects.

3. (U) FY 1991 PLANS: Future plans are to operationally test and evaluate Chief of Naval Operations projects.

4. (U) Program to Completion: This is a continuing project.

D. (U) WORK PERFORMED BY: In-house: The Commander, Operational Test and Evaluation Force, Norfolk, VA; Naval Weapons Center, China Lake, CA; and Pacific Missile Test Center, Point Mugu, CA. CONTRACTOR: Lockheed Missiles and Space Co., Sunnyvale, CA.

E. (U) RELATED ACTIVITIES: Not applicable.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

PROGRAM ELEMENT: 0605866N BUDGET ACTIVITY: 5
PROGRAM ELEMENT TITLE: Navy Command and Control Planning & Development
PROJECT NUMBER: R0739 PROJECT TITLE: Navy C2 Top Level Warfare Requirements (TLWR)

A. (U) RESOURCES (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0739	Navy C2 TLWR	2,853	3,046	3,139	Cont.	Cont.

B. (U) DESCRIPTION: This program element analyzes specific fleet requirements, documented operational deficiencies, joint US and NATO/Allied systems and plans, and R&D technology to develop top level consolidated plans for implementing and operating Navy command and control systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:

a. (U) Completed feasibility study for VLF transmitter in Space to support strategic connectivity.

b. (U) Surveyed existing ASW decision aids as basis for selection of features and funding for ASW Tactical Decision Aid.

c. (U) Identified Navy HF transmitter sites in PACOM as backbone for non-strategic nuclear forces C2 system. Decision to be based on this study.

d. (U) Developed decision aid for SSN Tactical Communications versus mission effectiveness.

e. (U) Developed methodology for assessing and optimizing TASM firing criteria.

2. (U) FY 1990 PROGRAM:

a. (U) The major thrust is to identify the Space and Electronic Combat System of 2010 and determine how to get there. The Navy 21 study and the follow-on CNO Executive Panel Task Force in Radio Electronic Battle Management mandate this effort. The following efforts will support this thrust:

(1) Develop an R&D strategy which will provide technologies needed for the C3 systems of 2010.

(2) Navy Space Study will determine use of space for submarine communications and OTH-T.

(3) Measure today's information architecture throughput in order to develop future architecture that will support requirements.

(4) Determine improvements in locating and targeting objects in space for possible use in ASAT targeting.

3. (U) FY 1991 PLANS:

a. (U) Continue production of integrated Navy C3 plans.

b. (U) Continue evaluation of C3 technologies, plans, and on-line systems with regard to service and world situation requirements.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NRL, Washington, DC; NAVPGSCHOOL, Monterey, CA. CONTRACTORS: Johns Hopkins University Applied Physics Laboratory, Laurel, MD; Booz-Allen and Hamilton, Arlington, VA; and International Research Institute, Norfolk, Va.

E. (U) RELATED ACTIVITIES: PE 0603763N, Warfare Systems Architecture and Engineering.

F. (U) OTHER APPROPRIATED FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: C2 Surveillance/Reconnaissance Support

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
T1034	TAC SAT RECON	9,655	8,054	8,490	Cont.	Cont.
R2007	SPACE MGMT SUP	785	1,105	1,183	Cont.	Cont.
X1368	NAV SPACE SYS ACT	286	291	310	Cont.	Cont.
	TOTAL	10,726	9,450	9,983	Cont.	Cont.

B. (U) DESCRIPTION: C2 Surveillance/Reconnaissance Support provides resources for Tactical Satellite Reconnaissance, commonly known as Tactical Exploitation of National Capabilities (TENCAP). This unique, low-cost, high payoff project was established by Congress in 1977

The Space Management Support project supports various Navy space research and development projects and space systems testing. The Navy Space Systems Activity project is an activity located in Los Angeles with a role as primary field support activity to the Navy Space Program Office.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: C2 Surveillance/Reconnaissance Support
PROJECT NUMBER: T1034 PROJECT TITLE: TAC SAT RECON OFFICE

C. (U) DESCRIPTION: The TAC SAT RECON OFFICE was established by Congressional direction to improve the tactical support provided by national systems. The project funds low cost, proof-of-concept demonstrations typically conducted during fleet operations. Efforts normally focus on two areas: detecting, locating and classifying targets of tactical interest; and reducing the time of delivery of tactically useful information.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
   a. (U) Executed JCS Special Project Night Fury.
   b. (U)

   c. (U)

   d. (U)

2. (U) FY 1990 PROGRAM:
   a. (U)

   b. (U)

   c. (U)

   d. (U)

3. (S) FY 1991 PLANS:
   a. (U)
   b. (U)

   c. (U)

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: Work performed under compartmented contracts.

F. (U) RELATED ACTIVITIES: PE 0603451N Tactical Space Operations.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: C2 Surveillance/Reconnaissance Support
PROJECT NUMBER: R2007 PROJECT TITLE: SPACE MGMT SUPPORT

C. (U) DESCRIPTION: This project provides resources to the Naval Space Command for the conduct of its support to various Navy space research and development projects and space systems testing.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 ACCOMPLISHMENTS:
   a. (u) Explored technology to determine the feasibility of developing capabilities as an integral part of naval platforms.

2. (u) FY 1990 PROGRAM:
   a. (u) Continue exploration, analysis and quantification of potential operation from and for naval platforms.

3. (U) FY 1991 PLANS:
   a. (U) Evaluate Low Probability of Intercept (LPI) and jam-resistant communications techniques, such as spread-spectrum and cross-banding systems, in support of programs such as ENCAP-C.
   b. (U) Analyze and develope surveillance and targeting architecture to fit into the space side of the Space-based Wide Area Surveillance system.
   c. (U) Explore navigation techniques such as optimal interferometry, in conjunction with the Naval Observatory, to define precise surveillance background for visual and infrared sensors.
   d. (U) Explore tactical applications of environmental sensing data being collected and extrapolate modern techniques for environmental sensors to project future capabilities.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Weapons Center (NSWC) Dahlgren, Va., Naval Research Labratory (NRL), Washington, D.C.. CONTRACTOR: Aerospace Corporation, Los Angeles, CA., ST Corporation (STX), Vienna, Va.

F. (U) RELATED ACTIVITIES: PE 0102427N, Project X0125, Naval Space Surveillance; PE 0605867N, Project T1034, Tactical Satellite Reconnaissance Office.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N BUDGET ACTIVITY: 4
PROGRAM ELEMENT TITLE: C2 Surveillance/Reconnaissance Support
PROJECT NUMBER: X1368 PROJECT TITLE: NAV SPACE SYS ACT LA

C. (U) DESCRIPTION: This project provides support for the Navy Space Systems Activity, Los Angeles, CA, for the conduct of its mission and functions in its role as primary field support for the Navy Space Project.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 ACCOMPLISHMENTS:
a. (U) Continued management, security, financial system analysis and computer service support to various Navy space and space-related programs.

2. (U) FY 1990 PROGRAM:
a. (U) Continue financial systems analysis, computer services and administrative efforts to support Navy space programs.
b. (U) Continue support in management and security.

3. (U) FY 1991 PLANS:
a. (U) Continue support to various Navy space and space-related programs.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: Naval Space Systems Activity, Los Angeles, CA.

F. (U) RELATED ACTIVITIES: PE 0603451N, Tactical Space Operations.

G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605871M BUDGET ACTIVITY: 6
PROGRAM ELEMENT TITLE: Marine Corps Tactical Exploitation of National Capabilities (TENCAP)
PROJECT NUMBER: C1424 PROJECT TITLE: TENCAP

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1424	TENCAP	1,056	1,190	1,863	Continue	Continue

B. (U) DESCRIPTION: This program funds activities designed to enhance the ability of tactical USMC forces to exploit the capabilities of national intelligence gathering systems. This Congressionally directed effort maximizes tactical exploitation of national intelligence systems by military services. It requires close and continuous liaison with the intelligence community and involves complex and highly-sensitive activities. It also involves training and familiarization with national systems and participation in the Joint Chiefs of Staff (JSC) test plan for evaluation of capabilities. The program requires technical support to ensure continuity.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 ACCOMPLISHMENTS: Pursued emerging technology. Co-sponsored the FY 1989, JCS directed, TENCAP special project. Continued development of theater intelligence architecture plans and national intelligence system.

2. (U) FY 1990 PROGRAM: Publish revised USMC Master Intelligence Plan (MCMIP). Pursue emerging technologies. Participate in the JCS-directed TENCAP SP. Evaluate secondary imagery dissemination equipment.

3. (U) FY 1991 PLANS: Participate in national intelligence systems development (NISD) technology assessments with Defense Special Projects Office (DSPO). Maintain liaison with DSPO and other services. Participate in JCS SP 1991. Update Marine Corps Imagery Intelligence Plan (MCIIP) and USMC TENCAP Plan. Revise USMC Master Intelligence Plan.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: SPAWAR and NAVSUP, Washington, DC, NOSC, San Diego, CA, Defense Support Project Office. CONTRACTORS: None.

E. (U) RELATED ACTIVITIES: Other services' TENCAP programs. Joint Services Imagery Processor, Military Exploitation for Reconnaissance and Intelligence.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605872N Budget Activity: 6
Program Element Title: Productivity Investment
Project Number: S2006 Project Title: Productivity Investment

A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Productivity Investment	256	676	715	0	4,860

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides for productivity enhancing capital investments at specified research and development laboratories. It supports development, purchase and/or implementation of improved equipment, facilities, procedures and labor quality, and alters the work environment to produce man-year savings and reduce costs while improving capabilities of Navy's RDT&E mission.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1989 Accomplishments:

a. (U) Restored two 360-foot towers used for test of projectile and missile fuses and guidance systems T&E. (Projected savings: $1.8M FY-1997).

2. (U) FY 1990 Program:

a. (U) Navy Expert System Commodity Manager Assistant -- Assist Naval Supply Center managers perform the following processes: (1) item dues management, (2) replenishment, (3) item range maintenance, (4) demand deviation analysis and (5) analysis and (5) item file updates.

b. (U) Automation of Ordalt Instructions -- Acquire, develop, install and integrate a computer controlled automated data base dsystem to allow for receipt, development, review and production of a completed Ordnance Alteration Instruction in a digital medium.

3. (U) FY 1991 Plans:

a. (U) DIAG Improved Diagnostic Expert System Shell -- Develop a user-friendly equipment diagnostic expert system shell which will assist Naval Repair Depot personnel in repairs.

4. (U) Program to Completion: Program completes in FY 1991.

D. (U) WORK PERFORMED BY: In-house: Naval Surface Warfare Center, White Oak, MD. Contractor: Dialog Systems Division, A.T. Kearney, Inc., Lansing, MI.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0708011N Budget Activity: 6
Program Element Title: Industrial Preparedness
Project Number: R1050 Project Title: Manufacturing Technology

A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY1989 Actual	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R1050	MANTECH	43,310	48,456	41,827	Cont	Cont

B. (U) DESCRIPTION:

The Navy Manufacturing Technology program is intended to improve the productivity and responsiveness of the U.S. defense industrial base by funding the development of manufacturing technologies. The Navy program, by providing seed funding for the development of moderate to high risk process and equipment technology, permits contractors to upgrade their manufacturing capabilities. Ultimately, the program aims to produce high-quality weapon systems with shorter lead times and reduced acquisition costs. To date the program has reached the point of operating "in the black" with a reported savings of over $1.192B against an investment of $336M. The projected savings against this investment is $7.3B, or a return on investment of better than 21:1. Major areas of endeavor both underway and planned include: electronics assembly, laser metal working, flexible machining, computer integrated manufacturing, advanced composites manufacturing, automated ship propeller manufacturing, repair technology for aircraft, and advanced metalworking technologies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (U) Continued development of the Circuit Card Assembly & Processing System with interim application of selected system modules
   b. (U) Continued the Best Manufacturing Practice Survey Program.
   c. (U) Continued other on-going projects previously started
   d. (U) Initiated advanced repair technologies for aircraft rework
   e. (U) Initiated cost-effective manufacturing of airframe structures and aircraft components
   f. (U) Transfer Electronic Manufacturing Productivity Facility to O&M,N Funding
   g. (U) Complete ultrasonic inspection of structural welds project
   h. (U) Demonstrate an unattended fully automated flexible turning workstation at Mare Island Naval Shipyard
   i. (U) Complete needs analysis for metalworking technology for advanced Navy weapon systems
   j. (U) Support National Shipbuilding Research Program
   k. (U) Initiated advanced composites manufacturing
   l. (U) Initiated silicon substrate packaging project

Program Element: 0708011N Budget Activity: 6
Program Element Title: Industrial Preparedness
Project Number: R1050 Project Title: Manufacturing Technology

2. (U) FY 1990 Program:

a. (U) Demonstrate at the Automated Manufacturing Research Facility (AMRF) the architecture and concepts necessary for the "seamless" processing of part description data through process planning, NC code generation, robot path creation, inspection plan generation and material handling.

b. (U) Demonstrate the technology for quality control in the unmanned small batch size environment by developing technology for deterministic metrology.

c. (U) Establish new manufacturing process for bomb suspension lugs.

d. (U) Initiate project to develop technology for refurbishment of engine parts (turbine blades/vanes and static components).

e. (U) Develop CNC thermal spray technology for application to ship and submarine components.

f. (U) Develop technology for automated tape laying of complex shapes

g. (U) Increase support for improving powder metallurgy manufacturing processes at Navy Metalworking Center of Excellence.

h. (U) Continue ductile iron advanced manufacturing technology development for 5" and 16" projectiles.

i. (U) Continue support of National Shipbuilding Research Program

j. (U) Establish Composites Manufacturing Center of Excellence.

3. (U) FY 1991 Plans:

a. (U) Demonstrate Circuit Card Assembly and Processing System

b. (U) Demonstrate aircraft robotic plastic bead media paint stripper.

c. (U) Demonstrate artificial intelligent welding technology

d. (U) Participate in the development of new interface and communications standards relating to manufacturing.

e. (U) Develop manufacturing technology for advanced aerospace materials.

f. (U) Demonstrate enhanced thermal performance composite materials.

g. (U) Develop factory modeling and simulation techniques to aid in transitioning products from design to production.

h. (U) Develop CIM technology for the shipbuilding industry .

i. (U) Demonstrate laser welding propulsor blades.

j. (U) Demonstrate improved manufacturing process for ausrolling gears.

4. (U) Program to Completion: This is a continuing program.

Program Element: 0708011N Budget Activity: 6
Program Element Title: Industrial Preparedness
Project Number: R1050 Project Title: Manufacturing Technology

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; DTNSRDC, Bethesda, MD; NRL, Washington, D.C; NSWC, Silver Spring, MD; NSWC, Dahlgren, VA; NWSC, Crane, IN; NWC, China Lake, CA; NBS, Gaithersburg, MD; CONTRACTORS: e.g., Hughes Aircraft Co., Los Angeles,CA; McDonnell Douglas Aircraft Corporation, St. Louis, MO; Westinghouse Electric Corporation, Pittsburgh, PA; IBM, Owego, NY; MTS Systems Corporation, Minneapolis, MN; Robotic Vision Systems, Hauppauge, NY; Metalworking Technology Inc., Johnstown, PA. There are approximately an additional forty contractors involved in the Navy's MT Program.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Not Applicable

2. (U) SCHEDULE CHANGES: Not Applicable

3. (U) COST CHANGES: Not Applicable

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: This is only Navy program element which funds Manufacturing Technology. The Army and the Air Force also have Manufacturing Technology programs in the same Program Element 0708011. There is a DoD Manufacturing Technology Advisory Group which screens all manufacturing technology projects to preclude duplication within the Navy or the Department of Defense. Where appropriate, the Navy co-funds projects with other services, or agencies, e.g., Engine Blade Inspection, Titanium Process Development with the Air Force, and Flexible Manufacturing Systems with the National Bureau of Standards.

H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE: Not Applicable

FY 1991 MANUFACTURING TECHNOLOGY PROGRAM

Program Element: 0708011N Title: Industrial Preparedness
DoD Mission Area: 480 - Production Base Support
Budget Activity: 6 Defense-Wide Mission Support

PROCUREMENT APPROPRIATION SUPPORT

I.D. (Project Title) (End Item Supported)	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	Additional Out Year	Estimated Costs
SHIPBUILDING AND CONVERSION,NAVY					
M0512 Flexible Mfg. System for Small Batch Metal Parts (All Ship Construction)	4807	3100	4000	Continuing	Continuing
S1101 Propeller Integrated Computer Aided Mfg. (Ship Construction and Overhaul)	1900	2000	1500	200	9250
S0933 Fire Resistant Non-Metallic Bulkhead (All Ship Construction)	60	0	0	0	2210
S1218 National Shipbuilding Research Program (All Ship Construction)	1000	1000	1775	Continuing	Continuing
S1401 Ultrasonic Inspection of STR Welds (All Ship Construction)	100	0	0	0	1600
S1109 Robotic Adaptive Welding System (RAWS) (All Ship Construction)	400	0	0	0	1065
S1115 Propeller, Shaft, and Rudder Handling System (All Ship Construction and Repair)	50	0	0	0	1200
M0538 Plasma Arc-CNC Machining Cell (Ship Repair/Overhaul)	46	100	100	50	296
Mxxxx Congressional Directed Shipbuilding Projects (HY Steel Dev. and Electroslag Welding) (All Ship construction and Repair)	0	1500	0	0	1500
TOTAL FOR SUPPORT OF SHIPBUILDING AND CONVERSION, NAVY	8363	7700	7375	Continuing	Continuing

FY 1991 MANUFACTURING TECHNOLOGY PROGRAM

Program Element: 0708011N Title: Industrial Preparedness
DoD Mission Area: 480 - Production Base Support
Budget Activity: 6 Defense-Wide Mission Support

PROCUREMENT APPROPRIATION SUPPORT

I.D.	(Project Title) (End Item Supported)	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	Additional Out Year	Estimated Costs
AIRCRAFT PROCUREMENT, NAVY						
X0407	Circuit Card Assembly and Processing System (AN/AYK-14, UYS-1, EMSP, SUBACS, VHSIC)	15840	6000	2000	2000	61453
X0504	Integrated Mfg. Electronic Packaging (EMSP, AN/UYS-1, AN/APG-65, VHSIC)	1000	1500	1000	1000	7710
X0501	Advanced Integrated Circuit/VHSIC MT (Navy Electronic Systems)	1000	2000	1500	1500	11050
A0903	Masked Ion Beam Lithography (Navy Electronic Systems)	75	0	0	0	2754
A0972	Heat Pipes MT (Navy Electronic Systems)	75	25	0	0	1904
M0510	A/I for Failure Diagnosis of Electronic Systems (Avionics and Shipboard Electronics)	200	0	0	0	1173
A2010	Advanced Repair Technologies for A/C Rework Applications (All Navy Aircraft)	1000	2000	2500	Continuing	Continuing
A2011	Cost Effective Manufacture of Airframe Structures and Aircraft Components (All Navy Aircraft)	1000	2500	3500	Continuing	Continuing
Azzzz	Advanced Inspection Technology for Manufacturing (Advanced Navy Systems)	0	0	1000	Continuing	Continuing
	TOTAL FOR SUPPORT OF AIRCRAFT PROCUREMENT, NAVY	20190	14025	11500	Continuing	Continuing

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FY 1991 MANUFACTURING TECHNOLOGY PROGRAM

Program Element: 0708011N Title: Industrial Preparedness
DoD Mission Area: 480 - Production Base Support
Budget Activity: 6 Defense-Wide Mission Support

PROCUREMENT APPROPRIATION SUPPORT

I.D.	Project (Title) (End Item Supported)	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	Additional Out Year	Estimated Cost
WEAPONS PROCUREMENT, NAVY						
S0806	MT for Laser Assisted Metalworking (Guns, Missiles, and Launchers)	2160	1500	1000	0	19600
M0521	Modern Casting Technology for Projectiles (Guns)	532	1700	600	700	6000
S1407	MT for Fiber Optic Microcable (MK 48, Wire Guided Torpedoes)	500	800	1000	0	2300
TOTAL FOR SUPPORT OF WEAPONS PROCUREMENT, NAVY		3192	4000	2600	Continuing	Continuing
OTHER PROCUREMENT, NAVY						
M0522	Metalworking Productivity Facility (Generic Technology for All Navy Systems)	3751	7000	6000	Continuing	Continuing
M0422	Missile and Torpedo Shelss from Spun SiC/Al (Advanced Missiles and Torpedos)	450	0	0	0	1790
M0529	Composites Manufacturing Center of Exellence (Generic Technology for All Navy Systems)	0	4300	0	Continuing	Continuing

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FY 1991 MANUFACTURING TECHNOLOGY PROGRAM

Program Element: 0708011N Title: Industrial Preparedness
DoD Mission Area: 480 - Production Base Support
Budget Activity: 6 Defense-Wide Mission Support

PROCUREMENT APPROPRIATION SUPPORT

I.D.	Project (Title) (End Item Supported)	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate	Additional Out Year	Estimated Costs
OTHER PROCUREMENT, NAVY (Continued)						
M0523	Superconductivity MT (Advanced Navy Systems)	450	500	400	0	2850
M0528	Submicron Resist MT (Navy Electronic Systems)	1028	1600	1700	265	4765
M0526	A/I for Welding (Generic Technology for All Navy Systems)	725	1000	575	0	2400
M0527	Advanced Composites Manufacture for Improved Thermal Management (All Navy Weapon Systems)	75	3000	6134	8866	20000
M0532	MT for High Thermal Conductivity Fibers (Advanced Navy Systems)	143	232	200	0	575
M0540	Ausrolling for Gears (Aircraft Engines and Torpedos)	400	550	500	450	2200
TOTAL FOR SUPPORT OF OTHER PROCUREMENT, NAVY		7022	18182	15509	Continuing	Continuing
MT PROJECT SUPPORT		4543	4549	4843	Continuing	Continuing
TOTAL NAVY		43310	48456	41827	Continuing	Continuing

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 1110011N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Special Warfare Force Enhancements

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0416	SEAL Weapons Systems	2,067	4,906	0*	CONT.	CONT.
S0417	SEAL Support System	16,778	5,416	0*	CONT.	CONT.
S1684	Special Warfare Combatant Craft	10,075	24,683	0*	CONT.	CONT.
TOTAL		28,920	35,005	0	CONT.	CONT.

* Transferred to RDT&E, Defense Agencies.

B. (U) DESCRIPTION: This program develops weapons, life-support, C3I and mission support equipment, and mobility systems for Naval Special Warfare Forces (SEAL/SDV Teams and Special Boat Units) to enhance maritime Special Operations in support of Fleet or Joint Commanders. Tasking may include any of the following tactical missions: ship attack, direct action, and classified unconventional warfare tasks. This element includes three projects: (1) SEAL Weapons System: Offensive specialized weapons and accessories; (2) SEAL Support System: Mobility, life support, C3I and mission support; and (3) Special Warfare Combatant Craft: A series of special purpose craft/equipment systems for patrol, riverine, and other specialized taskings.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 1110011N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Special Warfare Force Enhancements
PROJECT NUMBER: S0416 PROJECT TITLE: SEAL Weapons System

C. (U) DESCRIPTION: Develops unique weapons and ordnance equipment for use by Naval Special Warfare forces. Weapons are employed during beach obstacle clearance, ship attacks, and other direct action missions. This system includes firing devices, demolition charges, marker beacons, hand-held weapons, and limpet mines.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Initiated Underwater Demolition Weapon.
2. (U) FY 1990 Program: Achieve Milestone II for Device. Achieve Milestone III for SEAL Equipment Canister. Achieve Milestone II for Underwater Demolition Weapon.
3. (U) FY 1991 Plans: Narrative description contained in RDT&E Defense Agencies Descriptive Summaries.
4. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Warfare Center, White Oak, MD/Dahlgren VA; Naval Weapons Support Center, Crane, IN; Undersea Warfare Engineering Station, Keyport, WA. CONTRACTORS: None.

F. (U) RELATED ACTIVITIES: S0417, SEAL Support System; S1684, Special Warfare Combatant Craft.

G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PROCUREMENT					
OPN (551600) #240	4,052	1,355	0	CONT.	CONT.
WPN (323300) #55	1,946	971	0	CONT.	CONT.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 1110011N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Special Warfare Force Enhancements
PROJECT NUMBER: S1684 PROJECT TITLE: Special Warfare Combatant Craft

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1684	Special Warfare Combatant Craft	10,075	24,683	0*	CONT.	CONT.

* Transferred to RDT&E, Defense Agencies.

B. (u) DESCRIPTION: Develops specialized combatant craft with equipment and systems to operate in shallow water, riverine areas, coastal approaches, and the open ocean in Efforts include the development of new high speed craft designs, propulsion systems, and a variety of combat and weapons systems. Efforts also include analysis, material development and tests to develop techniques to enhance survivability. Information regarding other programs is classified. Questions should be referred to CNO (OP-08J).

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1989 Accomplishments: Continued hull performance improvement efforts to include evaluation of test samples of composite hulls. Continued evaluation of propulsion systems for SPECWAR craft including the Foreign Weapons Evaluation (FWE) Program Waterjet Propulsion System evaluation and qualification testing of candidate engines for Coastal Patrol Boat (PBC), Special Warfare Craft Riverine (SWCR) and High Speed Boat (HSB). Continued support of the Stabilized Weapons Platform System (SWPS) including completion of

Completed testing of adhesives and material for Combat Rubber Raiding Craft (CRRC) programs. Completed Development Testing (Technical and Fleet Familiarization) of Non-Developmental Item (NDI) test craft procured for the High Speed Boat (HSB) program. Evaluated performance and weapon and communication system effectiveness. Initiated feasibility studies for an air-launched craft (Meteor). Continued development of Pre-Planned Product Improvements (P3I) for Special Warfare Craft Riverine. Completed performance evaluations of Unmanned Craft (UMC). Continued proof-of-concept analyses for Mobile Operating Facility (MOF) program.

2. (u) FY 1990 Program: Continue performance improvements for hull, propulsion, electrical/electronic, and weapons systems to reduce size and weight to suit application to SPECWAR high performance craft. Continue the P3I for the Coastal Patrol Boat (PBC), Special Warfare Craft Riverine and Combat Rubber Raiding Craft. Continue development of the Stabilized Weapons Platform System. Initiate the Rapid Available Craft (RAC) program. Develop technical data packages for procurement of CRRC(L) and RIB(30). Continue the Meteor program. Complete FWE Waterjet Propulsion System evaluation. Complete MOF dock-side proof-of-concept demonstration.

PROGRAM ELEMENT: 1110011N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Special Warfare Force Enhancements
PROJECT NUMBER: S1684 PROJECT TITLE: Special Warfare Combatant Craft

3. (U) FY 1991 Plans: N/A
4. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSEA Combat Systems Engineering Station, David Taylor Research Center, Naval Weapons Support Center, Naval Research Laboratory, Naval Coastal Systems Center, and Naval Ship Systems Engineering Station. CONTRACTORS: Resource Consultants, Inc., Stanley Associates, and Advanced Marine; Texas A&M, LTV Inc.

E. (U) RELATED ACTIVITIES: S0416, SEAL Weapons System; S0417, SEAL Support System.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

(U) PROCUREMENT

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
SCN	1,625	98,375	0	0	100,000
OPN	27,673	5,301	4,519	CONT.	CONT.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 1110011N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Special Warfare Force Enhancements
PROJECT NUMBER: S0417 PROJECT TITLE: SEAL Support System

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0417	SEAL Support System	16,778	5,416	0*	CONT.	CONT.

* Transferred to RDT&E, Defense Agencies.

B. (U) DESCRIPTION: This program develops Seal Support items used during the conduct of hydrographic/inland reconnaissance, beach obstacle clearance, underwater ship attack, and other direct-action missions. Items include: SEAL Delivery Vehicle (SDV) improvements; Advanced SEAL Delivery System (ASDS); Diver Active Thermal Protection System for cold water combat swimmer missions; Advanced Underwater Breathing Apparatus (AUBA) for increased combat swimmer endurance; Full Face Mask improvements; UBA extension studies to improve duration of existing dive profiles; Very Shallow Water Mine Countermeasures studies to establish environmental models to forecast operational conditions; biomedical research to examine physiological, medical and human engineering factors to better train/prepare SEALs for improved mission success; mission simulators and planning aids.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments: Continued MK 8 Mod 1 SDV project and issued RFP. Continued development and testing of AUBA. Continued development and began testing of Diver Active Thermal Protection System. Finished evaluation and delivered improved Full Face Mask. Introduced Field Change Kits resulting from 6.2 work in Radio Waterproofing Technology. Continued development of NSW mission planners/simulators. Initiated work on improved Mine Countermeasures equipment. Continued C-2A(R) upgrade. Continued ASDS initiatives. Upgraded DA-8990 Digital Message Device Group (DMDG) to improve NSW/Fleet interoperability.

2. (U) FY 1990 Program: Continue MK 8 Mod 1 SDV project. Continue evaluation of AUBA and Diver Active Thermal Protection System. Achieve IOC for Tactical Video. Continue work on mine countermeasures equipment package. Continue ASDS project development/validation phase. Test 3gst9 Italian submersible for possible ASDS application. Achieve IOC for C2A(R) upgrade. Deliver prototypes of improved DMDG.

3. (U) FY 1991 Plans: N/A

4. (U) Program to Completion: This is a continuing program.

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PROGRAM ELEMENT: 1110011N BUDGET ACTIVITY: 4-Tactical Programs
PROGRAM ELEMENT TITLE: Special Warfare Force Enhancements
PROJECT NUMBER: S0417 PROJECT TITLE: SEAL Support System

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Center, Panama City, FL; David Taylor Research Center, Annapolis and Carderock, MD; Naval Weapons Center, China Lake, CA; Naval Electronics Systems Engineering Activity, St Inigoes, MD; Naval Research Laboratory, Washington, DC; Naval Medical Research and Development Command, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Naval Personnel Research and Development Center, San Diego, CA; Naval Air Development Center, Warminster, PA. CONTRACTORS: S-TRON, Belmont, CA; Newport News; Honeywell-Maritalia.

E. (U) COMPARISON WITH REVISED FY 1990/1991 PRESIDENT'S BUDGET:
1. (U) Technology changes: None.
2. (U) Schedule changes: None.
3. (U) Cost changes: The -$6585 Department reduction was applied to higher priority programs.

F. (U) PROGRAM DOCUMENTATION: The following projects are being developed as part of the SEAL Support System under the Naval Special Warfare Systems R&D Master Plan: MK 8 Mod 1 SDV, OR 159-03-87 4/27/87, Advanced SEAL Delivery System OR 243-03-89 12/01/88, Air Delivery/Recovery (C2A(R)) NAPDD 162-03 3/9/87, Diver Thermal Protection NDCP S-0417-SW, TEMP 098-10 8/22/86, Advanced Underwater Breathing Apparatus OR 102-02-87 6/16/86, Full Face Mask OR 102-02-87 6/16/86, Survivable Comms NAPPDD 160-03 4/7/87, C3I Development NAPDD 157-03 3/4/87, Environmental Support NAPDD 158-03 3/4/87, Mission Analysis NAPDD 161-03 3/17/87, Very Shallow Water Mine NAPDD 152-03 2/12/87.

G. (U) RELATED ACTIVITIES: S0416, SEAL Weapons System; S1684, Special Warfare Combatant Craft.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

(U) PROCUREMENT

	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN (114100) #44	42,210	18,193	0	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Information Exchange Project (IEP) B-80 between US and UK.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 1140011N BUDGET ACTIVITY: 2
PROGRAM ELEMENT TITLE: Advanced Special Operations, Research, Development and Acquisition
PROJECT NUMBER: S2075 PROJECT TITLE: JSOC

A. (U) RESOURCES: (Dollars in thousands)

PROJECT NUMBER	TITLE	FY 1989 ACTUAL	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM COMPLETE
S2075	JSOC	0	1,557	0*	0	1557

* Funding has been transferred to RDT&E, Defense Agencies.

B. (u) DESCRIPTION: This program is designed to meet joint requirements for projects which are

These efforts will typically include research and developments, developmental and non-developmental testing, and modification of off-the-shelf equipment. Projects are divided into seven categories: mobility, weapons, communications, medical/life support, tactical intelligence, night vision and training systems.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1989 Accomplishments:
   a. (u) Continued development and testing of operational prototype of
   b. (U) Continued night scope and illuminator projects.
   c. (U) Began development of an Integrated Communications Module.
   d. (u) Began development of
   e. (U) Continued Night Vision Lab technical support.
2. (U) FY 1990 Program:
   a. (u) Begin development of
   b. (U) Begin development of light weight communications enhancements.
   c. (u) Modify and test two operations.
   d. (U) Continue development of mission planning and simulation systems.
3. (U) FY 1991 Plans: Not Applicable
4. (U) Program to Completion: Not Applicable

D. (U) WORK PERFORMED BY: Programs will normally be managed through Service program management offices. Assignment of management responsibility will be determined by JSOC and negotiated with the desired Service organization.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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SECTION II

CONSTRUCTION AT
RDT&E,N FACILITIES

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MAJOR IMPROVEMENTS TO AND CONSTRUCTION OF GOVERNMENT-OWNED FACILITIES FUNDED BY RDT&E

The data provided by this exhibit includes the following:

Part I - Utilization of Section 2353, Title 10 Authority - Specialized R&D Facilities and/or Equipment Constructed by or Furnished to Contractors

SECTION I - Projects accomplished or underway

SECTION II - Projects planned or projected

Part II - Utilization of RDT&E for Facilities at Government-Owned/Government-Operated Installations

SECTION I - Projects accomplished or underway

SECTION II - Projects planned or projected

Part III - Utilization of RDT&E Appropriation for Minor Construction

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DEPARTMENT OF DEFENSE, MILITARY
RDT&E, NAVY
MAJOR IMPROVEMENTS TO AND CONSTRUCTION OF GOVERNMENT-OWNED FACILITIES FUNDED BY RDT&E

PART I. UTILIZATION OF SECTION 2353, TITLE 10 AUTHORITY

Specialized R&D facilities and/or equipment determined to be necessary for the performance of a contract for a Military Department for research and development may be constructed by or furnished to the contractor and funded from appropriations available for research, development, test and evaluation. The Congress enacted this legislation, now 10 USC 2353, in 1956. This policy is executed through DOD Directive 4275.5. Under this policy, the Secretaries of the Military Departments or their designees, and the Directors of Defense Agencies may approve facilities projects up to $3,000,000; the Under Secretary of Defense (Acquisition) approves projects exceeding $3,000,000. The Congress is notified in advance of starting any project involving construction, regardless of the dollar amount. The table below provides a summary listing of all such projects accomplished in FY-89 and planned in FY-90 and FY-91.

FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	CONTRACTOR	LOCATION	Total Obligation Authority (Thousands of Dollars) FY89	FY90	FY91
SECTION I PROJECTS ACCOMPLISHED OR UNDERWAY						
None						

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FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	CONTRACTOR	LOCATION	Total Obligation Authority (Thousands of Dollars) FY89	FY90	FY91
		SECTION II PROJECTS PLANNED OR PROJECTED				
60 HZ Switchboard 1/	0604567N S0857	International Switchboard Corp.	NAVSSES Philadelphia, PA	-	600	-
TOTAL - PART I				$ -	$600	$ -

1/ Previously listed in the FY 1990/1991 Biennial Budget, RDT&E,N DON Supporting Data, dated January 1989.

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MAJOR IMPROVEMENTS TO AND CONSTRUCTION OF GOVERNMENT-OWNED FACILITIES FUNDED BY RDT&E

PART II. UTILIZATION OF RDT&E,N APPROPRIATION FOR FACILITIES AT GOVERNMENT-OWNED/GOVERNMENT-OPERATED INSTALLATIONS

Chapter 251 of the DOD Budget Guidance Manual (which was approved by the GAO as DOD Instruction 7220.5) provides that RDT&E appropriations may finance the development, design, purchase, and installation (including directly related foundations, shielding, environmental control, weather protection, structural adjustments, utilities and access) of equipment or instrumentation required for research, development, test and evaluation activities. The table below provides a summary listing of all such projects for the installation of equipment, where the cost of installation is $200,000 or more, accomplished in FY-89 and planned in FY-90 and FY-91.

FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	LOCATION	Total Obligation Authority (Thousands of Dollars) FY89	FY90	FY91
		SECTION I PROJECTS ACCOMPLISHED OR UNDERWAY			
Distributive Systems 1/	0604567N	Naval Ship Systems Engineering Station, Philadelphia, PA	200	-	-
Machinery Control System 1/	0604567N S0857	Naval Ship Systems Engineering Station Philadelphia, PA	500	-	-
Large Cavitation Channel (LCC) 1/	0605862N X1957	CBI Nuclear Co. Facility Memphis, TN	20,020	15,754	5,940
LM2500's, Reduction Gear and Waterbrake (Propulsion Training) 1/	0604567N S0857	Naval Ship Systems Engineering Station, Philadelphia, PA	200	-	-

1/ Previously listed in the FY 1990/1991 Biennial Budget, RDT&E,N DON Supporting Data, dated January 1989.

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FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	CONTRACTOR	LOCATION	Total Obligation Authority (Thousands of Dollars) FY89	FY90	FY9
		SECTION II PROJECTS PLANNED OR PROJECTED				
Electric Power Distribution & Generation System 1/	0604567N S0857	Naval Ship Systems Engineering Station,	Philadelphia, PA	-	300	-
TOTAL, PART II				$20,920	$16,054	$ 5,940

1/ Previously listed in the FY 1990/1991 Biennial Budget, RDT&E,N DON Supporting Data, dated January 1989.

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LARGE CAVITATION CHANNEL

DAVID TAYLOR RESEARCH CENTER Bethesda, MD

(CBI NUCLEAR COMPANY FACILITY, MEMPHIS, TN)

(Thousands of Dollars)		
FY89	FY90	FY91
20,020	15,754	5,940

DESCRIPTION OF PROJECT:

This project was started in FY 1987 and will be ready for operations in late FY 1991. The Large Cavitation Channel (LCC) will be a ship and model testing facility similar to a wind tunnel except that it will be filled with water. The overall size of the circuit will be 65 feet in height and 239 feet in length. Its primary function will be to test models of ship and submarine hulls together with their propulsors and appendages to meet increasingly stringent U. S. Navy requirements for improved propulsive quietness and efficiency. Within the circuit, the test section size will be 10 x 10 x 40 feet, which will allow a large enough model for accurate scaling without excessive distortion of the flow due to the channel walls. The channel will be completed in time for the design of the next generation ships. The facility is a David Taylor Research Center field activity.

The major non-severable items included in the project and the dollar values are as follows:

Item	Value (Thousands of Dollars)
Channel Circuit	33,510
Pump and Drive Machinery	9,582

There are no major severable items.

The David Taylor Research Center has signed contract number N00167-87-C-0088 with CBI Na-Con, Inc. for design, fabrication, and installation of the LCC. The LCC will support RDT&E on all classes of ships in the Navy and all future classes into the next century, including the SSN 21. Pertinent schedule dates are as follows:

FY 1986: Issued Request for Proposals and received proposals.

FY 1987: Evaluated proposals, negotiated and awarded contract, began engineering design based on Government-Furnished Design.

FY 1988 Initiated civil improvements at Memphis, TN; established LCC Site as detachment of DTRC; and completed delivery of 14,000 HP pump motor controls.

FY 1989: Complete LCC acoustic trench concrete work; initiated intersection of stainless steel channel in acoustic trench; and complete all civil improvements. LCC field installation.

FY 1990: Complete LCC installation.

FY 1991: Complete acceptance testing and initial calibration, and initiate LCC operation.

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MAJOR IMPROVEMENTS TO AND CONSTRUCTION OF GOVERNMENT-OWNED FACILITIES FUNDED BY RDT&E

PART III. UTILIZATION OF RDT&E,N APPROPRIATION FOR MINOR CONSTRUCTION

For in-house installations, construction projects in support of R&D for $200,000 or less are funded from the RDT&E appropriation. Such expenditures are authorized by 10 USC 2805 and the applicable provisions of the current DOD Appropriation Act. Under this procedure, project approval at this level is authorized by the Major Command concerned, or delegated to R&D installation commanders as appropriate. The table below provides a summary total of such major construction accomplished in FY-89, and the estimated amounts planned for FY-90 and FY-91. All minor construction must result in a complete and useable facility. In no event are two or more minor construction projects or minor and major construction projects to be contrived to form a useable facility.

SUMMARY OF MINOR CONSTRUCTION FUNDED BY RDT&E, NAVY
(Thousands of Dollars)

	FY89	FY90	FY91
TOTAL, Part III	$8,005	$8,481	$9,389
GRAND TOTAL *	$28,925	$25,135	$15,329

* Major Improvements to, and Construction of, Government-Owned Facilities funded by Research, Development, Test and Evaluation.

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