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DEPARTMENT OF THE NAVY

SUPPORTING DATA FOR FY 1990/1991 BIENNIAL BUDGET BUDGET ESTIMATES DESCRIPTIVE SUMMARIES (U)

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DEPARTMENT OF DEFENSE, MILITARY
RDT&E NAVY
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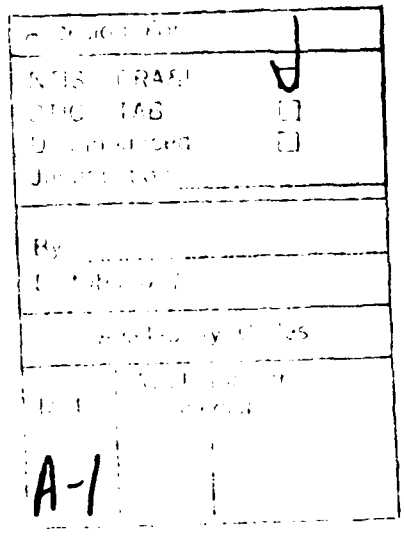
SECTION I

RDT&E,N DESCRIPTIVE SUMMARIES



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 1990/1991 hearings. The Descriptive Summaries provide narrative information on all non special access RDT&E Program Elements and Projects.

2. Comparison of FY 1988 and 1989 Data. A direct comparison of FY 1988 and FY 1989 data in the Program Element Descriptive Summaries dated February 1988 will reveal significant differences. Many of the differences are attributable to the following factors:

a. FY 1989 reductions as a result of Congressional action on the appropriation.

b. FY 1988 funding changes subsequent to October 1, 1988, including RDT&E Reprogramming Actions and Supplemental Appropriation.

c. Reclassification of FY 1988 and FY 1989 data to achieve comparability with the program structure for FY 1990/1991.

3. Relationship of FY 1990/1991 Budget Structure to the FY 1989 Budget Approved by Congress. The following list of program elements which do not appear on the Base for Reprogramming Action (DD 1414) for the Navy RDT&E which was prepared pursuant to final Congressional action of the FY 1989 DoD Budget Submission to Congress.

Program Element	Title
0603392N	ANTI-SATELLITE PROGRAM
0204154N	SEA-BASED EARLY WARNING AIRCRAFT
0603220N	ADVANCED TACTICAL SUPPORT
0603551N	LINK SAKI
0603610N	MK 50 TORPEDO IMPROVEMENT
0604219N	AIRBORNE ASW DEVELOPMENTS
0601103N	UNIVERSITY RESEARCH INITIATIVES (in OSD FY 1989)
0604514N	NAVIGATION SYSTEM
0605150N	COST RESEARCH

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

Section II

Construction at RDT&E,N Facilities

Major Improvements to and Construction of Government-owned Facilities

FY 1990/1991 BIENNIAL, NAVY RDT&E DESCRIPTIVE SUMMARY

Program Element: #0601103N Budget Activity: 1-Technology Base
Program Element: Title: University Research Initiative
Project Number: Not Applicable Project Title: Not Applicable

A. (U) RESOURCES (Dollars in Thousands)

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
University Research Initiative	0	0	24,275	24,268	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The University Research Initiative (URI) is a multi-component effort designed to strengthen the capabilities of U.S. universities to perform research and to educate scientific and engineering personnel in key disciplines important to the technologies that underlie a strong national defense. In recent years it has become clear that declining investments in the university research and teaching base during the 1970's have resulted in deficiencies that hamper the ability of U.S. universities to produce quality research and education in scientific and engineering disciplines. Among these problems are a shortage of faculty qualified to teach certain state-of-the-art technologies; obsolete research instrumentation; and declining numbers of American citizens pursuing science and engineering graduate degrees. The Navy URI program has included components such as graduate fellowships, and special research programs designed to simultaneously address deficiencies in the academic science and engineering infrastructure while meeting important Navy research requirements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: All funding has been transferred to OSD under Program Element 0601103D for FY 1988.

2. (U) FY 1989 Program: The Navy is beginning two new activities within URI: New research efforts to broaden URI's geographic distribution and a portion of a new DOD $10.0M graduate fellowship program, $5.0M of which is to come from the URI budget.

3. (U) FY 1990 Plans: The URI initiative established by the Navy in FY 1986 and described in paragraph B will continue.

4. (U) FY 1991 Plans: The block research programs started in FY 1987 will end in FY 1991. A new URI competition will be announced for FY 1992.

5. (U) Program to Completion: Not applicable.

D. (U) WORK PERFORMED BY: Work under this program element is performed directly and exclusively by the U.S. university research community.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: No change.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Similar programs are supported by the Army, Air Force and the Defense Advanced Research Projects Agency (DARPA).

H. (U) OTHER APPROPRIATION FUNDS: This is a nonacquisition program.

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL, NAVY RDT&E DESCRIPTIVE SUMMARY

Program Element: #0601152N Budget Activity: 1-Technology Base
Program Element Title: In-House Independent Laboratory Research
Project Number: Not Applicable Project Title: Not Applicable:

A. (U) RESOURCES (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
TOTAL FOR PROGRAM ELEMENT	22,627	23,429	24,426	25,903	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments: The following is a small sample from over 80 accomplishments reported during this fiscal year:

Materials/Mechanical/Chemistry--identified high-energy metallic reactions to obtain more explosive energy than is available from conventional explosives; established mechanisms of concrete set, for rapid damage repair.

Electrooptics/Electromechanics--demonstrated the promise of infrared detection of ship wakes; developed fluorescence-based optical fiber sensors to measure trace concentrations of chemicals in seawater, for possible use in detections.

Hydrodynamics/Aerodynamics--Developed solutions for wave problems and ship wakes, for use in computerized ship design; tunnel-tested large submarine model, providing full-scale flow data and scaling laws applicable to other Naval systems.

Physical/Environmental Acoustics--verified patterns of excitation in backscatter from long pulses, potentially useful for target identification via active sonar; developed a new method for predicting acoustic scattering from submarine hull forms at practical frequencies and ranges of interest.

Life Science/Medicine--demonstrated the primary effects of external electromagnetic fields on the biochemical/physical properties of cell surface membranes; identified body systems activated in human reaction to non-freezing cold injury, for better personnel protection and casualty treatment.

2. (U) FY 1989 Program: Several research projects funded in FY 1988 will continue to receive support in FY 1989. In addition, the program will include many new initiatives.

Materials/Mechanics/Chemistry--ceramic composite materials modeling; composite behavior in the space environment; molecular chemistry of energetic materials.

Electro-optics/Electro-magnetics--new solid-state laser materials in the near/mid-infrared region; superlattices of narrow band-gap semiconductors.

Hydrodynamics/Aerodynamics--holographic interferometry for supersonic flow measurement; flow noise reduction; propulsor velocity fields.
Information Sciences--investigation of neural networks for high-speed computing; real-time information processing/decision support in complex environments; expert systems for autonomous weapons.

Physical/Environmental Acoustics--arctic acoustics; non-acoustic detection.

3. (U) FY 1990 Plans: Programs will include the following topics: Materials/Mechanics/Chemistry--properties of high temperature ceramic superconductors; transient crack growth in structural steels.

Electrooptics/Electromechanics--tunable solid state laser materials for countermeasures devices; radar scattering and target discrimination.

Information Sciences--artificial intelligence for unmanned air vehicles.

Physical/Environmental Acoustics--signal processing for target discrimination in sonar clutter; matched field processing for Arctic acoustic detection.

General Physics--use of the scanning tunneling microscope for evaluation of semiconductors; interactions of electron beams and radiation with matter, for damage assessment.

4. (U) FY 1991 Plans: Programs may include the following topics:

Materials/Mechanics/Chemistry--robust methods for tactical missile computations; electrochemistry of batteries; diamond semiconductor film material deposition.

Electrooptics/Electromechanics--amplification of trace atmospheric elements in detection; science of superlattices of narrow band-gap semiconductors.

Information Sciences--development of a unified theory for data fusion.

Physical Environmental Acoustics--sound propagation modeling; interactions of acoustic, electromagnetic, and elastic waves with materials.

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.

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

D. (U) WORK PERFORMED BY: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Surface Warfare Center, Silver Spring, MD, and Dahlgren, VA; Naval Weapons Center, China Lake, CA; David Taylor Ship Research Center, Bethesda, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; and several other Navy laboratories and facilities engaged in medical and other specialized areas of research.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N.A.	N.A.	N.A.
SCHED	N.A.	N.A.	N.A.
COST	N.A.	N.A.	-3,642

Impact of Changes:
Technology: N.A.
Schedule: N.A.
Cost: The Navy/OSD reduction will have impact on the efforts of Laboratory Directors to initiate innovative, independent research.

F. (U) PROGRAM DOCUMENTATION: Not applicable

G. (U) RELATED ACTIVITIES: 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 Assistant Secretary of Defense for Research and 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 requests 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 nonacquisition program.

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
	TOTAL FOR PROGRAM ELEMENT	316,620	331,875	341,951	361,746	Continuing
11	General Physics	33,207	36,423	39,759	43,011	"
12	Radiation Sciences	2,281	2,484	2,515	2,578	"
13	Chemistry	20,768	23,752	24,842	25,291	"
14	Mathematics	13,579	12,899	14,541	16,574	"
15	Computer Sciences	14,925	16,329	15,871	16,665	"
21	Electronics	28,774	27,172	30,293	32,615	"
22	*Materials	29,710	29,584	30,204	32,209	"
23	Mechanics	19,047	19,466	21,662	24,429	"
24	Energy Conversion	8,940	9,564	10,476	9,984	"
31	Ocean Sciences	55,387	53,152	48,843	52,455	"
32	Ocean Geophysics	31,270	35,347	34,975	38,234	"
33	Atmospheric Sciences	14,096	14,669	14,941	13,098	"
34	Astronomy & Astrophysics	4,468	5,164	4,838	4,901	"
41	Biological & Medical Sciences	21,683	24,401	25,288	24,521	"
42	Cognitive & Neural Sciences	10,314	11,459	13,667	14,179	"
52	Multidisciplinary Support	8,171	10,010	9,236	11,002	Continuing

*The metallurgy component of this subelement is approximately 14,000 in FY90.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

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 1988 Accomplishments:

Mathematical and Physical Sciences--A silicon carbide field effect transistor offers superior instrumentation of jet engines/high-temperature environments; a tunable, room-temperature laser is a major step towards compact devices to defeat infrared sensors; a new means for compressing video signal data by a factor of 120 has military potential for data storage.

Environmental Sciences--An Arctic ambient noise model will be an important contributor to acoustic detection in that environment; a technique for increasing sonar directivity, can enhance detection of small mines.

Engineering Sciences--A new high-energy insensitive propellant, called CL-20, considered to be the most significant improvement in military explosives/propellants in 40 years, has been synthesized; the mechanisms for vibrational damping of metal matrix composites in airframe structures have been identified.

Life Sciences--Research on the responses of DNA genes to low-frequency electromagnetic fields (EMF) has furthered knowledge on possible biological effects of EMF; the discovery of a marine microorganism which can synthesize as well as devour plastics, addresses the Navy's need for novel materials (e.g., degradable sutures) and the general need for biodegradable plastics.

Special Programs--continued to support the ONR Graduate Fellowship Program, the ONR High School Apprenticeship Program and the Historically Black Colleges/ Universities Program; programs designed to increase scientific manpower trained in areas critical to naval research; the Summer Faculty Program which brings academic scientists into Navy laboratories to better couple Navy laboratory and university research.

2. (U) FY 1989 Program:

Mathematical and Physical Sciences--research in visible/infrared interferometry to obtain detailed images to improve surveillance; in the properties of nonneutral plasmas, to assess of systems options that may employ high-power microwaves, free electron lasers, and particle beams; to investigate processes that occur within the pico to femto-second pulse length regime, essential to the next generation of high-speed electronic and optical devices.

Environmental Sciences--research to understand relationships between marine bioluminescence and upper ocean physics; on both acoustic and non-acoustic methods of ASW; and to characterize the backscattering of acoustic energy from the sea floor, ocean volume and surface, for its impact on sonar systems. These activities include the operation and improvement of research ships and submersibles.

Engineering Sciences--research in active/adaptive control theory to improve the acoustic performance and propulsive efficiency of undersea systems; in the theories, techniques and tools for creating reliable real-time computing systems; and on explosives decomposition at the molecular/crystal lattice level.

Life Sciences--research on the molecular principles governing biological polymers of naval interest (coatings, acoustic energy absorbents, piezo-electrics); on the behavior of neural networks, for their ultimate application in Navy systems such as sonars and radars.

3. (U) FY 1990 Plans:

Mathematical and Physical Sciences--investigation of semiconductor properties of matched thin film-substrate crystal lattices; characterization of thin-film magnetic materials for high-frequency electronics uses.

Environmental Sciences--atmospheric studies of the transition from marine stratus (100% cloud cover) to cumulus (10% cloud cover) for its effects on communications, radar; ocean studies of mixed-layer physics 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.

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.

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.

4. (U) FY 1991 Plans:

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.

Environmental Sciences--space-based remote sensing; multi-sensor data correlation; bioluminescence imaging systems for ASW; remote Arctic monitoring.

Engineering Sciences--investigation of materials fracture at the atomistic level; dynamics/acoustics of complex/unsteady flows; energetic materials synthesis and reaction dynamics.

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.

5. (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 53% of funding goes to universities, 36% to Navy laboratories and 11% to industrial and other sources.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES			
Type of CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N.A.	N.A.	N.A.
SCHED	N.A.	N.A.	N.A.
COST	N.A.	N.A.	-34,837

Impact of Changes: Technology: N.A. Schedule: N.A.
Cost: The Navy/OSD reduction will impact various core and accelerated programs.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: 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 nonacquisition program.

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
AAW/ASUW Technology	54,748	55,341	58,176	61,003	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program supports future surveillance and weapons systems for surface, air, and space platforms for Navy missions in Anti-Air and Anti-Surface Warfare. Anti-Air Warfare requires surveillance and intercept capabilities extending beyond stand-off ranges of the launch platforms. It is also essential to develop innovative short-range defense technology to defeat penetration of the wide area defensive shield. Anti-Surface and Strike Warfare requires enhanced launch stand-off, precision targeting, survivability, post strike damage assessment and affordable munitions.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

o Wide Area Surveillance: Completed testing of space based radar transmit/receive modules and demonstrated completed testing of high-altitude remote platform lightweight radar.

o Area Surveillance: Demonstrated hybrid, adaptive beamformer for resolving airborne targets in presence of main beam jamming; completed design of a coherent multi-frequency radar for non-cooperative target recognition; demonstrated a motion compensation processor for Forward Looking Infrared (FLIRs).

o Multi-Sensor Synthesis and Data Correlation: Demonstrated an advanced tracker/correlator algorithm for sorting and identifying common tracks[ ]

o Air Superiority Weapons: Fabricated a[ ]for fire control radar.

o Long Range Fleet Air Defense: Demonstrated low cost[ ]completed technical assessment of DARPA's long range air intercept experiment (LORAINE) technology for application to Navy outer air battle.

o Local Area/Self Defense and Directed Energy Weapons: Fabricated high power, multiple target tracking laser radar and demonstrated moving target tracking capability; demonstrated pulsed chemical laser scaling; demonstrated technology in pulsed power, beam pointing and lethality for charged particle beams.

o Anti-Surface Ship/Strike Weapons: Demonstrated feasibility of solid fuel ramjet engine; developed a new propellant that is potentially [ ]standard missile propellant.

2. (U) FY 1989 Program:

o Wide Area Surveillance: Conduct at-sea experiment of the surface ship wake detection system; test super resolution IR focal plane array;

Program Element: 0602111N Budget Activity: 1
Program Element Title: Anti-Air/Anti-Surface Warfare Technology
Project Number: N.A. Project Title: N.A.

o Area Surveillance. Conduct flight tests of the auto-correlation processor; initiate processing concepts for us
to detect airborne targets; conduct experiment to characterize at-the-horizon IR background clutter.

o Multi-Sensor Synthesis and Data Correlation. Conduct at-sea test of the advanced tracker/correlator processor.

o Air Superiority Weapons. Fabricate/test breadboard hardware for narrow bandwidth active-array integrated-guidance seeker fuze concept; begin exploration of folding fin missile conceptual designs for internal weapons carriage.

o Long Range Fleet Air Defense Weapons. Complete RF/IR multi-spectral seeker for anti-air missile application; fabricate integrated IRST and long range laser range finder for enhanced long range targeting.

o Local Area/Self Defense and Directed Energy Weapons. Conduct characterization testing of laser radar; complete single sector antenna subsystem for low altitude azimuthally adaptive fuze; initiate low-to-moderate power laser development for anti-sensor missions;

o Anti-Surface Ship/Strike Weapons. Begin development for first pass targeting concept using real time multi-sensor fusion algorithms; complete fabrication of full-scale lightweight, low-hazard rocket motor case.

3. (U) FY 1990 Plans:

o Wide Area Surveillance. Conduct analysis of surface ship wake data; begin development of

o Area Surveillance. Test algorithms for detection of airborne targets; 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.

o Multi-Sensor Synthesis and Data Correlation. Transition advanced tracker-correlator to Advanced Technology Demonstration; transition portions of the airborne sensor synthesis processor

o Air Superiority Weapons. Fabricate and test wide bandwidth active array breadboard for active array; for integrated guidance-fuze concept, fabricate/test digital range/doppler/signal processing and begin wide bandwidth conceptual designs.

o Long Range Fleet Air Defense Weapons. Conduct high altitude tests of integrated IRST/LRF.

o Local Area/Self Defense and Directed Energy Weapons. Develop multi-target tracking system architecture for integrated radar/IRST/laser hardware; conduct full scale deformable warhead test to verify high directional lethality gain, based on lethality data.)

o Anti-Surface Ship/Strike Weapons. Conduct simulations of multi-sensor first pass targeting algorithms; demonstrate solid fuel-air warhead; test neural network fuze concept; investigate propellant applications of low hazard, high performance, thermoplastic elastomeric explosive technology.

4. (U) FY 1991 Plans:

o Wide Area Surveillance. Transition High Altitude Remote Platform Sensor System (HARPSS) radar to advanced demonstration; complete laboratory tests of breadboard.

o Area Surveillance. Conduct flight test of advanced AEW radar; initiate tests of the complete field tests of

Program Element: 0602111N Budget Activity: 1
Program Element Title: Anti-Air/Anti-Surface Warfare Technology
Project Number: N.A. Project Title: N.A.

o 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.

o Air Superiority Weapons. Develop active array fire control system architecture; fabricate/test frequency agility and high-speed range/angle/velocity tracking circuitry for wide bandwidth integrated guidance seeker fuze.

o Long Range Fleet Air Defense Weapons. Conduct captive flight test of integrated IRST/LFR.

o 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; continue compact accelerator development.

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-21,220

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The -21,220 reduction will reduce efforts on warhead precision guidance and fuzing for long stand-off weapons, terminate planned new starts in warheads for new kill mechanisms against hard targets, terminate pulsed chemical laser and other high energy laser technology, and delay efforts in low altitude fuzing for point defense.

F. (H) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Navy Coordination - P.E. 0603308N; P.E. 0603306N; P.E. 0603303N; P.E. 0603609N; P.E. 0603318N; and P.E. 0603217N. Inter-Service Coordination - Propulsion (Joint Army, Navy, NASA, and Air Force (JANNAF) Committee on Propulsion); Missiles and Rockets, Fire Control, and Warheads (Working Panels of the Joint Logistics Commanders' Technical Coordinating Group for Munitions Development); Surface/Aerospace Target Surveillance, U.S. Army P.E. 0602709A; P.E. 0603710A, P.E. 0602703A, U.S. Air Force P.E. 0602204F; P.E. 0602702F C-3 and P.E. 0603208F. The Navy contributes technology to the DARPA program in Charged Particle Beam technology.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: (Dollars in Thousands): Not applicable.

FY 1990/1991 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Surface Ship Technology	14,070	13,275	14,717	15,556	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This element provides technology essential for developing viable future warships to counter ever increasing threats. It is the Navy's source of surface warship hull, machinery and electrical technology to reduce the acquisition and operating costs of these systems, and to increase their military effectiveness and reliability. Project areas derived from operational needs that are presently being pursued include: technology impact assessment and feasibility studies; electric, auxiliary, propulsion and hull systems; electromagnetic compatibility; damage control; northern latitude operations; and weapon effects.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - o Designed, built, and tested a second generation flow smoothing propulsor at model scale.
   - o Began efforts
   - o Completed laboratory acoustical tests on AOE Class composite propeller shaft components.
   - o Initiated work on quieting rotary diesel engines.
   - o Added Small Waterplane Area Twin Hull (SWATH) ship modifications to the Ship Survivability/Vulnerability Model.
   - o Demonstrated feasibility of new armor system to defeat current threat warheads.
   - o Transitioned an enhanced machinery module for the Advanced Surface Ship Evaluation Tool (ASSET) to the Navy design community.
   - o Completed conceptual design of model contra-rotating homopolar motor.
   - o Completed feasibility demonstration of lightweight, composite foundation concepts.
   - o Complete vane wheel propulsor design and model scale trials.
2. (U) FY 1989 Program:
   - o Complete closed-loop degaussing system algorithm development and begin tests on magnetic model.
   - o Transition flow-smoothing propulsor work to Advanced Development for system demonstration.
   - o Transition high efficiency ship service prime movers to Advanced Development.
   - o Complete blast tests of composite deckhouse module.

Program Element: 0602121N Budget Activity: 1
Program Element Title: Surface Ship Technology
Project Number: N.A. Project Title: N.A.

- o Transition "floating" uninterruptable power source for vital electrical loads to Advanced Development.
- o Transition design guidelines for SWATH ships to the design community.
- o Transition noise model for high load bull gears to design community.
- o Complete low field evaluation of contra-rotating current collector.
- o Demonstrate heat pipe technology for cooling motors and generators.

3. (U) FY 1990 Plans:
   - o Complete maneuvering, seakeeping and hydrodynamic load analyses for podded propulsor concept.
   - o Demonstrate performance of closed loop degaussing algorithm on magnetic model of Mine Countermeasures (MCM) vessel.
   - o Incorporate full scale ship wake measurements into mathematical wake prediction models.
   - o Initiate experiments combining anti-radiation coatings with hull transmission path blockers to reduce radiated noise.
   - o Transition design guidance for low pressure, low temperature composite heat exchanger to Advanced Development.
   - o Transition composite stack concepts to Advanced Development.
   - o Complete concept design and initial pay-off demonstration of composite diesel engine.
   - o Demonstrate viability of revolutionary ventilation/air conditioning system.
   - o Complete evaluation of membrane dehydrator hardware model.
   - o Initiate fatigue testing of a 50,000 horsepower composite drive shaft.
   - o Demonstrate improved technology for the containment, control and extinguishment of unconventional fires.
   - o Complete development of frequency hopping VHF/UHF transmitter models for electromagnetic interference analyses.
4. (U) FY 1991 Plans:
   - o Fabricate advanced propeller for podded propulsor system.
   - o Transition closed loop degaussing technology to Advanced Development for MCM and Mine Sweeper Hunter (MSH) vessel signature reduction.
   - o Validate ship wake prediction codes with actual at-sea measurements.
   - o Transition high cavitation inception speed propulsors technology to the Navy design community.
   - o Develop hardware modeling capability for 270/600 volt DC power systems.
   - o Define design parameters for family of advanced high pressure centrifugal pumps to serve future fleet needs.
   - o Transition design recommendations for podded drive train components to Advanced Development.
   - o Conduct at-sea testing of first breadboard of autonomous structural data acquisition system aboard T-AGOS-19.
   - o Complete initial evaluations of double-hull structural concept.
   - o Utilize shipboard test results to validate fire and smoke spread modeling.

Program Element: 0602121N Budget Activity: 1
Program Element Title: Surface Ship Technology
Project Number: N.A. Project Title: N.A.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: David Taylor Research Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, D.C.; Naval Surface Warfare Center, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-1,355

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The -1,355 reduction will delay initiation of take home propulsor development and machinery monitoring work and reduce advanced power distribution system development. This work is necessary for the successful completion of the budgeted 6.3/6.4 electric propulsion initiative.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Work in this element complements and builds on efforts in the following exploratory development program elements: 0602131M, (Marine Corps Landing Force Technology); 0602233N, (Mission Support Technology); 0602234N, (System Support Technology); 0602315N, (Mine and Special Warfare Technology; 0602323N, (Submarine Technology); and 0602936N, (Laboratory Independent Exploratory Development).

This element provides significant technical contributions to the following Advanced Development program elements: 0603502N, (Surface Mine Countermeasures); 0603508N, (Ship Propulsion Systems); 0603513N, (Shipboard Systems Component Development); 0603514N, (Shipboard Damage Control); 0603553N, (Surface Anti-Submarine Warfare); 0603564N, (Ship Development); 0603573N, (Electric Drive); and 0603724N, (Navy Energy Program).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands): This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.
J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/91 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Aircraft Technology	21,969	21,503	22,686	23,911	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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. The need to assure and advance the dominance of sea-based aviation is increasingly evident in the light of the expanding scope of Soviet naval air warfare capabilities. New concepts in naval warfare and the inherent constraints of restricted manpower, space and logistic support place a premium on highly capable and easily maintainable naval aircraft. 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. Emphasized throughout this program are significant reductions in aircraft life-cycle costs, maintenance and manpower requirements and quantum increases in system reliability, availability, and survivability. 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 1988 Accomplishments:

- o Continued to develop composite structures repair and certification techniques for field, intermediate, and depot level activities.
- o Completed fabrication and testing of a one-half scale carrier Electromagnetic Aircraft Launcher (EMAL).
- o Commenced transitioning completed jet engine projects, such as the swept aero fan compressors, to the joint service Integrated High Performance Turbine Engine Technology (IHPTET) program.

Program Element: 0602122N Budget Activity: 1
Program Element Title: Aircraft Technology
Project Number: N.A. Project Title: N.A.

- o Conducted several exploratory development tasks to resolve High Altitude Long Endurance (HALE) Unmanned Air Vehicle (UAV) performance risks such as multiday vehicle endurance, system/subsystem reliability, survivability against weather and threat missiles, and ability to perform extended unmanned autonomous operations.

2. (U) FY 1989 Program:

- o Transition the Electromagnetic Aircraft Launcher to Advanced Development (PE 0603512N).
- o Commence breadboard design/fabrication of an extended range Optical Landing System for use aboard aircraft carriers.
- o Continue Integrated High Performance Turbine Engine Technology (IHPTET) program.
- o Continue development of second generation composite materials and structures for aircraft.
- o Terminate investigation of technologies applicable to High Altitude Long Endurance (HALE) Unmanned Air Vehicles (UAV).

3. (U) FY 1990 Plans:

- o Fabricate a lightweight, high temperature aircraft engine core turbine.
- o Transition the advanced integrated armament system to Advanced Development (PE 63219N).
- o Demonstrate advanced technology cockpit design for fighter aircraft.
- o Demonstrate advanced closed loop environmental conditioning system.
- o Transition flight control smart actuators to Advanced Development.
- o Develop Aviation Test and Evaluation Technology to test advanced aviation systems and equipment for future weapon systems and platforms.

4. (U) FY 1991 Plans:

- o Complete fabrication of advanced aircraft engine control sensors.
- o Demonstrate braking and turning techniques for Ram-Air Parachutes for the Advanced Technology Cockpit.
- o Demonstrate flat panel displays, helmet mounted display presentations, and high brightness color displays.
- o Transition energy-efficient environmental conditioning system to Advanced Development (Energy Program).
- o Demonstrate the capability of composite components to endure aerodynamic buffet loads.
- o Continue Test and Evaluation Technology emphasizing sensor, modelling and Simulation Technologies for laboratory and test range improvements for future aircraft.

Program Element: 0602122N Budget Activity: 1
Program Element Title: Aircraft Technology
Project Number: N.A. Project Title: N.A.

5. (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.

E. (U) COMPARISION WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-1,168

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The net decrease of -1,168 reflects acceleration of effort in the IHPTET and test and evaluation technology programs (on the positive side) and cancellation of the HALE UAV program (on the negative side).

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: The Integrated High Performance Turbine Engine Technology Program is a joint Navy, Air Force, Army, DARPA and NASA program to demonstrate technology around the turn of the century which will double propulsion system capabilities for a wide range of potential aircraft and missile applications. All Navy aircraft development programs are coordinated with other services, DARPA and NASA through working groups, committees, and joint technology base reviews to insure no unnecessary duplication of effort.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Marine Corps Landing Force Technology	16,045	15,623	16,374	17,616	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments:
   - o Completed design and testing of several subsystems associated with the High Water Speed Technology Demonstrator (HWSTD) (advanced drive train, advanced suspension system and lightweight tracks). Defined and evaluated advanced container and handling equipments and tactical fuel system improvements in support of over-the-beach operations. Evaluated protective material for rapidly emplaced fortifications.
2. (U) FY 1989 Program:
   - o Continue testing HWSTD components and evaluate composite materials designed to withstand mine blasts. Validate over-the-beach logistics support concepts and develop technologies for enhanced cargo inventory management ashore.
3. (U) FY 1990 Plans:
   - o Test HWSTD and associated components. Implement design concepts for alternative propulsion system. Continue assessment of technologies for enhancing over-the-beach logistics support.
4. (U) FY 1991 Plans:
   - o Pursue technology for enhancing HWSTD vehicle capabilities and over-the-beach logistics support.

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

(U) Amphibious Weapons and Defensive Systems Technology

1. (U) FY 1988 Accomplishments:
   - o Completed lab test of underwater imaging of mines using laser illumination for surf zone mine detection and demonstrated linked miniature shaped charge systems capabilities to neutralize mined areas.

Program Element: 0602131M Budget Activity: 1
Program Element Title: Marine Corps Landing Force Technology
Project Number: N.A. Project Title: N.A.

2. (U) FY 1989 Program:
   - o Continue development and testing of laser illumination for surf zone mine detection and explore use of high power microwave technology for mine destruction.
   - o Transition miniature shaped charge mine neutralization system.
   - o Test and evaluate subsystems designed to provide a search and track capability for Lightweight Armored Vehicles (LAV) and increase the combat capabilities of forward observer teams through lightweight equipment design and enhanced operating capabilities. Conduct laboratory tests of chemical/biological decontamination technology for increased survivability. Transition chemical drop off detector technology.
3. (U) FY 1990 Plans:
   - o Complete development of airborne mine detection system imaging processing procedures.
   - o Complete test and evaluation of LAV search and track capability.
   - o Develop new design concepts for chemical and biological detection and protection.
4. (U) FY 1991 Plans:
   - o Complete testing of airborne mine detection system.
   - o Transition technology of materials for enhancing individual protective clothing and CBR detection enhancement technology.
5. (U) Program to Completion: This is a continuing program.

(U) Battlefield Electronic Support
1. (U) FY 1988 Accomplishments:
   - o Completed work on ground radio antenna remoting enhancement and development of a low loss fiber optic cable for long haul communications.
2. (U) FY 1989 Program:
   - o Develop plans for integrating and testing commercially available battlefield hardware/software technology/equipment for enhanced C^2 operating capabilities.
   - o Commence study on measuring IR microwave antenna signatures for application to determine impact on tactical deception measures.
3. (U) FY 1990 Plans:
   - o Demonstrate prototype C^2 system capabilities employing data fusion techniques for integration of tactical communication requirements at various command levels and commence feasibility demonstration of various measures for enhancing tactical deception.
4. (U) FY 1991 Plans:
   - o Transition integrated battlefield management system of enhanced command and control technologies and complete feasibility demonstration of tactical deception plan.
5. (U) Program to Completion: This is a continuing program.

(U) Marine Corps Manpower Technology:
1. (U) FY 1988 Accomplishments:
   - o Conducted testing of personnel and assessed data related to identifying stress and fatigue tasks.

Program Element: 0602131M Budget Activity: 1
Program Element Title: Marine Corps Landing Force Technology
Project Number: N.A. Project Title: N.A.

2. (U) FY 1989 Program:
   - o Perform data collection analysis on stress and fatigue-related tasks and their application to military job assignments.
3. (U) FY 1990 Plans:
   - o Continue acceptance testing of tour optimization system.
   - o Commence assessment of technology to develop a force manpower management and personnel forecasting system.
4. (U) FY 1991 Plans:
   - o Continue to pursue manpower management and forecasting technology.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, Diego, CA; Naval Coastal Systems Center, Panama City, FL; Naval Surface Weapons Center, Dahlgren, VA; David Taylor Research Center, Bethesda, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Weapons Center, China Lake, CA; Naval Personnel Research and Development Center, San Diego, CA; Naval Research Laboratory, Washington, DC. CONTRACTORS: Boeing Corporation, Seattle, WA; Martin-Marietta Corporation, Lexington, MA; Arizona State University, Mesa, AZ; San Diego State University, San Diego, CA; Texas A&M University, College Station, TX; Lawrence Livermore National Laboratory, Livermore, CA; Los Alamos National Laboratory, Los Alamos National Laboratory, Los Alamos, NM.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-4,673

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable
2. (U) SCHEDULE CHANGES: Not Applicable
3. (U) COST CHANGES: The reduction of -4,673 will impact Marine Corps priority programs such as Mine Countermeasures and Lightweight Surface Vehicle technology.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Close coordination is maintained with all of the other armed services and selected DOD agencies, and industrial research and development programs. There is no duplication of effort.

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

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/91 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0602232N Budget Activity: 1
Program Element Title: Command, Control and Communications Technology
Project Number: N.A. Project Title: N.A.

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C^3 Technology	18,812	13,935	16,508	17,832	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This program provides the technologies needed to meet requirements in secure communications, tactical communications interoperability, timely data fusion, decision aids and accurate navigation. Present emphasis in joint operations requires Joint Service/NATO tactical C3 (command, control and communications) systems interoperability as a high priority. Today, combat decisions must often be made and implemented in seconds. The information needed by a commander to conduct operations is rapidly increasing as are threats to communications links. New long-range weapons require navigation with vastly increased accuracy while at the same time being reliable and affordable.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Communications: Unified Network Technology

1. (U) FY 1988 Accomplishments:
   - o Began transition process to Advanced Technology Demonstration (6.3A).
   - o Developed multinetwork controller algorithms.
2. (U) FY 1989 Program:
   - o Conduct land-based testing of integrated high frequency/ultra-high-frequency communications employing existing line-of-sight equipment and land-based test sites off Southern California to simulate intra-battle group communications.
3. (U) FY 1990 Plans:
   - o Conduct at-sea demonstration of intra-battle group communications.
   - o Complete transition to 6.3A Advanced Technology Demonstration.

(U) Communications: Advanced Arctic Communications Concepts

1. (U) FY 1988 Accomplishments:
   - o Conducted arctic test of expendable [redacted] and
   - o Conducted open ocean [redacted] experiments.
2. (U) FY 1989 Program:
   - o Transition expendable [redacted] to engineering development.
   - o Investigate radio propagation characteristics in the arctic.

Program Element: 0602232N Budget Activity: 1
Program Element Title: Command, Control and Communications Technology
Project Number: N.A. Project Title: N.A.

3. (U) FY 1990 Plans:
   - o Design and build an experimental system for submarine communications.
4. (U) FY 1991 Plans:
   - o Conduct arctic demonstration of system.
5. (U) Program to Completion: This is a continuing program.

(U) Command Support: Distributed Command and Control (C2)

1. (U) FY 1988 Accomplishments:
   - o Transitioned network interface technologies to Navy Desk Top Computer and Flag Data Display System programs.
2. (U) FY 1989 Program:
   - o Investigate security models in relation to the International Standards Organization's open systems interface model.
   - o Transition technologies to Navy Desk Top Computer and Flag Data Display System programs.
3. (U) FY 1990 Plans:
   - o Transition the decentralized operating system technology to the Unified Networking Technology ATD.
4. (U) FY 1991 Plans:
   - o Demonstrate real-time distributed database management functions on the distributed C2 testbed.
5. (U) Program to Completion: This is a continuing program.

(U) Navigation: Navigation Systems Technology

1. (U) FY 1988 Accomplishments:
   - o Completed fabrication of flight-quality ring laser gyro inertial measuring units for tactical missile applications.
   - o Designed and fabricated prototype fiber optic gyro.
2. (U) FY 1989 Program:
   - o Flight test and transition tactical missile ring laser gyro technology to advanced development.
   - o Conduct lab tests of fiber optic gyro and advanced accelerometer technology.
3. (U) FY 1990 Plans:
   - o Conduct lab test of high accuracy ring laser gyro for submarine applications.
   - o Complete lab tests of fiber optic gyro and advanced accelerometer technology.
4. (U) FY 1991 Plans:
   - o Complete high accuracy ring laser gyro development for submarines.
   - o Develop second generation fiber optics gyros.
   - o Transition advanced accelerometric technology to Navy strapdown navigation systems.
5. (U) Program To Completion: This is a continuing program.

Program Element: 0602232N Budget Activity: 1
Program Element Title: Command, Control and Communications Technology
Project Number: N.A. Project Title: N.A.

D. (U) WORK PERFORMED BY: IN-HOUSE - Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, D.C.; Naval Underwater Systems Center, New London, CT; Naval Weapons Center, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-8,629

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The reduction of -8,629 will necessitate de-emphasizing network interface demonstrations in favor of real-time network interface technologies and slip ICEX demonstration of system by at least one year.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Efforts in this element are coordinated by the Under Secretary of Defense for Research and Engineering, Assistant Secretary of the Navy (Research, Engineering, and Systems), the Chief of Naval Operations (CNO) Joint Service Project Offices, and informal liaison among program managers of the Office of Naval Technology, Army Material Command, Defense Advanced Research Projects Agency, and Air Force Systems Command. Program Element 0602234N, (Systems Support Technology), provides the computer device and human factors technology base from which the program draws. Program Element 0602111N, (AAW and ASUW Technology), provides sensor information needed to update data bases. The miniature ring laser gyro development is conducted jointly with the Air Force under a cooperative memorandum of agreement. Work in this program element contains no unnecessary duplication within the Navy or the Department of Defense.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/91 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0602233N Budget Activity: 1
Program Element Title: Mission Support Technology
Project Number: N.A. Project Title: 1-Technology Base

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

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Mission Support Technology	28,058	31,140	31,781	33,398	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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; improve fuel procurement specifications; and advance 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 1988 Accomplishments:
   - o Completed development of simulation techniques for training Inverse Synthetic Aperture Radar (ISAR) target recognition skills.
   - o Completed bone marrow stem cell isolation techniques for use in bone marrow transplantation.
   - o Completed evaluation of concepts which will enable Roll-on/Roll-off (RO/RO) ships to off-load in Sea State 3.
   - o Successfully demonstrated prototype model for automated fabrication of expendable aircraft fuel tanks.
   - o Developed analytical techniques for direct measurement of metallic toxic wastes in sea-water.
   - o Established feasibility of adding starch to plastic packaging to improve their biodegradability when disposed of at sea.
   - o Initiated investigation to identify emerging chemical threat agents.
   - o Developed impregnants for activated carbon to enhance protection.
2. (U) FY 1989 Program:
   - o Complete development of measures which predict officer leadership abilities, for use in selecting Naval Academy midshipmen.
   - o Complete evaluation of artificial intelligence applications to a maintenance training course for the SH-3H helicopter.
   - o Initiate evaluation of Rh-positive to Rh-negative converted blood cells as final step in the development of universal blood.
   - o Start post-trauma immunological modulation/enhancement program.
   - o Evaluate effectiveness of large samples of conductive concrete

Program Element: 0602233N Budget Activity: 1
Program Element Title: Mission Support Technology
Project Number: N.A. Project Title: 1-Technology Base

to provide shielding against high electromagnetic pulse.
- o Develop design rules for when spare items should be subject to screen and burn-in requirements before procurement.
- o Identify operating parameters of liquid-phase sensor systems for detecting leaks in underground storage tanks.
- o Evaluate detoxification/biodecontamination processes on JP-5 and petroleum hydrocarbons in different soil matrices.
- o Complete development of a small, economical interior shipboard Chemical Warfare Agent (CW) detector.
- o Complete assessment of the performance of gas filters at high relative humidity.

3. (U) FY 1990 Plans:
   - o Complete evaluation of techniques for training and evaluating the performance of Naval combat teams.
   - o Improve calibration techniques for computer-administered test items used to select and assign applicants for military service.
   - o Initiate Chemical Hazards program to assess and document risks of occupational exposures to hazardous chemicals.
   - o Complete the evaluation of the efficacy of drug therapy during hypothermia to minimize myocardial irritability.
   - o Complete evaluation and transition to advanced development a prototype large diameter tensioned hose fueling-at-sea system which will provide a 30 percent cost reduction over current systems.
   - o Complete the development of microchip tags for the management, tracking and control of in-transit items of supply to provide improved productivity and better responsiveness to Fleet requirements.
   - o Develop control technology for minimizing nitrogen oxide formation in exhaust emissions in jet engine test cells.
   - o Complete evaluation of alternative materials for rendering plastics degradable without impacting on the specialized packaging requirements of the plastic material.
   - o Determine response of chemiresistor coatings to test vapors.
   - o Develop prototype multi-element optical waveguide sensor.
4. (U) FY 1991 Plans:
   - o Complete development of acoustic simulation technology for training under-ice navigation, target acquisition and weapon delivery.
   - o Complete evaluation of prototype intelligent training system which improves the allocation of functions between human and computer.
   - o Complete all computer assisted diagnostic programs for use in submarine environment.
   - o Initiate field evaluation of mission-specific performance enhancement interventions developed for the naval special warfare community.
   - o Complete bearing/gear analyzer instrumentation for helicopter transmissions and transition to Advanced Development for full scale operational demonstration.
   - o Complete development of a propellant embedded anchor for an advanced cargo transfer facility for use in transfer of con-

Program Element: 0602233N Budget Activity: 1
Program Element Title: Mission Support Technology
Project Number: N.A. Project Title: 1-Technology Base

tainers and equipment from commercial cargo ships to shore sites.
- o Complete evaluation of wind-driven aerosol penetration of Navy protective garments.

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

D. (U) WORK PERFORMED BY: In-House: Naval Air Propulsion Center, Trenton, NJ; Naval Coastal Systems Center, Panama City, FL; Naval Training Systems Center, Orlando FL; Navy Personnel Research and Development Center, San Diego, CA; Naval Medical Research and Development Command Laboratories, Bethesda, MD; Naval Air Development Center, Warminster, PA; David Taylor Research Center, Bethesda, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Surface Warfare Center, Dahlgren, VA; Naval Research Laboratory, Washington, D.C.; Naval Ocean Systems Center, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-3,688

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Reduction of -3,688 will force schedule slippage of advanced training systems using Artificial Intelligence techniques and novel simulation methods. Program will not be able to fully address countermeasures to new threats in the CBR environment.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Efforts are in consonance with progress in other services and are coordinated through informal exchanges of information as well as formal technical Advisory Groups, Working Groups, Committees, Joint Memoranda of Understanding and/or Joint Service Agreements.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Systems Support Technology	57,596	60,819	63,593	66,647	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 technology. 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 1988 Accomplishments:
   - o Rapidly solidified glass-metallic cable demonstrated to
   - o Initiated Navy program to provide metal matrix, ceramic matrix and organic matrix composites for application to the Integrated High Performance Turbine Engine Technology (IHPTET) Program for high performance aircraft.
   - o Three bay, eleven foot section of a space satellite tetrahedral truss assembled and tested using metal matrix composite tubes and end-fillings.
   - o Demonstrated a three dimensional radio-frequency cold test computer code for designing Travelling Wave Tubes. Automated design can save millions of dollars on future design efforts.
   - o Transitioned a multiple chip package technology to the tri-service MIMIC (Microwave Millimeter Wave Integrated Circuits) program including approaches to modelling transmission line characteristics of the package.
   - o Initiated development of testbed for the evaluation of new computer architectures for use in Navy systems.
   - o Completed work on the S-1 Computer Project.
   - o Completed shipboard evaluation of intelligent decision aiding technology with emphasis on weapons allocation for air strike planning.
2. (U) FY 1989 Program:
   - o Transition high productivity welding consumables to Fleet use in High Strength Low Alloy (HSLA) steel applications.
   - o Accelerate development and implementation of OSPREY spray forming process.

Program Element: 0602234N Budget Activity: 1
Program Element Title: Systems Support Technology
Project Number: N.A. Project Title: N.A.

- o Transfer the Modulation-doped Field Effect Transistor low noise amplifier to the tri-service MIMIC program.
- o Evaluate and demonstrate advanced computer architectures and their application to Navy Systems.
- o Demonstrate an integrated Software Engineering Environment capability using Ada language system facilities.
- o Complete laboratory evaluation of a decision support system to assist antisubmarine warfare tacticians in integrating information from multiple sources.

3. (U) FY 1990 Plans:
   - o Complete development and evaluation of 700°F Aluminum alloy for IHPTET rotating components.
   - o Complete development of welding consumables for HSLA 100 and HY 130 steels.
   - o Develop sensing and control system to automate OSPREY spray forming process.
   - o Demonstrate all lower cost ($30K vs $60K) staggered ladder Travelling Wave Tube for use in the Navy EHF (44GHz) satellite communications system (savings, including replacement tubes are estimated at $100K/year/installation).
   - o Demonstrate integration of software tools into a functional software engineering environment.
   - o Complete development of supervisory control techniques for underwater vehicles and manipulators, with application to the ARGO-JASON deep ocean research system.
   - o Complete development of prototype decision aid to assist submarine approach officers to develop an accurate understanding of the current three-dimensional ASW tactical situation.
4. (U) FY 1991 Plans:
   - o Transition HSLA 100 and HY 130 welding consumables to industry and shipyards.
   - o Integrate sensing and control system with OSPREY process to fabricate complex shapes.
   - o Demonstrate a significantly reduced
   - o Fully demonstrate application of Artifical Intelligence technologies to Inverse Synthetic Aperture Radar target classification and Fault Diagnosis issues.
   - o Demonstrate a complete, transportable, fully functional software engineering environment.
   - o Complete evaluation of heads-up display formats to prevent loss of situational awareness (spatial disorientation) in fighter and attack pilots.
   - o Complete development and demonstration of advanced concepts for user-computer interfaces for shipboard combat direction systems.
5. (U) Program to Completion: This is a continuing program.

Program Element: 0602234N Budget Activity: 1
Program Element Title: Systems Support Technology
Project Number: N.A. Project Title: N.A.

D. (U) WORK PERFORMED BY: IN-HOUSE - Naval Civil Engineering Lab, Port Hueneme, CA; David Taylor Research Center, Bethesda, MD; Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; Naval Ocean Systems Center, San Diego, CA; Naval Research Lab, Washington, DC; Naval Surface Warfare Center, Dahlgren, VA; Naval Weapons Center, 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; Raytheon, Waltham, MA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-17,244

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The reduction of -17,244 will result in various delays including brassboard demonstration for second generation Infrared Focal Plane Arrays and thermal management design technology based on metal matrix composites. Major initiative on sub-micron silicon technology to replace VHSIC and dual band IRFPA technology development will be cancelled.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: This program coordinates with the PE 0602111N (AAW/ASUW Technology) and 0603270N (Electronic Warfare Technology) to provide needed experimental sensor devices, power sources, and special processing chips. The materials efforts are coordinated with PE 0602121N (Surface Ship Technology), 0602122N (Aircraft Technology) and 0602323N (Submarine Technology) and provide an array of new structural materials to satisfy new mission requirements. Computer Technology is coordinated with PE 0602232N (Command, Control and Communications Technology), 0602111N, 0603270N and 0602314N (ASW Technology). A significant cooperative effort is being jointly pursued with PE 0603792N (Advanced Technology Transition) to develop Ultra-Low Loss Fiber Optic cables for Anti-Submarine Warfare applications.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands): This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.
J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ASW Technology	86,055	100,592	95,986	101,911	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
In this element, technologies are developed for detection, tracking, localization, classification, destruction and/or neutralization of undersea targets. The Soviets have made a concerted effort to reduce the effectiveness of U.S. Navy weapons and sensors. This has resulted in a target submarine which is deeper diving, faster, and quieter, making it more difficult to

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

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. Weapon guidance and control developments emphasize

torpedo quieting programs emphasize

Countermeasures against attacking enemy torpedoes include devices to

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Surveillance:

1. (U) FY 1988 Accomplishments:
   - o Completed the
   - o Completed acoustic array tests on the
   - o Began procurement of
   - o Demonstrated achievement of acoustic self-noise goals.
   - o Demonstrated design performance of the tightly buffered fiber-optic tow cable for ARGO/JASON.

Program Element: 0602314N Budget Activity: 1
Program Element Title: Anti-submarine Warfare Technology
Project Number: N.A. Project Title: N.A.

- o Initiated design of
2. (U) FY 1989 Program:
   - o Conduct
   - o Complete the ACSAS program with data analysis and reports.
   - o
   - o
   - o Complete Exploratory Development of ARGO/JASON.
   - o Begin fabrication of
3. (U) FY 1990 Plans:
   - o Conduct
   - o
   - o Demonstrate computer-aided sonar preclassification screen.
4. (U) FY 1991 Plans:
   - o
   - o Conduct engineering shake-down tests at sea.
5. (U) Program to Completion: This is a continuing program.

(U) Torpedoes and Warheads:

1. (U) FY 1988 Accomplishments:
   - o Transitioned Advanced Stored Chemical Energy Propulsion System.
   - o Began development of technologies.
   - o Transitioned the advanced
   - o Completed demonstration to confirm warhead lethality.
   - o Developed models to evaluate damage potential for new warheads.
   - o Completed transition of warhead.
2. (U) FY 1989 Program:
   - o Complete transition of motor and battery technology.
   - o Begin design and fabrication of power plant.
   - o Assemble test vehicle hardware to support torpedo
   - o Investigate drag reduction effects
   - o Initiate concepts for torpedos,
   - o Conduct in-water testing of fuze concepts.
   - o Complete preparations for phase II test warhead.
   - o Analyze submarine internal damage from shock test data.
   - o Transition explosive to advanced development.
   - o Solicit, evaluate and select new technologies, and award contracts for advanced torpedo technology.
3. (U) FY 1990 Plans:
   - o Transition signal processing technology.
   - o Propulsion improvements to be transitioned to MK 50 P^{3}I program.
   - o Conduct large scale tests of H_2O_2 propulsion battery.
   - o Begin range test of technologies.
   - o Select fuze concept and fabricate hardware.
   - o Conduct phase II tests.

Program Element: 0602314N Budget Activity: 1
Program Element Title: Anti-submarine Warfare Technology
Project Number: N.A. Project Title: N.A.

- o Transition [ ] technology.

4. (U) FY 1991 Plans:
   - o Transition [ ] weapon to Advanced Development.
   - o Begin [ ] power plant development testing.
   - o Complete fabrication of [ ] power plant.
   - o Complete testing [ ] techniques.
   - o Complete testing of [ ] weapon placement.
   - o Complete analytical damage rule development.
   - o Demonstrate computer modelling of [ ] head.
5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-6,900

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The -6,900 reduction will significantly reduce in-water testing of the [ ] warhead, and delay development of [ ] as well as delaying development of submarine self-defense technologies. Congressional addition of 10,000 for advanced torpedo technology in FY 1989, is unfunded for FY 1990 and the outyears.

F. (U) PROGRAM DOCUMENTATION: Not applicable.
G. (U) RELATED ACTIVITIES: Program Element 0602435N, Ocean and Atmospheric Support Technology provides environmental acoustics and oceanographic support. Coordination is maintained with Program Element 0101224N SSBN Security Program in active surveillance. Liaison is maintained with the Defense Advanced Research Projects Agency in surveillance arrays, fiber optics, signal processing techniques, batteries, propulsion concepts and warheads.
H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands): This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.
J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Mine/Special Warfare	14,832	15,370	16,556	17,439	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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. Increased performance must be attained through technology advances rather than increases in size or quantity because of delivery platform constraints. Current technology emphasis is being placed on sensors, mine delivery and advanced minefield concepts.

(U) MCM Technology. The Soviets have the world's largest stockpile of mines and Soviet mine technology is directed toward

Emphasis is on the detection

In addition, work is directed towards improving mine influence sweep capabilities and

(U) Special Warfare Technology. Naval Special Warfare missions are primarily clandestine or covert 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 miniaturized firing devices and efficient and reliable methods for attachment of demolition ordnance to targets under adverse and often clandestine combat conditions.

DECLASSIFY ON: OADR

Program Element: 0602315N Budget Activity: 1
Program Element Title: Mines and Special Warfare
Project Number: N.A. Project Title: N.A.

(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

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Mine Warfare:

1. (U) FY 1988 Accomplishments:
   - o Began laboratory testing of target localization system for mine application.
   - o Sea tested sensor for Advanced Sea Mine.
   - o Conducted mine sensors tests.
   - o Measured sea bottom clutter for detection system.
2. (U) FY 1989 Program:
   - o Laboratory test
   - o Complete model tests and analyses of
   - o Complete
   - o Transition buried mine detection system to 6.3A.
   - o Complete development of mine burial prediction techniques.
3. (U) FY 1990 Plans:
   - o Complete feasibility study of expert system minefield planner.
   - o Confirm principle.
   - o Transition sea bottom classifier system.
   - o Develop improved
   - o Document viability of low cost side scan sonar concept.
4. (U) FY 1991 Plans:
   - o Demonstrate full-scale
   - o Transition
   - o Characterize,
   - o Demonstrate mine classification sonar.
5. (U) Program to Completion: This is a continuing program.

(U) Special Warfare/Explosive Ordnance Disposal

1. (U) FY 1988 Accomplishments:
   - o Transition Propulsor concept to Advanced SEAL Delivery System.
   - o Tested candidate
   - o Demonstrated concept.
   - o Demonstrated
   - o
2. (U) FY 1989 Program:
   - o Develop sonar prototype for SEAL Delivery Vehicle (SDV) use.

Program Element: 0602315N Budget Activity: 1
Program Element Title: Mines and Special Warfare
Project Number: N.A. Project Title: N.A.

- o Demonstrate a field portable, system.
- o Transition

3. (U) FY 1990 Plans:
   - o Demonstrate advanced.
   - o Transition field-portable technology.
   - o Demonstrate viable reconnaissance through
4. (U) FY 1991 Plans:
   - o Determine feasibility of hollow fiber membranes for CO^2 extraction in underwater breathing equipment.
   - o Demonstrate for SEAL use.
   - o Transition
   - o Complete demonstration of
5. (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 Ocean Research and Development Activity, 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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: (Dollars in Thousands) Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Program Element No. 0602314N (ASW TECHNOLOGY) addresses acoustic target detection, batteries, explosives, warheads and torpedo technology; Program Element No. 0602435N (OCEAN & ATMOSPHERIC SUPPORT TECHNOLOGY) provides environmental data relevant to ASW mines and mine hunting sonars; and Defense Advanced Research Projects Agency (DARPA) works jointly on batteries, propulsion and warheads. Program Element No. 0602233N (MISSION SUPPORT) covers biomedical considerations related to the training and operational environments of Naval Special Warfare personnel.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Submarine Technology	13,443	14,503	15,334	16,169	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:

- o Developed hull toughness evaluation method resulting in cost savings projected to be more than $800M over the next 30 years.
- o Identified concept.
- o Lightweight, efficient, low cost structural concepts.
- o
- o Completed advanced submarine shaft seal.
- o
- o
- o
- o
- o Assessed illustrative concepts
- o
- o Advanced techniques to reduce weight of pressure hull.

2. (U) FY 1989 Program:

- o

Program Element: 0602323N Budget Activity: 1
Program Element Title: Submarine Technology
Project Number: N.A. Project Title: N.A.

- o
- o Assess low cost illustrative submarine concept.
- o
- o Complete
- o
- o Quantify stability
- o Initiate Propulsor concept.
- o Initiate work on high temperature resilient mounts.
- o
- o Develop add-on damping of machinery structures.
- o Continue advanced electrical machinery development.
- o Complete evaluation of propulsion concept.

3. (U) FY 1990 Plans:
   - o Develop hydrophone.
   - o Complete evaluation of quarter scale model
   - o
   - o
   - o
   - o
   - o Develop advanced hull structure configurations
   - o
   - o Experimental evaluation of quarter-scale hulls
   - o Complete model tests of
   - o
   - o Transition shaft seal to Program Element No. 0603561N, (Submarine (Advanced)).

4. (U) FY 1991 Plans:
   - o Transition.
   - o
   - o
   - o
   - o Model tests of initial
   - o
   - o Develop advanced centrifugal high pressure air compressor.

Program Element: 0602323N Budget Activity: 1
Program Element Title: Submarine Technology
Project Number: N.A. Project Title: N.A.

- o
- o Measure shock response of
- o Assess high weapons load submarine concept.

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-3,540

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable
2. (U) SCHEDULE CHANGES: Not Applicable
3. (U) COST CHANGES: The -3,540 reduction will significantly lengthen the time to develop highly promising innovative concepts on

and Advanced Hull Concepts.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: This program is being coordinated with the DARPA Advanced Submarine Program. These programs are complementary and do not duplicate effort. There are related activities at General Dynamics, Electric Boat, Lockheed and other corporations with IR&D programs. Work in this element has provided foundation and made significant contributions to:

- o Program Element 0101228N, (TRIDENT Program)
- o Program Element 0603561N, (Submarine (Advanced))
- o Program Element 0604561N, (Submarine (Engineering))
- o Program Element 0603569N, (Attack Submarine Development)

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Nuclear Propulsion Technology	40,663	44,423	14,036	14,353	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 has evaluated Nuclear Propulsion Technology and determined that the majority of work will have become sufficiently mature to progress to the 6.3 category in FY 1990.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 ACCOMPLISHMENTS:

- o Tested and analyzed developmental plant materials. Materials with potential for reactor plant applications were subjected to a wide variety of analyses, including mechanical property, irradiation and fatigue testing.
- o Investigated microprocessor and graphic display technology for possible use in plant instrumentation and control systems.
- o Explored improved thermal and fluid transfer technologies to increase longevity and efficiency of plant components.
- o Investigated structural design and acoustic analysis methods to aid in developing more resilient plants.
- o Developed and qualified new nuclear design methods to enhance plant component and systems capabilities.
- o Developed new technologies and investigated the processes needed to make these new technologies available for fleet applications.

Program Element: 0602324N Budget Activity: 1
Program Element Title: Nuclear Propulsion Technology
Project Number: N.A. Project Title: N.A

2. (U) FY 1989 Program:

- o Continue reactor materials development to provide insight into [ ] cladding, [ ] and structural material properties. Long and short term tests and analyses of existing and new materials are conducted to ensure their optimal use.
- o Develop graphic display and electrical distribution technology and adapt advanced microprocessor technology to enhance the reliability and safety of plants.
- o Develop and understand the technology necessary for improved thermal transfer equipment with reduced corrosion rates.
- o Continue 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.
- o Develop physics and computational methods to improve advanced plant component and systems capabilities.
- o Develop the [ ] processes to permit application of advanced [ ] and [ ] technologies.

3. (U) FY 1990 Plans:

- o 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 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;
  - Examining reactor plant materials to ensure continued plant safety, verify designs and incorporate relevant data into new materials development.

4. (U) FY 1991 Plans:

- o Continue development, testing and analyses of reactor and structural materials and evaluate results of long and short term tests in search of [ ] applications for existing and developmental materials.

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

Program Element: 0602324N Budget Activity: 1
Program Element Title: Nuclear Propulsion Technology
Project Number: N.A. Project Title: N.A.

D. (U) WORK PERFORMED BY: 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.

E. (U) COMPARISON WITH AMENDED FY 1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-39,915

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: By FY 1990, developmental nuclear propulsion plant technology work such as ongoing thermal hydraulics, physics, electronics, manufacturing processes and acoustics efforts will reach the point where they are most properly categorized as 6.3 efforts. These efforts will be continued in Program Element 0603570N and the -39,915 reflects this change. Reactor materials work will remain in the Nuclear Propulsion Technology Program Element in FY 1990 and beyond.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: This project is a part of the Naval Nuclear Propulsion Program's integrated research and development effort which is funded by both the Departments of Defense and Energy. No duplication of effort occurs.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Ocean and Atmospheric Support Technology	26,432	28,854	29,458	30,897	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments:
   - o
   - o Completed vertical aerosol model validation.
   - o Revised models relating to synoptic weather patterns, satellite images and radio propagation conditions.
2. (U) FY 1989 Program:
   - o Begin sensitivity analysis of electro-optic system performance.
   - o Develop 94 GHz world-wide propagation statistics.
3. (U) FY 1990 Plans:
   - o Complete sensitivity analysis of electro-optical system performance, including sensitivity to data input.
   - o Revise propagation models to include air-sea coupling.
4. (U) FY 1991 Plans:
   - o Validate propagation models based on coupled air-sea modeling.
   - o Perform study of benefits gained by using statistical models.
5. (U) Program to Completion: This is a continuing program.

(U) ASW Oceanographic Support Technology

1. (U) FY 1988 Accomplishments:
   - o

Program Element: 0602435N Budget Activity: 1
Program Element Title: Ocean and Atmospheric Support Technology
Project Number: N.A. Project Title: N.A.

o

o

2. (U) FY 1989 Program:
   - o Develop state of the art instrumentation for ocean research at Woods Hole Oceanographic Institution (WHOI).
   - o Summarize
   - o Conduct reverberation measurements
   - o

3. (U) FY 1990 Plans:
   - o

4. (U) FY 1991 Plans:
   - o
   - o

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

(U) Multi-Mission Applied Ocean and Atmospheric Support:

1. (U) FY 1988 Accomplishments:
   - o Demonstrated prototype concepts of environmental command and control products for the Advanced Combat Display System.
   - o Developed improved techniques to incorporate remotely sensed environmental data into prediction models.
   - o Initiated Instrument and Calibration Facility improvements at WHOI.
2. (U) FY 1989 Program:
   - o Initiate prototype, next generation, integrated model for ocean and atmospheric forecasting.
   - o Prepare assimilated data bases for prediction model evaluation.
   - o Complete the modernization of Instrument and Calibration Facility at WHOI.

Program Element: 0602435N Budget Activity: 1
Program Element Title: Ocean and Atmospheric Support Technology
Project Number: N.A. Project Title: N.A.

3. (U) FY 1990 Plans:
   - o Perform sensitivity tests for data needs of ocean prediction models.
4. (U) FY 1991 Plans:
   - o Determine efficient blend of remote and in situ data needed to drive the ocean prediction models.
   - o Specify the next generation data needs for anticipated coupled air-sea model.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: - David Taylor Research Center, Bethesda, MD; Naval Air Development Center, Warminster, PA; Naval Environmental Prediction Research Facility, Monterey, CA; Naval Observatory, Washington, DC; Naval Ocean Research and Development Activity, Stennis Space Center, MS; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC; Naval Underwater Systems Center, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Meteorological RDT&E is coordinated with other service efforts by the Under Secretary of Defense (Acquisition). The oceanographic program supports efforts in ASW underwater acoustics, including sensor and weapon design, acoustic communication, ocean modeling and ocean remote sensing. Programs are pursued jointly with Program Elements 0602314N, (ASW Technology); 0603785N, (Long-Range Propagation); 0603207N, (Environmental Applications); and 0603704N, (Oceanographic Instrumentation Development). Polar research programs are coordinated through 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: (Dollars in Thousands): 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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
IED	14,696	15,788	16,407	17,289	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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. 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 ten 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 doctorate graduates in relevant research areas at Navy Centers and Laboratories.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Laboratory Independent Exploratory Development (IED)

1. (U) FY 1988 Accomplishments:
   - o A 3-D obstacle avoidance algorithm was developed by the Naval Coastal Systems Center that safely guides an autonomous underwater vehicle through an unknown minefield.
   - o A computer model of a variable geometry diffuser was developed by the David Taylor Research Center that accurately predicts centrifugal compressor performance and stall.
2. (U) FY 1989 Program:
   - o The FY 1989 Program, currently being executed, is based upon 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 at the end of FY 1989.
3. (U) FY 1990 Plans:
   - o The FY 1990 Program will be planned during FY 1989 based upon review of the FY 1989 accomplishments and proposed projects.

Program Element: 0602936N Budget Activity: 1
Project Element Title: Independent Exploratory Development
Project Number: N.A. Project Title: N.A.

4. (U) FY 1991 Plans:
   - o The FY 1991 Program will be planned during FY 1990 based upon review of the FY 1990 accomplishments and proposed projects.
5. (U) Program To Completion: This is a continuing program.

(U) Navy Scientific Assistance Program (NSAP)

1. (U) FY 1988 Accomplishments:
   - o Operational guidance for conducting surface and airborne mine countermeasures operations in the Persian Gulf was provided by scientific advisors from the Naval Coastal Systems Center.
   - o A technique which permits a towed array sonar operator to exploit the directional properties of the ambient noise field was developed by the Naval Coastal Systems Center, significantly enhancing the sonar's ASW capability.
   - o A simple, non-mechanical, low-cost microclimate cooling system was demonstrated by the Naval Clothing and Textile Research Facility in Persian Gulf operations. The system reduces heat stress and increases stay times in hot shipboard areas.
2. (U) FY 1989 Program:
   - o Navy R&D Center scientific advisors currently assigned to units in the Atlantic, Pacific, and Mediterranean Commands are identifying high priority fleet problems and working with the R&D Centers to provide solutions.
3. (U) FY 1990 Plans:
   - o The FY 1990 Program will be planned based on review of FY 1989 accomplishments and proposed projects.
4. (U) FY 1991 Plans:
   - o The FY 1991 Program will be planned based on review of FY 1990 accomplishments and proposed projects.
5. (U) Program to Completion: This is a continuing program.

(U) ONT Postdoctoral Fellowship Program

1. (U) FY 1988 Accomplishments:
   - o Selected and appointed thirty-six first-year Fellows for assignment to Navy R&D Centers and Laboratories while another twenty-four were reappointed for second and third years.
2. (U) FY 1989 Program:
   - o Select and appoint approximately forty first-year Fellows for assignment to Navy R&D Centers and Laboratories while another thirty will have been re-appointed by end FY 1989.
3. (U) FY 1990 Plans:
   - o The FY 1990 Program will be based upon quarterly review and selection of potential new post-doctorate candidates to the nationally disseminated American Society for Engineering Education program announcement circulars.
4. (U) FY 1991 Plans: This is a continuing program.
5. (U) Program to Completion: 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.

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; CONTRACTOR: American Society for Engineering Education.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	-3,252

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: While the NSAP and ONT Postdoctoral fellowship programs will be maintained at the current level of effort, the -3,252 reduction will result in a substantially reduced level of effort in the Navy R&D Centers' funding for innovative concepts under the discretionary portion of the Independent Exploratory Development program.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: The program provides the Navy R&D Center Technical Directors with the opportunity to support promising new technology concepts having potential Navy application in a manner akin to the basic research opportunities provided by the Laboratory Independent Research program (Program Element 0601152N). Some efforts, initially sponsored by this program, that illustrate the process of transition hand-offs to related Navy programs are shown below:

- o Conformal submarine periscope antenna development received a U.S. patent, and currently is in Operations Evaluation (OPEVAL) for use in a SATCOM Type 18 antenna. (Naval Underwater Systems Center).
- o Feasibility of a closed-loop degaussing system for Mine Countermeasure ships has been proven. Future development will continue as part of the Surface Ship Technology program. Program Element 0602121N. (Naval Surface Warfare Center).
- o An optical correlator for high-speed acoustic signal processing has transferred to the Anti-Submarine Warfare Technology program, Program Element 0602314N. (Naval Air Development Center).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands): This is a non-acquisition program.
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.
J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603210N Budget Activity: 2
Program Element Title: AIRCRAFT PROPULSION

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W2014	Integrated High Perf. Turbine Eng. Tech.(IHPTET)	5,476	6,111	8,359	9,954	Demo.Engine 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 with the engine industry. Navy participation ensures IHPTET advanced technology payoffs meet Navy needs. IHPTET Demonstrator Engines will fall into 3 classes: (1) fighter/attack demonstrator; (2) turboprop/turboshaft demonstrator, and (3) missile and expendable engine classes.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Conducted GE23A low-pressure turbine and core testing.
   b. (U) Began medium sized Joint Turboshaft Advanced Gas Generator (JTAGG) effort.
   c. (U) Contracted for PW699 and GE33 turbofan demo engines.
2. (U) FY 1989 Program:
   a. (U) Fabricate and assemble GE33 and PW699 engines and complete fan testing.
   b. (U) Complete GE23A dry engine demonstration.
   c. (U) Complete performance baseline for small expendable engine.
3. (U) FY 1990 Plans:
   a. (U) Conduct GE23A afterburner test.
   b. (U) Complete GE33 and PW699 build 1 and start test.
   c. (U) Award JTAGG GEN 5 engine contracts.
4. (U) FY 1991 Plans:
   a. (U) Complete GE33 and PW699 build 1 test and initiate build 2.
   b. (U) Start GEN 6 Fighter/Attack engine effort.
   c. (U) Complete JTAGG Final Design and intiate core testing.
   d. (U) Start small expendable engine.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAPC, Trenton, NJ; NADC, Warminster, PA; and David Taylor Research Center, 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603217N Budget Activity: 2
Program Element Title: Advanced Aircraft Subsystem
Project Number: W0446 Project Title: Advanced Avionics Subsystems and Technology

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Adv Avionics Subsystems and Technology	7,301	12,469	9,286	5,893	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Advanced Avionic Technology Demonstration (AATD) Program includes advanced subsystem development for surveillance sensors, high speed optical data buses, advanced avionics packaging, advanced avionics architecture, advanced mission planning, Navy evaluation of advanced subsystems developed by the Army/Air Force or industry, and Navy participation in tri-Service/ Industry common avionics coordination meetings. The primary goals are to provide improved surveillance, detection and classification of threats and targets, develop and demonstrate advanced avionics systems, architecture concepts, and insert emerging technologies such as VHSIC, MIMIC, Infrared Focal Plane Array (IRFPA), etc. for future Navy aircraft. These projects will increase the commonality of avionics across tri-Service platforms while simultaneously providing Naval Aviation with lighter weight, more reliable platforms with improved mission/weapon system effectiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed the fabrication and testing of a fiber optic ring bus chip set.

b. (U) Continued Joint Integrated Avionics Working Group (JIAWG) coordination and specification efforts.

c. (U) Initiated the design and demonstration of airborne shared aperture sensor subsystem concepts based on MIMIC technology.

d. (U) Continued the development and demonstration of standard backplane concepts, modular high density connectors, and optical connectors.

e. (U) Initiated sensor correlation/mission planning development for in-flight mission planning updates compatible with the Navy's standard Tactical Air Mission Planning System (TAMPS).

f. (U) Evaluated the Integrated Terrain Access and Retrieval System (ITARS) displays developed for the Air Force for application to Navy mission planning and display systems.

g. (U) Initiated high speed sensor bus development.

h. (U) Completed the demonstration of MIL-STD-1773 multispeed bus hardware.

2. (U) FY 1989 Program:

a. (U) Demonstrate standard optical backplane concept.

b. (U)

c. (U) Complete the specification for the Common Avionics Baseline architecture in accordance with JIAWG plans and schedule.

d. (U) Complete the evaluation of the VHSIC Communications Processor (VCP) developed under VHSIC insertion funding.

e. (U) Continue development and evaluation of advanced mission planning systems including a developmental road map leading to an in-flight real-time update capability.

f. (U) Complete passive fiber optic high speed (100Mbit) linear data bus demonstration.

3. (U) FY 1990 Plans:

a. (U) Initiate the design and demonstration of a standard optical backplane architecture.

b. (U) [redacted]

c. (U) Continue JIAWG coordination and specification efforts to achieve common P^{3}I development for ATA, ATF and LHX.

d. (U) Investigate VHSIC Phase II advanced signal and data processor development applications to naval aircraft.

e. (U) Continue the development and demonstration of MIMIC wideband module affordability demonstrations under MIMIC program funding.

f. (U) Begin specification of advanced image processing engine for aircraft imaging architectures, capable of exploiting new image processing technologies.

4. (U) FY 1991 Plans:

a. (U) Continue design and demonstration of a standard optical backplane architecture.

b. (U) [redacted]

c. (U) Continue MIMIC affordability demonstration for advanced radar and EW systems with shared MIMIC program funding.

d. (U) Complete specifications for image processing engine development. Begin assessment and validation of parallel processing technologies and examine alternative technologies and architectural approaches.

5. (U) Program to Completion:

a. (U) Continue active array/shared aperture subsystem development.

b. (U) Complete bench and flight test of image processing engine utilizing parallel architecture. Demonstrate feasibility of retrofit and forward fit.

c. (U) Complete the laboratory demonstration of high speed optical data bus and integrated avionics architecture for advanced tactical aircraft and support aircraft. Conduct flight test of advanced avionics technology.

d. (U) Demonstrate solid state active array/shared aperture sensor system.

e. (U) Demonstrate on-board sensor correlation and mission planning capability for tactical aircraft survivability. Integrate with TAMPS.

f. (U) Continue JIAWG "common avionics" efforts with the Air Force and Army.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603217N Budget Activity: 2
Program Element Title: Advanced Aircraft Subsystem
Project Number: W0446 Project Title: Advanced Avionics Subsystems and Technology

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN. CONTRACTORS: TRW, Inc., San Diego, CA; General Electric Co., Utica, NY; Sanders, Nashua, NH; Hughes Aircraft Co., El Segundo, CA; Draper Laboratory, Cambridge, MA; Texas Instruments Co., Dallas, TX; Westinghouse, Baltimore, MD; Raytheon Company, Bedford, MA; UNISYS, Minneapolis, MN.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	See below	None	-35,837

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: As a result of the -35,837 reduction, the Advanced Shared Aperture Project (ASAP) prototyping and testing plans have been canceled.

F. (U) PROGRAM DOCUMENTATION: Non-Acquisition Program Definition Document (NAPDD) 083-50. MIMIC Acquisition Plan DOD-87X.

G. (U) RELATED ACTIVITIES: P.E. 0604203N, (Standard Avionics Development); P.E. 0603452F, (Very High Speed Integrated Circuit); P.E. 0603706D, (MIMIC) P.E. 0603109N, (Integrated Avionic Systems); P.E. 0603109F, (Pave Pillar/Pave Pace).

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
This is a non-acquisition program.					

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: N.A.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603270N Budget Activity: 2
Program Element Title: Electronic Warfare Technology
Project Number: R2030 Project Title: EW Technology

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

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
EW Technology	12,252	12,082	12,830	12,881	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITY: This program addresses the required technologies of electronic warfare (EW) cooperatively with the other Services; but uniquely, addresses the required war-at-sea EW technologies. 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 [redacted]. The growing sophistication, redundancy and diversity of these hostile weapons systems have forced renewed interest in countering the threat during the [redacted] phases of the engagements rather than the [redacted] phase as current point defense systems do. In order to meet the emerging electromagnetic threats and to apply new technologies to our projected [redacted] aircraft and ships, and in order to counter the evolving [redacted] hostile platforms with [redacted] radars, the Navy, jointly coordinated with the other Services, has restructured our program. The program now investigates new technologies for [redacted] 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 [redacted] countermeasures and off-board [redacted] expendables to defeat dual-mode, RF and infrared, anti-ship and anti-aircraft missiles. Hostile [redacted] targeting devices, [redacted] rangefinders, designators and [redacted] embedded as weapons are addressed. Other technological investigations include countermeasures for our [redacted]

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Major, immediate impact on U.S. naval operations in the Persian Gulf using modeling and simulation tools and specific materials /hardware planned for urgent operational application.

b. (U) Determined tri-service program for a common module [redacted]

c. (U) Commenced work on a [redacted] airborne expendable decoy.

d. (U) Developed low cost [redacted] expendable decoy for ships.

e. (U) Transitioned [redacted] to a 6.3A program.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0063270N Budget Activity: 2
Program Element Title: Electronic Warfare Technology
Project Number: R2030 Project Title: EW Technology

f. (U) Transitioned [ ] Electronic Countermeasures (ECM) to a 6.3A Advanced Technology Demonstration project (under PE0603792N).

g. (U) Completed unique [ ] missile countermeasures test facility.

2. (U) FY 1989 Program:

a. (U) Complete work on joint AF/NAVY [ ] decoy.

b. (U) Transition [ ] techniques to a 6.3A program.

c. (U) Commence work on aircraft exploitation as part of a tri-service effort.

d. (U) Test [ ] decoy design.

e. (U) Complete risk based expert system C^2 integrated decision aid.

f. (U) Complete work and brassboard [ ] warning receiver.

3. (U) FY 1990 Plans:

a. (U) Complete tailored noise false target deception device.

b. (U) Transition [ ] receiver technology to ship and airborne platforms.

c. (U) Complete work on channelized receiver for [ ] applications.

d. (U) Complete [ ] development as a monopulse countermeasure.

e. (U) Complete [ ] IR countermeasure.

4. (U) FY 1991 Plans:

a. (U) Complete Improved Capability (ICAP) II ECM investigation.

b. (U) Complete Digital Data Link countermeasure development.

c. (U) Transition [ ] warning receiver.

d. (U) Complete and transition [ ] countermeasure.

e. (U) Transition [ ] device.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL; Washington, DC; NAVAIRDEVCET, Warminster, PA; COMPACMISTESTCEN, Point Mugu, CA; NAVSWC White Oak, MD; NAVWPNSUPPCEN Crane, IN. NAVWPNCEN, 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0063270N Budget Activity: 2
Program Element Title: Electronic Warfare Technology
Project Number: R2030 Project Title: EW Technology

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY :

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See below	None	-3,362

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: Cancellation of [ ]Countermeasures, [ ]Decoy Countermeasures, and [ ]technology efforts. Reduce manhours developing [ ]Countermeasures by one-half.

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. Program guidance is located in the FY1989-1993 Electronic Warfare Mission Area Strategy and the CNO Tech Base Guidance. Program specifics are included in the Navy Exploratory Development Program Block Plan.

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 MOU's.

H. (U) OTHER APPROPRIATED FUNDS: (Dollars in Thousands): None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603303N Budget Activity: 2
Program Element Title: ELECTROMAGNETIC RADIATION SOURCE ELIMINATION

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0447	ERASE	4,559	6,006	7,014	9,542	Cont.	Cont.
W1720	SIDEARM	1,150	0	0	0	0	0
TOTAL		5,709	6,006	7,014	9,542	Cont.	Cont.

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 1988 Accomplishments:
   a. (U) Conducted Advanced ARM Seeker anechoic testing.
   b. (U) Completed integration of wideband passive Anti-Radiation Homing (ARH)/semiactive BIMODE breadboard seeker.
   c. (U) Performed integration of experimental C^3 sensor system.
   d. (U) Initiated development of Targeting Avionics Sensor (TAS) System.
   e. (U) Completed SIDEARM OPEVAL.
2. (U) FY 1989 Program:
   a. (U) Complete brassboard BIMODE seeker development.
   b. (U) Develop improved VHF antenna.
   c. (U) Initiate multimode seeker design.
3. (U) FY 1990 Plans:
   a. (U)
   b. (U) Conduct Targeting Avionics flight test.
4. (U) FY 1991 Plans:
   a. (U) Develop brassboard prototype advanced receiver.
   b. (U) Initiate development of neural network processor.
   c. (U)
5. (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.

E. (U) RELATED ACTIVITIES: P.E. 0604360N, 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: Not Applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603508N Budget Activity: 2
Program Element Title: SHIP PROPULSION SYSTEM

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0379	Gas Turbine Propulsion System	6,068	9,563	10,882	16,502	Cont.	Cont.
S1848	Gas Turbine CIP	2,503	5,155	3,241	2,422	Cont.	Cont.
TOTAL		8,571	14,718	14,123	18,924	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The primary objectives of this program are to: (1) develop new, high efficiency, marine gas turbine engines, transmission, propulsors and related systems for surface combatants; (2) provide component improvements for operational marine gas turbines and related systems.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603508N Budget Activity: 2
Program Element Title: SHIP PROPULSION SYSTEM
Project Number: S0379 Project Title: GAS TURBINE PROPULSION SYSTEM

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Gas Turbine Propulsion System	6,068	9,563	10,882	16,502	Cont.	Cont.

B. (U) PROJECT DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project develops an advanced propulsion system and components to reduce manning, maintenance, fuel consumption, and ship vulnerability, while increasing reliability, ship availability and performance for gas turbine powered surface ships.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed preliminary design of Intercooled Recuperative (ICR) engine.

b. (U) Completed factory accceptance testing of Integrated Electronic Controls (IEC); delivered first shipset to shipyard Land Based Engineering Facility.

c. (U) Continued development of degraded fuel combustion systems for large and small gas turbines.

d. (U) Initiated preliminary design definition of compact transmission system.

2. (U) FY 1989 Program:

a. (U) Award contract for design and construction of demonstration compact transmission system.

b. (U) Initiate planning for installation of compact transmission system into NAVSSES Electric Drive Land Based Test Site.

c. (U) Award ICR engine Risk Reduction contracts.

d. (U) Initiate ICR engine Advanced Technology Demonstration.

e. (U) Initiate testing of degraded fuel combustion system for large and small gas turbine.

f. (U) Initiate transition of composite shafting from exploratory development to advanced technology demonstration.

g. (U) Initiate preliminary design definition of propulsion derived ship service power.

h. (U) Initiate prelimary design definition of an advanced ship service generator drive engine.

i. (U) Initiate conceptual design of compact side exhaust system for gas turbine engines.

Program Element: 0603508N Budget Activity: 2
Program Element Title: SHIP PROPULSION SYSTEM
Project Number: S0379 Project Title: GAS TURBINE PROPULSION SYSTEM

3. (U) FY 1990 Plans:

a. (U) Continue execution of ICR advanced technology demonstration engine.
b. (U) Continue manufacture of compact transmission for advanced technology demonstration.
c. (U) Continue planning for land based testing of the compact transmission system.
d. (U) Continue planning for land-based testing of the ICR engine.
e. (U) Continue testing of degraded fuel combustion system for large and small gas turbine.
f. (U) Continue transition of composite shafting from exploratory development to advanced technology demonstration.
g. (U) Continue preliminary design definition of advanced ship service generator drive engine.

4. (U) FY 1991 Plans:

a. (U) Continue execution of ICR advanced technology demonstration engine.
b. (U) Continue manufacture of compact transmission for advanced technology demonstration.
c. (U) Continue planning for land-based testing of the ICR engine.
d. (U) Continue planning for land-based testing of compact transmission system.
e. (U) Continue testing of degraded fuel combustion system for large and small gas turbines.
f. (U) Continue transition of composite shafting from exploratory development to advanced technology demonstration.
g. (U) Continue preliminary design definition of advanced ship service generator drive engine.

5. (U) Program to completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: David Taylor Research Center, Bethesda, MD; Naval Ship Engineering Station, Philadelphia, PA; Naval Research Laboratory, Washington, DC; CONTRACTORS: Allison Division of General Motors, Indianapolis, IN; General Electric, Cincinnati, OH, Daytona Beach, FL, and Lynn, MA; Garrett Turbine Engine Company, Phoenix, AZ and Torrance, CA; Westinghouse Electric, Pittsburgh, PA; Solar Turbines International and General Atomic, San Diego, CA; Rolls Royce Inc., Coventry, England.

Program Element: 0603508N Budget Activity: 2
Program Element Title: SHIP PROPULSION SYSTEM
Project Number: S0379 Project Title: GAS TURBINE PROPULSION SYSTEM

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	Completion delayed	-17,873

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: The reduction of -17,873 will delay completion of ATD to FY 95.

F. (U) PROGRAM DOCUMENTATION: Program Definition Document
CNO LTR SER 03/7U386701 Dated 11 Sept 87

G. (U) RELATED ACTIVITIES:
a. Program Element 0602121N (Surface Ship Technology);
b. Program Element 0604710N (Navy Energy Program (Engineering));
c. Program Element 0601153N (Defense Research Sciences);
d. Program Element 0603573N (Electric Drive);
e. Program Element 0604567N (Ship Development (Engineering)).

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

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

J. (U) MILESTONE SCHEDULE:
- o Contract for demonstration ICR engine 2Q FY90
- o Complete demonstration ICR engine FY 95
- o Initiate FSD of ICR 1Q FY 96
- o Complete FSD of ICR 1Q FY 99

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603508N Budget Activity: 2
Program Element Title: SHIP PROPULSION SYSTEM
Project Number: S1848 Project Title: GAS TURBINE COMPONENT IMP PROGRAM

C. (U) PROJECT DESCRIPTION: This project develops components for Navy Surface Ship Gas Turbines to improve the maintenance and durability of gas turbines installed for main propulsion and ship service power.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed verification of depot build-up of vibration improvements to LM2500 and transition to OPN purchase of special tooling and insurance of revised depot build-up procedures.

2. (U) FY 1989 Program:

a. (U) Award AVCO-Lycoming TF-40B component improvement contract.

b. (U) Complete new fuel nozzle design.

3. (U) FY 1990 Plans:

a. (U) Begin testing of LM2500 main fuel control modification.

b. (U) Complete testing of new LM2500 vane segments.

c. (U) Start development of improved LM2500 enclosure noise, temperature reduction. Develop propulsion engine controller using standard Navy electronic hardware, development of TF-40B combustor improvements, develop improved TF-40B fuel metering and overtemperature control systems. Develop TF-40B performance monitoring system, 501-K17 compressor and hot section improvement development efforts.

4. (U) FY 1991 Plans:

a. (U) Begin testing of low cost cast LM2500 vane segments, construction of improved LM2500 acoustical enclosure, LM2500 low power design improvements, and TF-40B combustor, turbine and control system improvements.

b. (U) Complete testing of LM2500 fuel controller modifications.

5. (U) Program to completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Engineering Station, Philadelphia, PA; CONTRACTORS: Allison Division of General Motors, Indianapolis, IN; General Electric, Cincinnati, OH, and Daytona Beach, FL.

F. (U) RELATED ACTIVITIES: Not Applicable.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
OPN #011					
GA 009	4,725	3,502	4,012	3,464	Cont.
GA 013	0	0	417	0	Cont.
GA 014	0	0	143	148	Cont.
OPN #012					
GF 007	1,428	2,545	3,813	3,008	Cont.
OPN #013					
GB 001	466	642	0	0	Cont.
GB 002	360	212	0	0	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Electric Propulsion	5,988	13,934	11,998	11,802	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The program develops and operationally evaluates electric propulsion systems for Navy ships with propulsion power requirements in the range of 25,000 to 50,000 horsepower per shaft. Initial developments are directed toward electric propulsion systems for near-term operational evaluation and approval for production. Development preference in the initial system demonstration is for those electric propulsion machinery designs which are considered low development risks for near-term at-sea evaluation and which are amenable to future upgrade with higher-performance, and more advanced design components. Advanced design electric drive system component and technology developments will support upgrade of near term electric propulsion systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Program:
   a. (U) Continued overall layout design for Navy land-based test site (LBTS) installation of twin-shaft system.
2. (U) FY 1989 Program:
   a. (U) Award contract for design and manufacture of integrated, twin shaft 50,000 horsepower electric drive system.
   b. (U) Continue supporting technology developments and LBTS design.
3. (U) FY 1990 Plans:
   a. (U) Complete preliminary design review of components of the lead system and order remainder of long lead material to meet schedule requirements.
   b. (U) Continue supporting technology developments and LBTS design.
4. (U) FY 1991 Plans:
   a. (U) Complete critical design review of the lead system.
   b. (U) Continue supporting technology development and LBTS design.
5. (U) Program to Completion:
   a. (U) Complete land based test with twin shaft components, and integrated propulsion derived ship service power.
   b. (U) Complete at sea test of system in FY 1998.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Systems Engineering Station, Philadelphia, PA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Weapons Support Center, Crane, IN; and Supervisor of Shipbuilding, Conversion and Repair, San Francisco, CA. CONTRACTORS: AiResearch Manufacturing Company, Torrance, CA; General

Program Element: 0603573N Budget Activity: 2
Program Element Title: ELECTRIC DRIVE
Project Number: S1314 Project Title: Electric Propulsion System

Electric Company, Lynn, MA, and Schenectady, NY; Westinghouse Electric Company, Pittsburgh, PA and Sunnyvale, CA; and Gibbs & Cox, Incorporated, New York, NY.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	Completion delayed	-3,828

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The reduction of -3,828 will delay completion of ATD to FY 95.

F. (U) PROGRAM DOCUMENTATION:

a. (U) Program Requirements Document - 8 December 1987.
b. (U) Acquisition Plan #SEA 408-85 (latest modification approval 13 November 1986).

G. (U) RELATED ACTIVITIES:

a. (U) P.E. 0603508N (Ship Propulsion System (Advanced)).
b. (U) P.E. 0603513N (Shipboard Systems Component Development).
c. (U) P.E. 0604567N (Ship Development Engineering).
d. (U) P.E. 0602121N (Ships, Submarines and Boats Technology).
e. (U) P.E. 0601153N (Defense Research Science).

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

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

J. (U) MILESTONE SCHEDULE:

a. (U) Lead system contract 1Q FY 89.
b. (U) Propulsion Derived Ship Service Power contract 2Q FY 92.
c. (U) System Test begin 2Q FY 93.
d. (U) Twin Shaft Test begin 4Q FY 94.
d. (U) Propulsion Derived Ship Service Power contract 2Q FY 92.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603701N Budget Activity: 2
Program Element Title: Human Factors Engineering Development

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
WO542	Air Human Factors Eng.	872	842	879	972	Cont.	Cont.
R1771	Ship Human Factors Eng.	1,665	1,594	1,662	1,804	Cont.	Cont.
	TOTAL	2,537	2,436	2,541	2,776	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-acquisitiion 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 systems design.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603701N Budget Activity: 2
Program Element Title: Human Factors Engineering Development
Project Number: WO542 Project Title: Air Human Factors Engineering

C. (U) PROJECT DESCRIPTION: This project seeks to improve the effectiveness of Naval aviation systems by developing operator decision aids for increasingly complex air missions, and by providing improved aviation design methodologies that allow earlier, affordable identification of program design changes needed to enhance operator effectiveness.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Continued development of real-time decision aid for Airborne Early Warning (AEW) aircraft crews.
b. (U) Complete interactive prototype AEW aid.
c. (U) Further develop rapid-prototype tool for use with dynamic/ interactive display evaluations.
d. (U) Begin air combat optimum launch display development.

2. (U) FY 1989 Program:
a. (U) Begin field testing of real-time decision aid for AEW, and initiate ASW real-time project.
b. (U) Use rapid-prototype tool in aircraft development/evaluation.
c. (U) Continue development of air combat optimum launch displays.

3. (U) FY 1990 Plans:
a. (U) Complete field test of real-time decision aid.
b. (U) Transition AEW specifications to E-2C program.
c. (U) Continue ASW real-time project.
d. (U) Continue development of optimum launch displays.

4. (U) FY 1991 Plans:
a. (U) Begin flight tests of air combat optimum launch displays.
b. (U) Complete demonstration module of ASW real-time decision aid.

5. (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 Air Test Center, Patuxent River, MD.

F. (U) RELATED ACTIVITIES: All new aviation platforms, weapons, and sensors rely upon human engineering to achieve maxium potential.

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

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

FY 1990/1991 BIENNIAL 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. Thrusts include (1) tactical information management and decision-making, (2) battle force information management, (3) multisensor integration and data display, (4) combat system design, and (5) electronic display of maintenance data.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY-1988 Accomplishments:

Developed specifications for combat system general-purpose console. Evaluated data combat displays for submarine tactical approach officer. Fielded a classified prototype data base that integrates data across mission areas. Integrated data on Required Operational Functions, command and systems functions, and networks of warfare systems.

2. (U) FY 1989 Program:

Develop data format specifications for combat system consoles. Identify formats that improve performance. Load ASW data into warfare data base. Use submarine display and simulation facility to identify optimal display formats.

3. (U) FY 1990 Plans:

Test displays for submarine approach officer. Complete ASW phase of warfare system performance data base. Assess commonality of combat system operator tasks across warfare areas.

4. (U) FY 1991 Plans:

Complete interactive workstation for submarine approach officer. Start development of operability enhancements in software form for sonar mode and control selection, weapon presets, and engagement preview.

5. (U) Program to completion: This is a continuing program.

E. (U) WORKED PERFORMED BY: In-house: Naval Ocean Systems Center, San Diego, CA. Contractor: Anacapa Sciences, Santa Barbara, CA.

F. (U) RELATED ACTIVITIES: PE 0602234N, Training and Human Factors Technology.

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

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0095	Fleet Health Technology	11,448	12,898	13,668	14,921	Cont.	Cont.
M0096	Fleet Health Standards	5,398	5,575	4,368	4,097	Cont.	Cont.
M2022	Bone Marrow Registry	2,055	2,482*	0	0	*	*
Total		18,946	20,955	18,036	19,018	Cont.	Cont.

* Program transferring to Department of Health and Human Services

B. (U) BRIEF DESCRIPTION OF ELEMENT:

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0095	Fleet Health Technology	11,448	12,898	13,668	14,921	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments
   a. (U) evaluated the circulation of red blood cells that have been frozen and washed by the diafiltration system
   b. (U) deployed frozen blood bank systems aboard additional LHA, LDH and hospital ships
   c. (U) continued prototype development of a system capable of thawing frozen red blood cells with reduced chance of contamination
   d. (U) began preclinical trials of a pourable collagen-based wound dressing
   e. (U) evaluated new methods to prevent and treat septic shock
   f. (U) continued evaluation of recombinant growth factors and blood-forming cells in animal models of bone marrow damage
   g. (U) continued development of a radiofrequency device to rewarm casualties
   h. (U) completed sea trials and initiated hospital trials of abdominal and chest pain modules of computer-assisted diagnosis package
   i. (U) studied the effect of sub-pathologic exposures to LASER irradiation on human performance of a visual search task in a simulated cockpit environment
   j. (U) demonstrated efficacy of computerized dental diagnosis system
   k. (U) began development of database to monitor the incidence of Disease and Non-Battle Injuries

2. (U) FY 1989 Program:
   a. (U) evaluate stroma-free hemoglobin and the liposome-encapsulated hemoglobin for suitability as blood substitutes
   b. (U) obtain FDA licensure for human platelets frozen for up to 2 years
   c. (U) evaluate whether prostaglandins are able to prevent shock lung syndrome
   d. (U) begin development of sutureless vascular anastomosis
   e. (U) begin assessment of a pourable, field-usable, hemostatic wound dressing
   f. (U) begin study of wound treatment with theater implantable antibiotic beads
   g. (U) begin studies on the effect of freezing and thawing on the shelf life of medical pharmaceuticals and other materiel
   h. (U) complete advanced development of a radiofrequency device to rewarm casualties
   i. (U) begin studies to define casualty rates and medical logistic requirements to treat casualties
   j. (U) begin development of cold acclimatization protocols
   k. (U) begin development of prototype rapid dental diagnosis kit

3. (U) FY 1990 Planned 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

4. (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 FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	VARIOUS	-1,382

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NONE
2. (U) SCHEDULE CHANGES: NONE
3. (U) COST CHANGES: The FY 1990 reduction will result in a delay in the initiation of clinical trials of stem cell growth factors, and a delay in the development of improved devices for thawing and washing frozen blood cells.

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 complimentary 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 AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE:

1. Transition of field diagnostic imaging system to 6.4	October 1989
2. Transition of electromagnetic radiation device for rewarming hypothermic casualties to 6.4	October 1990
3. Transition of device for thawing frozen blood products to 6.4	October 1991
4. Begin advanced development of diafiltration cell washing device	October 1991

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments: Began the toxicological assessment of Navy-unique chemicals/applications; began studies on the effects of sustained operations, cold weather, and ship motion on human performance in operational settings and assess countermeasures; demonstrated cognitive test battery could predict 40 percent of students that will fail primary flight training and began testing of bubble technology to monitor the Specific Absorption Rate(SAR) of RF energy and neutrons in the work space.

2. (U) FY 1989 Program: Complete an evaluation of pharmacologic intervention during sustained flight operations; begin to develop operational models for predicting human performance in varied missions, job-tasks, and environments; begin 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.

3. (U) FY 1990 Plans: 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.

4. (U) FY 1991 Plans: Complete testing bubble technology for measuring SAR of RF 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.

5. (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 1990/1991 BIENNIAL 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) PROJECT 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 1988 ACCOMPLISHMENTS:
   (U) o unrelated transplants were performed utilizing donors identified by the registry
   (U) o increased the numbers of donors in the registry
   (U) o identified the factors that increase the likelihood of a successful transplantation from an unrelated donor

2. (U) FY 1989 Program:
   (U) o The management of the national bone marrow registry is transitioning to the Department of Health and Human Services in FY 1989. Management of the current contracts is being transferred to Health and Human Services, along with the appropriated funds to support the registry.

3. (U) FY 1990 Plans: 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 has decided to assume the management and support of the bone marrow donor registry during FY 1989 and in future years.

G. (U) OTHER APPROPRIATION FUNDS: Not Applicable

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603707N Budget Activity: 2
Program Element Title: Manpower and Personnel Systems
Project Number: R1770 Project Title: Manpower and Personnel Systems
A. (U) RESOURCES: (Dollars in Thousands)

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Manpower and Personnel Systems	3,019	3,205	4,113	4,133	Cont.	Cont.

B. (B) BRIEF DESCRIPTION OF ELEMENT: This program responds to Congressional and DoD guidance to improve the use of Navy manpower and personnel resources through advanced technology. It applies mathematical optimization, computer technology, and manpower/personnel forecasting and measurement techniques to the design and development of systems to improve personnel selection and assignment, and to better project and manage personnel inventories.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Validated enlisted selection standards for communications jobs. Tested optimal assignment procedures for 38 ratings. Developed officer PCS move forecasting methods.

2. (U) FY 1989 Program: Test optimal assignment procedures for minimizing enroute training. Test improved techniques for forecasting PCS moves. Validate enlisted selection standards for electronics jobs.

3. (U) FY 1990 Plans: Conduct implementation test of PCS forecasting system. Evaluate optimal assignment system for 90% of enlisted force. Validate enlisted selection standards for electrical jobs.

4. (U) FY 1991 Plans: Expand testing of performance measurements to all enlisted job families. Test PCS expenditure control system.

5. (U) Progam to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NPRDC, San Diego, CA. Contractors: Systems Exploration Inc., San Diego, CA; B-K Dynamics, Rockville, MD; SYSCON Inc., Washington, DC; and Resource Consultants Inc., Washington, DC.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603712N Budget Activity: 2
Program Element Title: Logistics R&D Technology Demonstration

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
T1816	Standard Hardware Acquisition and Reliability Program (SHARP)	4,925	9,585	8,281	9,504	Cont.	Cont.
T1884	Rapid Acquisition of Manufactured Parts (RAMP)	20,100	10,411	8,434	0	0	59,991
T1910	Integrated Diagnostics Support System (IDSS)	2,983	5,593	4,260	4,258	Cont.	Cont.
Total		28,008	25,589	20,975	13,762	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This is a coordinated program to apply advanced technology to logistics needs and problems in order to:

1. (U) Design weapon systems and their support to eliminate requirements for large logistics tails.

2. (U) Reduce the high cost of maintaining weapon systems and improve readiness.

3. (U) Assist program managers with technology to design, deliver, and support weapon systems within shortened development cycles.

4. (U) Develop innovative logistics support systems for contingency operations.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603712N Budget Activity: 2
Program Element Title: Logistic Research and Development Tech Demo
Project Number: T1816 Project Title: Standard Hardware Acquisition and Reliability Program (SHARP)

C. (U) PROJECT DESCRIPTION: Development of advanced standard, multi-system electronic hardware of proven quality and reliability for new systems and modifications. Aid VHSIC insertion into electronic systems and develop avionic/shipboard standard enclosures. SHARP standardizes future electronic modules, power supplies and enclosures to decrease cost and increase fleet readiness and operational availability.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (a) Initiated development of 23 new Standard Electronic Modules; (b) investigated module manufacturing/ repairability issues (i.e. substrates); (c) developed 3 power supplies; (d) selected 2 standard shipboard electronics enclosures; (e) initiated VHSIC-compatible power supplies; (f) investigated use of advanced materials for SHARP hardware (frames, enclosures).

2. (U) FY 1989 Program: (a) Develop 51 new electronic modules; (b) develop 2 standard shipboard enclosures; (c) develop 2 power supplies for VHSIC application; (d) complete format SEM E development. Apply to programs such as A-12 and EMSP.

3. (U) FY 1990 Plans: (a) Develop advanced avionics enclosure; (b) perform power distribution studies; (c) initiate 51 new Standard Electronics Modules and two standard power supply units; (e) conduct module testability reviews.

4. (U) FY 1991 Plans: (a) Initiate 52 new Standard Electronic Modules (SEM); (b) test/evaluate critical fiberoptic components; (c) test/evaluate new lightweight materials for frames, containers, and enclosures.

5. (U) Program to Completion: (a) Complete development of all current technology modules, power supplies, and enclosures; (b) develop a computer-aided design, engineering, and testing tool for standard VHSIC modules. This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NAVOCEANSYSCEN, San Diego; NAVAVIONICCEN, Indianapolis; and NAVPWNSUPPCEN, Crane, IN. Contractor: (Numerous small contracts).

F. (U) RELATED ACTIVITIES: None.

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: 0603712N Budget Activity: 2
Program Element Title: Logistics R&D Tech Demo
Project Number: T1884 Project Title: Rapid Acquisition of Manufactured Parts (RAMP)

C. (U) PROJECT DESCRIPTION: This project provides advanced computer integrated manufacturing technology to reduce cost and production lead time in manufacturing small batches of parts not available from commercial sources. It involves the adaptation of emerging technology to production of parts on demand and integration into the Navy logistics system.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (a) Completed Computer Integrated Manufacturing (CIM) software/hardware design; (b) began detailed source coding and integration of CIM data base and interface software; (c) began procurement of long lead-time equipment for Small Mechanical Part (SMP) and Printed Wiring Assembly (PWA) workcells in RAMP Test integration Facility (RTIF).

2. (U) FY 1989 Program: (a) Install SMP and PWA workcells within the RTIF; (b) initiate a joint effort with the Air Force under Logistics Systems Technology (PE 0603106F) to demonstrate and validate RAMP technology; (c) complete coding of SMP CIM integration software; (d) demonstrate production of SMP spare parts in RTIF; (e) conduct test readiness review for SMP workcell.

3. (U) FY 1990 Plans: (a) Complete PWA equipment installation and conduct readiness review test; (b) complete software coding/integration and conduct detailed coding testing for PWA workcell; (c) conduct PWA workcell/RTIF installation readiness review and formal RTIF acceptance tests.

4. (U) FY 1991 Plans: Program transitions to procurement.

5. (U) Program to Completion: Not applicable.

E. (U) WORK PERFORMED BY: In-House: National Bureau of Standards (NBS), Germantown, MD; NOSC, San Diego, CA; NWSC Crane, In; NOSC Louisville, KY; NAC, Indianapolis, In. Contractor: South Carolina Research Authority (SCRA), Charleston, SC.

F. (U) RELATED ACTIVITIES: None.

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: 0603712N Budget Activity: 2
Program Element Title: Integrated Diagnostic Support System (IDSS)
Project Number: T1910 Project Title: Integrated Diagnostic Support System (IDSS)

C. (U) PROJECT DESCRIPTION: Develop, integrate and demonstrate software tools with Computer Aided Design (CAD) and Logistic Support Analysis (LSA) interface capability for optimizing weapon system testability design. Such capability will reduce high false removal rates, improve efficiency of organizational level maintenance, and reduce the cost of developing diagnostic programs.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (a) Completed programming and integration of Weapon System Testability Analyzer (WSTA) software modules; (b) continued programming of Adaptive Diagnostic Subsystem (ADS) software tool; (c) began development of Adaptive Diagnostic Authoring (ADA) tool.

2. (U) FY 1989 Program: (a) Demonstrate WSTA on two weapon systems; (b) complete programming of ADS and conduct demonstrations; (c) begin requirements analysis of Feedback Analyser (FA) tool for compiling historical failure data from all IDSS fielded systems; (d) conduct trade studies of DoD and commercial Technical Information and Training Authoring (TIATA) systems to determine most compatible candidate for incorporation into IDSS System.

3. (U) FY 1990 Plans: (a) Complete development, integration and acceptance testing of all IDSS software tools; (b) begin demonstration of IDSS on a weapon system Unit Under Test (UUT).

4. (U) FY 1991 Plans: (a) Complete demonstration of IDSS; (b) begin development/revision of military standards, design guides, and specifications to incorporate integrated diagnostics ideas and applications.

5. (U) Program to Completion: (a) Demonstrate IDSS on a mechanical system UUT; (b) complete development of military standards, design guides, and specifications; (c) ensure full institutionalization of IDSS in the weapon system design process. This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NSWC Dahlgren; NAEC, Lakehurst, NJ. Contractor: Harris Corp.

F. (U) RELATED ACTIVITIES: PE 0603106F (Log Sys Tech); PE 0604708F(GIMADS); PE 0603001A (AIDME).

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: 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Education and Training	5,053	5,332	6,374	6,806	Cont	Cont

B. (U) BRIEF DESCRIPTION OF PROGRAM: This program responds to Congressional and DoD directives to improve training and meet critical Navy requirements by exploiting advanced technology. It applies automation and expert systems to the development, revision, updating, delivery, and management of Navy training. Key technology areas include artificial intelligence, expert systems, job performance training aids, automated performance testing, and advanced training and evaluation technologies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Field-tested a computer training system for intelligence officers and a troubleshooting maintenance trainer and performance evaluator. Field-tested an expert training materials development system and battle simulation trainer/performance evaluator. Began Navy and USMC operational tests of instructorless drill-and-practice computer-based system for threat analysis training.

2. (U) FY 1989 Program: Apply curriculum/delivery technologies to counter low entry skills for initial technical training.

3. (U) FY 1990 Plans: Extend training materials development system to logistics information. Implement advanced microcomputer training systems at fleet and reserve sites. Test techniques to counter low entry skills.

4. (U) FY 1991 Plans: Apply artificial intelligence to logistics training materials development. Apply new technologies to performance testing, tying training more closely to new job requirements. Implement forecasting tools for training resource management.

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

D. (U) WORK PERFORMED BY: In-House: NPRDC, San Diego, CA. Contractor: Instructional Science and Design, San Diego, CA.

E. (U) RELATED ACTIVITIES: Program Elements 0602722A, Manpower, Personnel and Training; 0603743A, Education and Training; 0601153N, Defense Research Sciences; 0602131N, Marine Corps Air-Ground Technology; 0602233N, Mission Support Technology; 0604703N, Manpower, Personnel, Training, Simulation, and Human Factors.

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: 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0073	Human Resources	2,134	3,092	4,078	3,522	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1988 Accomplishments: Completed test development and data collection for Joint Job Performance Measurement (JJPM) of the infantry MOS (General Technical composite).

2. (U) FY 1989 Program: Complete the Officer Assignment Decision Support System (OADSS) and begin new phase of JJPM.

3. (U) FY 1990 Plans: Two new programs are initiated: Joint Human Resource Studies (JHRS) to identify system vulnerability and PREPAS II to plan for incorporation of new technologies into manpower systems. Conduct JJPM field testing.

4. (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.

5. (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 and ATAC, Herndon, VA.

E. (U) RELATED ACTIVITIES: This program relates to all armed services' human resources management and forecasting; providing Marine Corps-unique requirements and participation 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 1990/1991 BIENNIAL 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 and Training Devices

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

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Simulation and Training Devices	7,894	6,405	5,687	5,436	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program demonstrates proof-of-concept, risk reduction, and cost effectiveness in simulators and training technology. It links exploratory development in simulation, training devices and human factors; and first-article training device procurement in aviation, surface and subsurface systems. Technical areas include visual, motion, sensor, weapons fire, and maintenance simulation; and software techniques for simulation, instructional systems methods, part-task training, and artificial intelligence. (Training Performance Data Center funding transferred to OSD PE 0604722S in FY 1990.)

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: Designed helmet-mounted display for the F/A-18 training system. Developed performance and interface specifications for battle force combat systems integration test training systems.
2. (U) FY 1989 Program: Develop specifications for F/A-18 deployable hands-on throttle stick trainer. Develop embedded radar training.
3. (U) FY 1990 Plans Develop battle force test and training system. Develop specifications for helicopter rotor dynamics simulation.
4. (U) FY 1991 Plans: Develop multispectral radar simulation trainer applications, and specifications for carrier-based training systems.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: NTSC, Orlando, FL. Contractors: Singer/Link, Binghamton, NY and Silver Spring, 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.

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: 0603739N Budget Activity: 2
Program Element Title: Navy Logistics Productivity

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
T1885	Quality Improvement	570	969	1,186	1,095	Cont	Cont
T1886	New Technology	380	485	259	463	Cont	Cont
Total		950	1,454	1,445	1,558	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: The purpose of this program is to improve the quality and productivity of Navy industrial activities such as shipyards, Naval Aviation Depots and other shore-based maintenance activities. This effort will be accomplished through evaluating, designing, and implementing a wide range of industrial management techniques employed by successful private-sector manufacturing companies or developed in private and government laboratories. These technologies/techniques include state-of-the-art manufacturing, process-oriented quality control, enriching and redesigning jobs, maximizing utilization of new technology, improved organization and individual measurement systems, revised organization structures that promote improved communication and participation among all levels, and development of improved information management and decision support systems. This program is also designed to satisfy a Congressional mandate for a feasibility study concerning the establishment of technology transfer centers to support Navy logistics productivity improvements. The study examines the concept of joint Industry/Academia/Government participation to investigate problems and determine technology solutions.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603739N Budget Activity: 2
Program Element Title: Navy Logistic Productivity
Project Number: T1885 Project Title: Quality Improvement

C. U) PROJECT DESCRIPTION: The purpose of this project is to design, develop, test, and evaluate new management and process control techniques for improving the quality and productivity at Navy maintenance and repair activities. The effort includes: an examination of the organizational, psychological and technical factors associated with new management and statistical process control techniques in a Navy maintenance and support environment; determining the most effective combination of organization, technical and human resource factors contributing to successful implementation of new techniques; and transferring lessons learned to other maintenance and repair activities.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(1) (U) FY 1988 Program: (a) Develop evaluation criteria and measurement system for new management and statistical process control techniques; (b) develop guidelines for implementing new quality and productivity improvements.

(2) (U) FY 1989 Program: (a) Expand application of statistical process control throughout the test site; (b) develop a process-oriented quality audit plan; (c) collect data and provide development analysis; (d) report on progress and modify the implementation approach based on interim evaluation; (e) continue application and evaluation of new techniques at test sites.

(3) (U) FY 1990 Plans: (a) Conduct activity-wide quality audit at demonstration site; (b) evaluate progress in implementing total quality management at demonstration site; (c) continue application and evaluation new techniques at selected sites.

(4) (U) FY 1991 Plans: (a) Monitor expansion to other sites and evaluate results; (b) adjust procedures and guidelines where necessary.

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

E. (U) WORK PERFORMED BY: In-House: NPRDC, San Diego, CA.

F. (U) RELATED ACTIVITIES: None.

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: 0603739N Budget Activity: 2
Program Element Title: Navy Logistics Productivity
Project Number: T1886 Project Title: New Technology

C. (U) PROJECT DESCRIPTION: The purpose of this project is to demonstrate transfer of technology from the research environment to application in DoD industrial facilities. The feasibility study is to identify and apply state-of-the-art technology to critical DoD repair, maintenance and acquisition problems. Organization, human resource and technology factors contributing to effective technology transfer will be identified and tested. At the completion of the feasibility study the Navy will establish a technology transfer process to identify emerging technologies, match technologies to problems and develop an effective implementation and utilization program.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Program: (a) Evaluate university-based technology transfer center concept; (b) complete demonstration of CLIP Probe technology development; (c) evaluate technological solutions; (d) develop University-based Technology Transfer Center (TTC) plan.

2. (U) FY 1989 Program: (a) Introduce the Technology Transfer Center concept in both industry and government workplaces; (b) initiate technology transfer plan; (c) identify technology transfer project evaluation criteria and measures; (d) select and prepare demonstration site(s); (e) collect baseline data and develop full-scale operational utilization model for implementation.

3. (U) FY 1990 Plans: (a) Verify concepts, models, and techniques; (b) establish new technology transfer project; (c) extend CLIP Probe application to compressor and turbine blade inspection and repair; (d) develop guidelines for DoD-wide application of emerging productivity-enhancing technology.

4. (U) FY 1991 Plans: Initiate process for establishing and maintaining technology transfer centers.

5. (U) Program to Completion: Establish TTC concept at other repair and maintenance facilities. This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NAVSUP, Washington, DC. Contractor: University of Michigan, Dearborn, MI.

F. (U) RELATED ACTIVITIES: None.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603747N Budget Activity - 2
Program Element Title: ASW Advanced Technology Demonstration
Project Number: X1933 Project Title: ASW Advanced Technology Demonstration

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1933	Adv ASW Tech	18,815	2,420	4,603	5,021	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Advanced ASW Technology Demonstration proves concepts through at-sea and Arctic field experiments. This project is comprised of [ ] The program provides specifications for engineering developments to field ASW passive and active systems capable of detecting the [

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Completed the on board signal processing and display system for , validated single target classifier using echoes from the AN/SQS-26/53; completed preliminary sensor designs and] for Enhanced Low Cost Sonobuoy (ELCS), Enhanced Tactical Surveillance System (ETSS) and the Fixed Distributed System (FDS); completed efforts in advanced waveforms, improved displays and large aperture receiving arrays. Conducted research and development in support of Broadband Array Processing, efforts.

2. (U) FY 1989 Program: Test and evaluate sensor designs and complete final validation of , for ELCS, ETSS, and FDS.

3. (U) FY 1990 Plans: Continue] task element expanded to include the threat in support of FDS; [

4. (U) FY 1991 Plans: Continue] task element; commence validation.

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

D. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA; NADC, Warminster, PA. Contractors: Hughes Aircraft Co., Fullerton, CA.

E. (U) RELATED ACTIVITIES: PE 0204311N (Undersea Surveillance Systems); PE 0204313N (Surveillance Towed Array Sensor System); PE 0603792N (Advanced Technology Transition).

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

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R1889	Advanced Technology Transition (ATD)	23,294	32,033	45,603	51,396	Cont.	Cont.
X1959	At Sea ASW Critical Experiments	24,816	24,695	16,956	0	0	69,161
TOTAL		48,110	56,728	62,559	51,396	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 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 efforts to reduce uncertainty in the [redacted] system performance and design prior to Navy commitment for system development. The program, through a series of extensive at-sea experiments, resolves critical [redacted] technology issues (i.e., [redacted] 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 today's [redacted] and for the [redacted]

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ATD	23,294	32,033	45,603	51,396	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. Sources of emerging technological opportunities include Navy and other DOD 6.2 efforts, DARPA Advanced Prototyping efforts, and DOE laboratories. 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 92.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - o (U) Advanced Fiber Optics Technology - Ultra low loss coated fluoride fiber drawn; contaminants reduced.
   - o (U) SEA RAY - Developed [ ]
   - o (U) Undersea Weapons Technology - Fabrication of propulsion test vehicle; power plant and components integrated for in-water testing.
   - o (U) All-Optical Towed Array - [ ]
   - o (U) Unified Network Technology - Refined algorithm for multi-network simulation; commenced design of simulation hardware.
   - o (U) Airborne Transient Processor Program -

2. (U) FY-1989 Program
   - o (U) Advanced Fiber Optics Technology - a 10KM test to'
   - o (U) SEA RAY - demonstrate
   - o (U) Undersea weapons Technology -
   - o (U) All Optical Towed Array -
   - o (U) Unified Network Technology - Test multi-network simulator; fabricate anti-jam hardware, and HF/UHF sub-net brassboards.

- o (U) Airborne Transient Processor Program -
- o (U) Ultra-Low-Noise Crossed Amplifier (CFA)
- o (U) Magnetic Acoustic Detection of Mines -
- o (U) Surveillance Infrared Search and Track (IRST) - Integrate the High Altitude Remote Platform Surveillance System (HARPSS) IRST sensor head into a laboratory P-3 aircraft.

3. (U) FY 1990 Plans:
   - o (U) All Optical Towed Array -
   - o (U) Unified Network Technology - test of mixed media multi network at sea.
   - o (U) Airborne Transient Processor Program
   - o (U) Fiber Optic Mk 48 ADCAP -
   - o (U) Unifed Network technology -
   - 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) Real-Time 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) Air/Surface Data fusion. - Demonstrate data transfer/correlation.
   - o (U) Synthetic Red Blood Cells. - Large animal testing; human hemoglobin studies.
   - o (U) Undersea Weapons Guidance and Control -

4. (U) FY 1991 Plans:
   - o (U) Ultra-Low-Noise CFA -
   - o (U) Magnetic Acoustic Detection of Mines. - System integration and at-sea tests.
   - o (U) Surveillance IRST
   - o (U) Real-Time 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) Air/Surface Data Fusion-Prepare for fleet tests.
   - o (U) Synthetic Red Blood Cells-Human hemoglobin production.
   - o (U) Air Weapon/Neural Computer Demonstration
   - o (U) Undersea Weapons Guidance and Control
   - o (U) High Power Microwave Technology - System integration and preliminary testing.

Program Element: 0603792N Budget Activity: 2
Program Element Title: Advanced Technology Transition
Project Number: R1889 Project Title: Advanced Technology Transition

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

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, McDonnel Douglas, Bell Labs, Westinghouse, Honeywell, Advanced Digital Systems, Hughes, AT&T, ITT, Sunstrand, and Applied Research Lab (Penn State University).

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

NON ACQUISITION PROGRAM DEFINITION DOCUMENTS		SUBPROJECT
2/86	#034-095	ULTRA-LOW-LOSS FIBER OPTIC
10/86	#140-05	SEA RAY
10/86	#143-02	UNDERSEA WEPS TECH
10/86	#145-03	ALL OPTICAL TOWED ARRAY
10/86	#141-094	UNIFIED NETWORK TECHNOLOGY

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. Each ATD has a planned transition to a 6.3B or 6.4 program at the completion of the demonstration. In general, FY 1990 transition is planned for FY 1987 ATDs, FY 1991 transition is planned for FY 1988 ATDs, etc.

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

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

J. (U) MILESTONE SCHEDULE:

Transition:	Advanced Fiber Optic Technology	FY90
	SEA RAY	FY90
	Undersea Weapons Technology	FY90
	All-optical Towed Array	FY90
	Unified Network Technology	FY91
	Airborne Transient Processor	FY91
	Fiber Optic MK48 ADCAP	FY91
	Surveillance IRST	FY92
	Magnetic Acoustic Detection of Mines	FY92
	Quiet Weapon Launcher	FY92
	Ultra-Low-Noise CFA	FY92
	Adaptive Monopulse Countermeasures	FY92
	Intelliegnet Welding System	FY93
	Air/Surface Data Fusion	FY93
	Synthetic Red Blood Cells	FY93
	Air Weapon Neural Computer	FY93
	Undersea Weapons G&C	FY93
	High Power Microwave	FY93

FY 1990/1991 BIENNIAL 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

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
CST	24,816	24,695	16,956	0	0	69,161

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Critical Sea Test (CST) Program reduces risk and uncertainty in the system performance and design prior to Navy commitment for system development. The program, through a series of extensive at-sea experiments, resolves critical tech-nology 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 today's and for the threat in the

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

   a. (U) Developed both processor software for research vessel.
   b. (U) Analyzed target strength data on
   c. (U) Continued
   d. (U) Planned and executed sea test.
   e. (U) Planned and executed test.

2. (U) FY 1989 Program:

   a. (U) Complete analysis of sea test.
   b. (U) Complete analysis of data collected in tests.
   c. (U) Plan and execute tests.
   d. (U) Complete model analysis.

3. (U) FY 1990 Plans:

   a. (U) Plan and execute fourth and fifth
   b. (U) Conduct target strength measurements.
   c. (U) Complete data analysis. Approximate completion date 4Q/FY90.
   d. (U) Program concludes in FY90.

Program Element: 0603792N Budget Activity: 2
Program Element Title: Advanced Technology Transition
Project Number: X1959 Project Title: At Sea ASW Critical Experiments

4 (U) FY 1991 Plans: Program concludes in FY90.

5. (U) Program to Completion: N/A.

D. (U) WORK PERFORMED BY: In-House: NRL, Washington, DC; NORDA, Bay St. Louis, LA; NAVOCEANSVCEN, 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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	No change	No change	No change
SCHD	No change	No change	No change
COST	No change	No change	+$2,140

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: The increase of +$2,140 will allow completion of Sea Test #5, as well as analysis of the data from that test.

F. (U) PROGRAM DOCUMENTATION:

NAPDD 10/86

G. (U) RELATED ACTIVITIES: PE 0603747N (Advanced ASW Technology Demonstration) proves concepts through at-sea experiments; PE 0204311N (Integrated Undersea Surveillance System (IUSS) Development) provides

H. (U) OTHER APPROPRIATION DATA: (Dollars in Thousands).
This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
are being jointly conducted with the United Kingdom under

Program Element: 0603792N Budget Activity: 2
Program Element Title: Advanced Technology Transition
Project Number: X1959 Project Title: At Sea ASW Critical Experiments

J. (U) MILESTONE SCHEDULE:

(U)	Conduct test in conjunction with OP-21	FY 88
(U)	Conduct Test	FY 88
(U)	Conduct Tests	FY 89
(U)	Conduct Tests	FY 90
(U)	Complete target strength measurements	FY 90
(U)	Conduct detailed tests	FY 90
(U)		FY 90

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0101221N Budget Activity: 3-Strategic Programs
Program Element Title: Fleet Ballistic Missile Systems

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
J0091	SLRM System Improvement Program	18,504	23,435	30,511	32,415	Cont.	Cont.
S1265	Sub Acoustic Warfare Development	4,533	7,640	18,647	30,699	Cont.	Cont.
Total		23,037	31,075	49,158	63,114	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports developments related to deployed POSEIDON (C3) and TRIDENT I (C4) 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. This program also develops acoustic countermeasure systems for all classes of submarines.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0101221N Budget Activity: 3

Program Element Title: Fleet Ballistic Missile Systems

Project Number: J0091 Project Title: SLBM System Improvement Program

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
SLMB System Improvement Program	18,504	23,435	30,511	32,415	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project currently provides assessments of and supports improvements to POSEIDON (C3) and TRIDENT I (C4) Fleet Ballistic Missile Weapon Systems and has the objective of extending the effectiveness and survivability of these vital strategic weapon systems. Subsequent to deployment in FY 1990, similiar efforts will be included for TRIDENT II (D5). This project includes vulnerability and effectiveness assessments, and integration of the NAVSTAR Global Positioning System capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - ° Continued to identify potential improvements to the Fleet Ballistic Missile Weapon System to decrease potential vulnerabilities and to maintain effectiveness. Efforts included:
     - Determination of the need and extent of countermeasures resulting from the threat of rapidly maturing sensors and related advanced state-of-the-art sensor/signal processing improvments.
     - Evaluation of threat postulations.
     - Investigation of potential system performance improvements.
     - Assessment of survivability implications of subsystem operations and formulation of corrective measures.
     - Investigation of methods for improving navigation subsystem performance that will allow extending the interval between navigation fixes.
   - ° Conducted planning and validation effort for integration of NAVSTAR Global Positioning System (GPS) receiver equipment into the navigation subsystem of the Strategic Weapon System.
2. (U) FY 1989 Program:
   - ° Continuing vulnerability and effectiveness efforts of the FY 1988 program including:
     - 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.
     - Effort increases on the investigation of Missile Guidance System vulnerability to potential boost and post-boost threats.
     - Start of investigations into the critical signature characteristics of the C3 and C4 weapon systems.
   - ° Continuing planning and validation effort for integration of NAVSTAR GPS receiver equipment into the navigation subsystem of the strategic weapon system.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0101221N Budget Activity: 3
Program Element Title: Fleet Ballistic Missile Systems
Project Number: J0091 Project Title: SLBM System Improvement Program

3. (U) FY 1990 Plans:
   - ° Continue vulnerablity and effectiveness efforts which will expand to include TRIDENT II (D5) subsequent to D5 deployment early in the fiscal year including:
     - Effort for determination of the need and extent of counter-measures resulting from the threat of rapidly maturing sensors and related advanced state-of-the-art sensor/signal processing improvements.
     - Evaluation of threat postulations.
     - Investigation of Missile Guidance System vulnerability to potential boost and post-boost threats.
     - Assessment of survivability implications of subsystem operations and formulation of corrective measures.
     - Investigations of potential system improvements.
     - Investigation of methods for reducing submarine observability by increasing the interval between navigation fixes.
     - Investigation of the critical signature characteristics of the C3 and C4 weapon systems.
   - ° Continue planning and validation effort for integration of NAVSTAR GPS receiver equipment into the navigation subsystem.

4. (U) FY 1991 Plans:
   - Continue vulnerability and effectiveness efforts conducted in FY 1990. This is the first year that the by now deployed TRIDENT II (D5) Strategic Weapon System will be fully integrated into the program.
   - ° Continue development effort for integration of NAVSTAR Global Positioning System (GPS) receiver equipment into the navigation subsystem of the strategic weapon system.

5. (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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0101221N Budget Activity: 3
Program Element Title: Fleet Ballistic Missile Systems
Project Number: J0091 Project Title: SLBM System Improvement Program

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	-8,023

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The FY-1990 reduction of -8,023 reduces support for survivability and advanced missile concepts.

F. (U) PROGRAM DOCUMENTATION: Non-Acquisition Program Definition Documents (NAPDD's) promulgated:

- Vulnerability and Effectiveness Program - 4/86
- NAVSTAR GPS Receiver Equipment - 5/86

G. (U) MILESTONE SCHEDULE: Not applicable

H. (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.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program

Procurement justification material does not contain this level of detail.

OPN 1/ #233,234,303
WPN 2/ #1,#2

1/ These funds provide for the procurement of test instrumentation; equipment for maintenance, calibration, handling, data processing and tests at shore facilities; alterations to tactical hardware; overhaul equipment; 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 POSEDION MK-3 reentry body shells to test configuration, and spares and repair parts.

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

J. (U) MILESTONE SCHEDULE: N/A

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0101221N Budget Activity: 3

Program Element Title: Fleet Ballistic Missile Systems

Project Number: S1265 Project Title: Submarine Acoustic Warfare Development

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
SAWS (Project S1265)	4,533	7,640	18,647	30,699	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project develops acoustic countermeasures which extend the effectiveness and improve the survivability of all classes of submarines. Currently this project includes development of an external countermeasures device (six inch) launching system designated the Countermeasure Set, Acoustic (CSA), MK-2; and development of expendable six-inch advanced torpedo and sonar countermeasure devices designated Acoustic Device Countermeasure (ADC) MK-3 (torpedo) and MK-4 (sonar). Out year (FY 89 and beyond) project starts include a New Sonar Intercept System (NSIS) in addition to several new countermeasure devices and a Countermeasure Command and Control Unit (C/M CCU).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - ° CSA MK 2:
     - Completed OPEVAL
     - Obtained NAVSEA ARB approval to proceed to OPNAV Milestone III (AFP) NPDM
   - ° ADC MK 3:
     - Completed OPEVAL
     - Obtained NAVSEA ARB approval to proceed to OPNAV Milestone III (ALP) NPDM
   - ° ADC MK 4:
     - Issued FSED Contract Solicitation
     - Obtained Milestone II (FSED) Approval
     - Awarded competitive FSED Contract
2. (U) FY 1989 Program:
   - ° CSA MK 2
     - Obtain Milestone III approval award production contract
     - Complete SSN 688 Launcher System Design
     - Acquire SSN 688 EDM System and components
   - ° ADC MK 3
     - Obtain Milestone III (ALP) approval
     - Award production contract
   - ° ADC MK 4
     - Complete Preliminary and Critical Design Reviews (P&CDRs) of EDMs
     - Commence Fabrication of EDMs
   - ° New Sonar Intercept System (NSIS):
     - Complete and issue operational requirement (OR).
     - Prepare Program startup documentation and requirements.
     - Begin Advanced Development Model (ADM) specifications.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0101221N Budget Activity: 3
Program Element Title: Fleet Ballistic Missile Systems
Project Number: S1265 Project Title: Submarine Acoustic Warfare Development

3. (U) FY 1990 Plans:
   - ° CSA MK 2
     - Deliver SSN 688 EDM System and Components
     - Complete SSN 756 Installation and Testing
   - ° ADC MK 4
     - Complete EDM Fabrication and Begin Testing
     - Exercise Contract Option for Service Test Models (STMs)
   - ° New Sonar Intercept System (NSIS)
     - Complete specifications and ADM contract procurement package.
   - ° Sonobuoy C/M
     - Complete program start-up documentation and associated rqmts.
     - Commence Design of Advanced Development Models (ADMs)
   - ° Multifunction C/M Devices
     - Complete program start-up documentation and associated rqmts.
     - Commence Design of ADMs.
   - ° C/M Command and Control Unit (C/M CCU)
     - Complete program start-up documentation and associated rqmts.
     - Complete Specification for Advanced Development Model (ADM)

4. (U) FY 1991 Plans:
   - ° CSA MK 2
     - Award Production Contract for SSN 688 Systems
   - ° ADC MK 4
     - Complete Fabrication of STM Units; Begin TECHEVAL
   - ° NSIS
     - Award competitive ADM System contract
     - Commence design of ADM System
   - ° Sonobuoy C/M
     - Complete Design and Fabricate ADM Units
   - ° Multi-function C/M devices
     - Complete Design and Fabricate ADM Test Units
   - ° Submarine Torpedo Defense Weapon (SMTD)
     - Complete program start-up documentation and associated requirements.
     - Complete specificications for Engineering Development Model (EDM).
   - ° C/M CCU
     - Complete Design and Begin Fabrication of ADM System
   - ° CTTLS/Quiet Launcher
     - Complete program start-up documentation and associated rqmts.
     - Begin development of system specifications.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0101221N Budget Activity: 3
Program Element Title: Fleet Ballistic Missile Systems
Project Number: S1265 Project Title: Submarine Countermeasure Development

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; Allied-Signal Inc., Sylmar, CA; Singer Librascope, Glendale, CA; Hazeltine Corp., Braintree, MA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	-3,005

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The program has been restructured to remain within revised funding allocations.

F. (U) PROGRAM DOCUMENTATION:

System	TOR	DOP	OR	TEMP
CSA MK 2	N/A	N/A	12/76	#581 (3/86)
ADC MK 3	N/A	N/A	12/76	#619 (12/85)
ADC MK 4	N/A	N/A	12/76	#1171 (3/88)
NSIS	9/85	6/86	9/86*	FY 89
Sonobuoy C/M	3/86	11/87	2/88*	FY 90
MMD	3/86	11/87	2/88*	FY 90
SMTD	3/86	11/87	2/88*	FY 90
C/M CCU	3/86	11/87	2/88*	FY 90
CTTLS/QTLHNR	3/86	11/87	2/88*	FY 91

*Draft

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

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

	PROCUREMENT	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U)	OPN-BA-2	29,318	16,652	26,487	34,331	Cont.	Cont.

J. (U) MILESTONE SCHEDULE:

SYSTEM	ADV DEV CONTRACT	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	1Q/89
ADC MK 4	N/A	3Q/88	4Q/88	FY 92	FY 92
NSIS	FY 91	FY 93	FY 93	FY 94	FY 95
Sonobuoy C/M	N/A	FY 92	FY 92	FY 96	FY 96
MMD	N/A	FY 92	FY 92	FY 97	FY 98
CTTLS/QTLNCHR	FY 92	FY 94	FY 94	FY 96	FY 97
SMTD	FY 92	FY 94	FY 94	FY 96	FY 97
C/M CCU	N/A	FY 93	FY 94	FY 96	FY 97

FY 1990/1991 BIENNIAL 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 Program

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0092	SSBN Security	39,685	41,682	41,994	42,143	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
   - Conduct an experiment and analysis program to test
     of the hull and towed buoy.
   - Continue development and upgrade [ ] models.
   - Continue [ ] developments necessary to exploit improved [ ] capabilities.
   - Observed force habit trends, and updated [ ] analysis.
   - Promulgated changes to NWP-75.
   - Conducted [ ] exercise.
   - Completed experiments to test [ ] acoustic operation [ ] scenario.
   - Initiated program to determine detectability of [ ]
   - Initiated program in acoustic response [ ]

2. (U) FY 1989 Program:
   - Upgrade [ ] detectability assessment and define specifications for countermeasure development.
   - Continue passive [ ] investigation.
   - Continue detectability assessment of LIDAR and transfer technology to appropriate advanced development program.
   - Continue [ ] detectability assessments and evaluate requirements for [ ] development.

Program Element: 0101224N Budget Activity: 3
Program Element Title: SSBN Security Technology Program
Project Number: R0092 Project Title: SSBN Security Technology Program

- Conduct a major
- Continue technological and modelling assessments of several detection phenomena including

- Accelerate program assessing

- Continue tactical development, including promulgation of new OPORDS for the
- Continue Patrol Habit analysis.
- Conduct major sea test to evaluate
- Continue programs in detection.
- Continue program in
- Conduct sea test to evaluate

- Conduct tests or sensor concepts for protection.
- Conduct initial assessment of

3. (U) FY 1990 Plans:
   - Continue tactical development and operations analysis
   - Conduct major sea test to evaluate acoustic sensor concept.
   - Continue programs in acoustics, protection.
   - Upgrade detectability assessment and define specifications for countermeasure development.
   - Continue passive investigation.
   - Conduct major sea test to evaluate capability.
   - Accelerate
   - Upgrade assessments of identified as potential threats from previous years studies.
4. (U) FY 1991 Plans:
   - Continue tactical development and operations analysis.
   - Conduct sea test to evaluate protection concepts.
   - Continue programs in acoustics.
   - Finalize detectability assessments and transfer technology to appropriate advanced development program.
   - Continue detection investigation.
   - Conduct major sea test to ascertain false alarm rate
5. (U) Program to Completion:
   - This is a continuing program.

D. (U) WORK PERFORMED BY: David Taylor Research Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Naval Oceanographic Office, Bay St. Louis, MS; Naval Underwater Systems Center, New London, CT; Naval Research Laboratory, Washington, DC. Contractors: Applied Physics Laboratory, Johns Hopkins University, Laur , MD; TRW, McLean, VA, SRI International, Menlo Park, CA; Science Applications, Inc., LaJolla, CA, McLean, VA; BB&N Laboratories, Cambridge, MA.

Program Element: 0101224N Budget Activity: 3
Program Element Title: SSBN Security Technology Program
Project Number: R0092 Project Title: SSBN Security Technology Program

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	- 20,049

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NONE

2. (U) SCHEDULE CHANGES: NONE

3. (U) COST CHANGES: Program has been restructured to remain within revised funding allocation.

F. (U) PROGRAM DOCUMENTATION: No additional documentation required.

G. (U) RELATED ACTIVITIES:
- Program Element #0603588N - SSBN Survivability. The Survivability program is intended to be the bridge from the SSBN Security Program to full scale development.

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

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

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

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
TRIDENT	29,226	33,227	40,589	36,819	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 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 1988 ACCOMPLISHMENTS:
   - Continued TRIDENT CCS improvements including:
     - Development of ELF (I) systems.
     - Design phase of the HF Scanner and Spectrum Analyzer.
   - Initiated Class Improvement Efforts including:
     - Type 8J Periscope Extremely High Frequency (EHF) Antenna
     - Radar Absorbent Material (RAM)
   - Continued TRIDENT CCS Engineering and Integration (E&I) efforts for system improvements.
   - Continued development site support associated with CIP efforts.
   - Continued Ship Control OPEVAL efforts including development, analysis, testing, and implementation of D-5 Ship Control software.
   - Initiated development of Monitoring Subsystem Co-processors.
   - Began development and integration of CCS MK 2 and AN/BQQ-5E into TRIDENT CCS.

2. (U) FY 1989 Program:
   - Continue development of the following TRIDENT CIP items: Type 8J Periscope EHF, LF/HF Scanner, RAM (Type 15L Periscope).
   - Initiate development of the following CIP items:
     - TRIDENT Compact Very Low Frequency (CVLF) Receivers
     - Submarine Acoustic Warfare System 6" Countermeasure
     - Sonar Tactical Recording Improvements.
     - UHF Satcom Buoy
   - Continue TRIDENT CCS E&I efforts.
   - Continue development site support associated with CIP item efforts.
   - Continue Ship Control OPEVAL efforts.
   - Continue development and integration of CCS MK 2 and AN/BQQ-5E into TRIDENT CCS.

Program Element: 0101228N Budget Activity: 3-Strategic Programs
Program Element Title: TRIDENT I
Project Number: S0004 Project Title: Trident Submarine System Improvements

3. (U) FY 1990 Plans:
   - ° 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.
   - ° Continue TRIDENT CCS E&I efforts.
   - ° Continue development site support associated with CIP item efforts.
   - ° Continue Ship Control OPEVAL efforts.
   - ° Continue development and integration of CCS MK 2 and AN/BQQ-5E into TRIDENT CCS.
4. (U) FY 1991 Plans:
   - ° Initiate development of the following CIP items:
     - AN/BRR-6 Towed Buoy Antenna System.
     - EHF (Integrated Radio Room).
   - ° Complete development of the following CIP items: EHF (Type 8J Periscope), SAWS 6" Countermeasure.
   - ° Continue developmentof the following CIP items: CVLF Receivers, RAM (Type 15L Periscope), Sonar Tactical Recording Improvements.
   - ° Continue TRIDENT CCS E&I efforts.
   - ° Continue development site support associated with CIP item efforts.
   - ° Continue Ship Control OPEVAL efforts.
   - ° Continue development and integration of CCS MK 2 and AN/BQQ-5E into TRIDENT CCS.
5. (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 Center, Crane, IN. Contractors: Electric Boat Division of General Dyamics Corp., Groton, CT; John Hopkins University, Applied Physics Laboratory, Laurel, MD; UNISYS Corp., St. Paul, MN; SPEARS Associates, Philadelphia, PA; Radio Corp. of America, Camden, NJ; and International Business Machines, Manassas, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact Schedule	Impact on FY 1990 Cost
TECH	ADCAP TBX Array CCS MK 2 AN/BQQ-5(E)	N/A	N/A
SCHD	N/A	N/A	N/A
COST	N/A	Delay CVLF	-$14,064K

Program Element: 0101228N Budget Activity: 3-Strategic Programs
Program Element Title: TRIDENT I
Project Number: S0004 Project Title: Trident Submarine System Improvements

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL:
   - TRIDENT fire controls and sonars will be upgraded by backfitting the CCS MK2 and the AN/BQQ-5E systems rather than incorporating incremental improvements in each. The program was restructured to reflect this decision. Development for the incremental improvements, such as, ADCAP (already in CCS MK2) and TBX (incorporated in BQQ-5E) were terminated.

2. (U) SCHEDULE: No changes.

3. (U) COST CHANGES: $14,064K reduction resulted in:
   - Reduction in TRIDENT E&T and development site support.
   - Delay CVLF integration for one year.
   - Reduces ship control testing efforts.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

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

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN Strat Plat Supt Equip (25)	66,025	78,574	158,415	209,023	Continuing	Continuing
OPN Strat Plat Supt Equip (106)	13,230	12,093	22,824	30,557	Continuing	Continuing
OPN Strat Plat Supt Equip (253)	41,989	42,340	60,145	57,722	Continuing	Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0101401N Budget Activity: 3-Strategic
Program Element Title: ELF COMM SYSTEM
Project Number: X0792 Project Title: ELF

POPULAR NAME: ELF

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MSD 2Q90	FOC 2Q91	
Engineering Milestones	STE 4Q88				
T&E Milestones					
Contract Milestones	Receiver Production Contract 1Q88		Production Receiver Starts 1Q90		Last Receiver Delivered 1Q91

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	0	200			125,127
Support Contract	5,921	2,872			65,252
In-House Support	595	218	100	100	Continuing
GFE/ Other					2,800
Total	6,516	3,290	100	100	Continuing

Program Element: 0101401N Budget Activity: 3-Strategic
Program Element Title: ELF COMM SYSTEM
Project Number: X0792 Project Title: ELF

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 surface operations. Current communications systems are unable to penetrate the ocean more than a few tens of feet. At present, 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 1988 Accomplishments:
   - Interference mitigation implementation at the Michigan Transmitter Facility (MTF) completed.
   - Commenced antenna grounds safety testing at MTF.
   - Released the ELF receiver production contract.

2. (U) FY 1989 Program:
   - Complete MTF antenna grounds safety testing.
   - Complete MTF System Test and Evaluation (STE).
   - Perform Wisconsin Transmitter Facility (WTF)/MTF synchronous testing.

3. (U) FY 1990 Plans:
   - Continue T&E.
   - Material Support Date (MSD) implemented 2Q90.

4. (U) FY 1991 Plans:
   - Full Operational Capability (FOC) 2Q91.
   - Collect and analyze mission data and optimize antenna patterns.

5. (U) Program to Completion:
   - Analyze potential jamming threat scenarios; assess performance gain from new signal processing algorithms.
   - Assess new technology applications to ELF.

D. (U) WORK PERFORMED BY: In-house: Lead laboratory is Naval Underwater Systems Center, New London, CT; Naval Facilities Engineering Command, Washington, DC; Northern Division, Naval Facilities Engineering Command, Philadelphia, PA; Naval Research Laboratory, Washington, DC; Naval Telecommunications Command, Washington, DC; and Naval Electronics Systems Engineering Centers, Charleston, Portsmouth, and San Diego. Contractors: General Telephone and Electronic Corporation, Needham Heights, MA, is the prime contractor. Others: IIT Research Institute, Chicago, IL; Computer Sciences Corporation, Falls Church, VA; MITRE Corporation, McLean, VA; R.M. Vredenburg and Company, McLean, VA; Research and Development Laboratories, Culver City, CA.

Program Element: 0101401N Budget Activity: 3-Strategic
Program Element Title: ELF COMM SYSTEM
Project Number: X0792 Project Title: ELF

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

IMPACT OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-3,259

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL: N/A
2. (U) SCHEDULE: N/A
3. (U) COST: The Department reduction of -3,259 reduction is a result of biological/ecological effort transferring to O&M,N

F. (U) PROGRAM DOCUMENTATION:

CNO Requirement Letter	12/81
NDCP (MSII)	10/83
NDCP (MSIII)	6/87
NPDM (MSIII)	8/87
ILSP	6/85
TEMP	2/87

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: (Dollars in Thousands)

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program

Procurement justification material does not contain this level of detail.

OPN 102 Trident
SCN 1&2 Trident
SCN 4&5 SSN 688
SCN 6&7 SSN21

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None.

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0793	TACAMO	22,270	26,170	14,719	12,628	24,861	115,648
W1438	E-6A	34,300	0	0	0	0	360,791
X1083	Shore-to-Ship Comms	17,059	24,896	16,565	6,622	Continue	Continue
Total		73,629	51,066	31,284	19,250	Continue	Continue

B. (U) BRIEF DESCRIPTION OF ELEMENT: This project develops communications systems which provide positive command and control of deployed ballistic missile submarines (SSBNs). Many communications systems and techniques have been initiated under this project which have migrated to separate projects or program elements due to uniqueness, maturity, or magnitude. 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 which are 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 and dual trailing wire antenna system to replace the current obsolete transmit system and provides an improved antenna 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 phased 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.

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0793	TACAMO	22,270	26,170	14,719	12,628	24,861	115,648

B. (U) BRIEF DESCRIPTION OF ELEMENT: This project develops communications systems which provide positive command and control to deployed ballisitc missile submarines. Two phases of this project are the VLF/LF High Power Transmitter System (HPTS) and Block II upgrade.

(1) HPTS - The VLF/LF High Power Transmitter System (HPTS) and Dual Trailing Wire Antenna (DTWA) Systems provide the E-6A TACAMO and the Air Force Airborne Command Post (EC-135) 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) BLOCK II - Additional upgrade of the E-6A TACAMO systems is required to ensure communications compatibility with World Wide Airborne Command Post (WAABNCP) aircraft. EHF/UHF MILSTAR, TMPS, (TACAMO Message Processing System), CVLF, NONAP, 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1988 ACCOMPLISHMENTS:
   - Continued aircraft integration design and fabricated HPTS EDM's.
   - Draft Block II Acquisition Plan submitted.
2. FY 1989 PROGRAM:
   - Deliver HPTS EDM's for contractor demo and test.
   - Contractor Installation/Test of HPTS on E-6A TACAMO aircraft.
   - Continue Block II integration development and testing.
3. FY 1990 Plans:
   - Perform HPTS TECHEVAL and OPEVAL on E-6A TACAMO aircraft.
   - Award FSD contract for Block II.
4. FY 1991 Plans Program:
   - Complete HPTS residual tasks/documentation from OPEVAL.
   - Install Block II equipment into prototype aircraft.
   - Block II TECHEVAL/OPEVAL.
5. Program to Completion:
   - Perform FOT&E on Block I & II.

D. (U) WORK PERFORMED BY: In-house: NADC, NATC, NAC, NAEC, NOSC; Rockwell for HPTS and FTS/SDSU; Boeing; Smith's Industries; Block II Contract Award Winners.

Program Element: 0101402N Budget Activity: 3-Strategic Programs
Program Element Title: Navy Strategic Communications
Project Number: W0793 Project Title: TACAMO

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIES	IMPACT ON SCHEDULE	IMPACT ON FY 1990 COST
TECH	None	None	None
SCHD	None	None	None
COST	None	Block II Upgrade	-22,397

NARRATIVE DESCRIPTIVE OF CHANGES

1. (U) Technology Changes: None
2. (U) Schedule Changes: None
3. (U) Cost Changes: The Navy reduction above results in extending the Block II upgrades, with the exception of MILSTAR, from FY 1991 to FY 1993. This includes delay of the CVLF receiver and TACAMO message processing system.

F. (U) PROGRAM DOCUMENTATION:

HPTS TEMP	1/87
OR	7/86
ACQ Plan	8/86

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

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

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN/#60	Procurement justification material does not contain this level of detail				

H. (U) OTHER APPROPRIATION FUNDS: Not Applicable

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

HPTS Contract Award	4/87
TECHEVAL	11/89
OPEVAL	4/90
MILSTAR FSD Award	4/90
MS III	1Q92

Program Element: 0101402N Budget Activity: 3-Strategic Programs
A:RDDS-90-0101402N
UNCLASSIFIED

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1083	Shore to Ship Comms	17,059	24,896	16.565	6.622	Continue	Continue

B. (U) BRIEF DESCRIPTION OF ELEMENT: This project develops communications systems which provide positive command and control of deployed ballistic missile submarines (SSBNs). Many communications systems and techniques have been initiated under this project which have migrated to separate projects or program elements due to uniqueness, maturity, or magnitude. Presently in this project are efforts such as propagation model parameter validation and high power component improvements which provide enhancements to current shore-to-ship transmitting and receiving systems. The Enhanced VERDIN System (EVS) provides a two phased replacement for the obsolescent VERDIN VLF processor and demodulator: Phase I Enhanced VERDIN Processor (EVP) provides a form/fit/functional replacement processor that will host the phase II (EVS) improvements which provide demodulator/modulator modifications and communications performance improvements. The Compact VLF (CVLF) system will replace the VLF/LF receiver/demodulator and transmitter/modulator (with the exception of High Power Elements) and the VERDIN and EVS processors. Additional enhancements to the CVLF system will be developed including introduction of CVLF transmit, ECP-34 (MEECN Mode Recognition), and pre-planned program improvements (P^3I) which include frequency scan and EMI cancellation. The Strategic Connectivity Assessment Program (SCAP) provides quantitive assessments of current and future connectivity for use in operational planning and for definition of future system requirements.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - Commenced CVLF Receiver development testing.
   - Deployed EVS capability in SSBNs and TACAMO aircraft.
   - Commenced Fixed VLF improvement program.
2. (U) FY 1989 Programs:
   - Upgrade VLF propagation prediction model.
   - Continue Fixed VLF improvement program.
   - Conduct CVLF OPEVAL and obtain authority for production.
   - Continue Strategic Communications Assessment program.
   - Commence CVLF development contract for Plugable Crypto Module, and receiver upgrades.
   - Determine fixed VLF Insulator Test and Design Standards.
3. (U) FY 1990 Plans:
   - Continue CVLF development contract for plugable crypto module and receiver verification upgrades.
   - Continue SCAP
   - Continue FVLF improvement program.
   - Continue VLF improvements.
   - Continue FVLF Propagation Model Parameter Validation.
   - Continue FVLF Insulator Test and Design Standards.

Program Element: 0101402N Budget Activity: 3-Strategic Programs
Program Element Title: Navy Strategic Communications
Project Number: X1083 Project Title: Shore-to-Ship Comms

4. (U) FY 1991 Plans:
   - Commence CVLF Receiver Set production.
   - Continue CVLF developments. (NONAP, P^{3}I, CVLF transmit and additional functions)
   - Continue FVLF Insulator test and design standards.
   - Continue SCAP.
   - Continue FVLF improvements program.
   - Continue VLF improvements.
   - Continue FVLF Propagation Model Parameter Validation.

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

D. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA; NRL, Washington, DC; NAVSEA, 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; and EATON Corp., Command Systems Division, Farmingdale, NY; Electrospace Systems Inc, Dallas, TX.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIES	IMPACT ON SCHEDULE	IMPACT ON FY 1990 COST
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION: (CVLF)

Acquisition Plan	9/80	OR 6/86
ILSP (Updated Draft)	6/87	TEMP 2/88
Acquisition Plan (Update)	11/88	

G. (U) RELATED ACTIVITIES: Program Element 0101221N (Fleet Ballistic Missile System) and Program Element 0101228N (TRIDENT Submarine System) relate to the Program Element for system-to-platform integration and interoperability. Navy Strategic Communications transmission will be received by the improved terminals developed for the Defense Communications Agency's Program Element 0303131N (Minimum Essential Emergency Communications Network). There is no unnecessary duplication of effort within the Navy or the Department of Defense.

Program Element: 0101402N Budget Activity: 3-Strategic Programs
Program Element Title: Navy Strategic Communications
Project Number: X1083 Project Title: Shore-to-Ship Comms

H. (U) OTHER APPROPRIATION FUNDS:

	FY 1988 ACTUAL	FY 1989 ESTIMATE	FY 1990 ESTIMATE	FY 1991 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN BA2						
Shore LF/VLF P1 line item OPN #135	1,322	8,262	12,033	23,528	Cont.	Cont.
VERDIN P-1 line item OPN #136						
CVLF P-1 line item OPN #139						

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None.

J. (U) MILESTONE SCHEDULE: (CVLF)

1.	DT IIE (Technical)	Nov 88
2.	MS III - AFP	Sep 89
3.	Production Contract Award	Jan 91

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0125	NAVSPASUR	678	689	755	782	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Naval Space Surveillance Center (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. NAVSPASUR is an element of the Naval Space Command performing fleet support functions. It is also responsible to the U.S. Space Command, Colorado Springs, CO. for those 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 Detection Operations Center. This project contains upgrade analysis 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 1988 Accomplishments:

a. (U) Conducted engineering studies directed toward defining system parameters for an upgraded surveillance system in the year 2000 and beyond.

b. (U) Conducted engineering studies to define the most cost-effective means of replacing obsolete equipment to maintain current capabilities rather than upgrade the system.

2. (U) FY 1989 Program: Conduct research on receiver hardware to support a modernized surveillance system.

3. (U) FY 1990 Plans: Continue research on receiver hardware to support a modernized surveillance system.

4. (U) FY 1991 Plans: Develop receiver hardware for a modernized surveillance system.

5. (U) Program to Completion: This is a continuing program which continues development of receiver hardware.

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

E. (U) RELATED ACTIVITIES: None.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN/BA2/P-1/#116 (33290100)	8,956	11,483	152	3,512	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303131N Budget Activity: 3-Strategic Programs
Program Element Title: Minimum Essential Emergency Communication Network (MEECN)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0795	MEECN	1,027	1,036	1,305	1,522	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This project develops the Minimum Essential Emergency Communications Network message processing mode, an integral part of Fleet Ballistic Missile Submarine Command and Control System communications which will improve delivery of emergency action messages via the Navy and Air Force Low Frequency/Very Low Frequency system. Navy is the designated program director for system development and acquisition of the Tri-Service/Defense Communications Agency Program. MEEC Network message processing mode encodes the specialized emergency action messages transmitted from the National Command Authority to Fleet Ballistic Missile submarines when using 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 JCS, AF and DCA.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - Continued analysis and test of Non-Linear Adaptive Processor (NONAP).
   - Completed design and evaluated new MEECN high data rate (HDR) mode.
2. (U) FY 1989 Program:
   - Implement and test MEECN HDR modes.
   - Support testing Compact Very Low Frequency (CVLF).
   - Analyze MEECN system architectures.
3. (U) FY 1990 Plans:
   - Implement NONAP.
   - Continue system architecture upgrades and configuration control management.
   - Continue MEECN interoperability testing as new software programs are evolving to meet applicable threats.
4. (U) FY 1991 Plans:
   - Continue systems architecture upgrades and configuration control management.
   - Continue MEECN interoperability testing as new software programs are evolving to meet applicable threats.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: Lead Laboratory is Naval Ocean Systems Center (NOSC), San Diego, CA. Contractors: GTE, Government System Corporation, Needham Heights, MA and Technology Services Corporation, Santa Monica, CA.

E. (U) RELATED ACTIVITIES: Program Element 0101402N, Navy Strategic Communications (Shore-to-ship Communications Project X1083) contains the Very Low Frequency/Low Frequency systems into which the Minimum Essential Emergency Communications Network message processing mode will be incorporated.

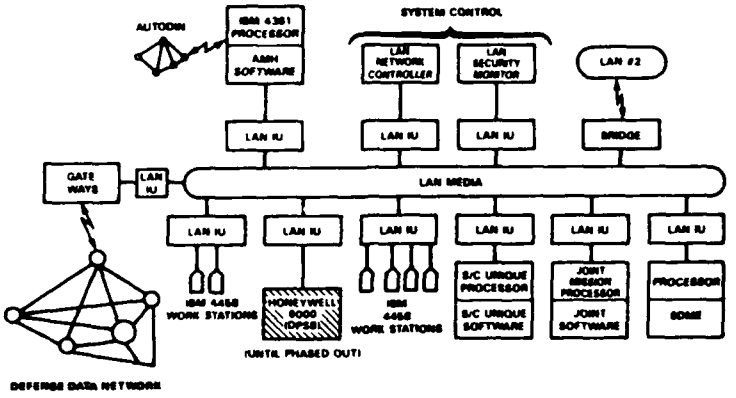
F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303152N Budget Activity: 3
Program Element Title: WWMCCS Information System (WIS) Modernization
Project Number: X1798 Project Title: WIS Modernization

SYSTEM BLOCK DIAGRAM



POPULAR NAME: WWMCCS Information System (WIS)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			Blk B MS-II		Cont.
Engineering Milestones	Install LAN Blk A PACOM	LAN IOC		Phase I Softw.DT/OT	Cont.
T&E Milestones		LAN DT & OT		AMH DT & OT Blk A OT	Cont.
Contract Milestones	Navy Softw. Phase I,II,III			Deliv. Navy Softw.Phase I	Cont.
BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total
Major Contract	2,829	4,022	3,950	2,785	Cont.
Support Contract	1,465	1,027	870	396	Cont.
In-House Support	1,205	542	1,206	728	Cont.
GFE/ Other	0	0	0	0	Cont.
Total	5,499	5,591	6,026	3,909	Cont.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303152N Budget Activity: 3
Program Element Title: WWMCCS Information System (WIS) Modernization
Project Number: X1798 Project Title: WIS Modernization

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) This joint modernization program provides for the phased redesign and replacement of the current WWMCCS Automated Data Processing (ADP) hardware/software system. The WIS program will develop a modern ADP system to provide C^2 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 WIS sites supporting USCINCPAC, CINCPACFLT, USCINCLANT, CINCLANTFLT, CINCUSNAVEUR, COMUSKOREA, COMUSJAPAN and CNO.

(U) The existing WWMCCS ADP, acquired in the early 1970s, which is based on system concepts and technology of the 1960s, is inadequate to support current WWMCCS user needs. WIS, developed and implemented in blocks, will provide significantly improved C^2 support for use by the NCA; the Joint Chiefs of Staff (JCS); unified, specified, and component commands; and other C^2 organizations throughout the Department of Defense. WIS modernizes the WWMCCS Standard ADP software, hardware and directly related telecommunications, taking advantage of a modern software development and maintenance environment and state-of-the-art commercial hardware to reduce life cycle costs. Other key elements are development of an automated message handling capability, use of Ada programming language, and implementation of the Joint Operations Planning and Execution System (JOPES) and National Military Command System Information System (NIS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed Block A site design for all sites. Continued transition and installation planning for the Navy sites.

b. (U) Completed Block A Local Area Network (LAN) installation at USCINCPAC.

c. (U) Contracted for Navy command/site unique software modernization (Phases I, II and III).

d. (U) Began technical review of joint Block B (Release 1) software design specifications.

e. (U) Continued technical review of System Design Notices (SDN) for WWMCCS.

2. (U) FY 1989 Program:

a. (U) Provide technical review of joint interface design of WIS workstations, printers and Automated Message Handling System (AMHS).

b. (U) Continue Block A transition and installation planning for Navy sites.

c. (U) Provide technical support for WIS Block A LAN Developmental Testing (DT) and Operational Testing (OT).

d. (U) Continue technical review of joint Block B (Release 1) software design specifications.

e. (U) Prepare site unique software Test and Evaluation Master Plan (TEMP).

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303152N Budget Activity: 3
Program Element Title: WWMCCS Information System (WIS) Modernization
Project Number: X1798 Project Title: WIS Modernization

f. (U) Continue site unique software modernization. Complete Phase I System Requirements Review (SRR), System Design Review (SDR), System Software Review (SSR) and Preliminary Design Review (PDR).

g. (U) Continue technical review of System Design Notices (SDN) for WWMCCS.

3. (U) FY 1990 Plans:

a. (U) Continue technical review for joint Block B (Release 1) software design and test specifications.

b. (U) Complete Phase I site unique Critical Design Review (CDR) and software development. Begin Phase II Systems Requirement Review (SRR).

c. (U) Begin Phase I site unique software DT and OT.

4. (U) FY 1991 Plans:

a. (U) Provide technical support for WIS Block A AMHS DT and OT. and WIS Block A Initial Operational Test and Evaluation (IOT&E).

b. (U) Complete Phase I site unique DT and OT testing. Complete Phase II site unique software SDR, SSR, PDR and CDR.

c. (U) Complete operational testing of Block B (Release 1).

d. (U) Begin technical review of joint Block B (Release 2) software design specifications.

e. (U) Continue technical review of System Design Notices (SDN) for WWMCCS.

5. (U) Program to Completion:

a. (U) This is a continuing program.

D. (U) WORK PERFORMED BY:

In House: Space and Naval Warfare Systems Command, Arlington, VA.; Naval Ocean Systems Center, San Diego, CA.

Contractors: (Joint Contractors) GTE, Billerica, MA; IBM, Gaithersburg, MD; MITRE, McLean, VA and Bedford, MA; RMS Technologies, Trevose, PA; Andrulis Research Corporation, Bethesda, MD; (Navy Contractors) Advanced Technologies Inc., Reston, VA; Booze-Allen-Hamilton, Bethesda, MD; Planning Research Corp., McLean, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

CHANGE	System Capabilities	Schedule	Budget Year Cost
ENG	None	None	None
SCHED	AMHS delay	Delays AMHS and Blk A IOCs 1 year to '91.	None
COST	None	Delays site unique software Phase III 1 year.	-1,633

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303152N Budget Activity: 3
Program Element Title: WWMCCS Information System (WIS) Modernization
Project Number: X1798 Project Title: WIS Modernization

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: None
2. (U) SCHEDULE CHANGES: FY-90 Department reduction to the joint WIS program will result in 1 year delay in AMHS and Block A IOC.
3. (U) COST CHANGES: FY-90 Department reduction of -$1,633K will result in a one year delay in Navy site unique software Phase III development. Funds were reduced to adjust Navy program to the schedule of the Joint WIS development.

F. (U) PROGRAM DOCUMENTATION: JMENS, 2/82; DCP, 7/88; TEMP 10/87; ILSP, 6/87.

G. (U) RELATED ACTIVITIES: PE 0303151N (WWMCCS ADP) funds the current WWMCCS ADP systems. PE 0303152F (WIS JPMO) funds the JPMO; PEs # 0303152A/F fund Joint WIS procurement and unique Army and Air Force modernization programs. Portions of PE 0303152A/F RDT&E resources, which partially funded the Joint WIS effort from FY 1984 to FY 1987, were consolidated in PE 0303154F beginning in FY 1988. PE 0303152K (WIS), PE 0303151H (WWMCCS ADP), and PE 0902498M (Management Headquarters (ADMIN)) fund Joint WIS procurement for Defense Communications Agency, Defense Nuclear Agency, and the US Marine Corps, respectively.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
PROCUREMENT					
OPN/148	WIS begins in FY-92				
NW002	250	600	442	480	Cont.
NW004			22		Cont.
NW019	44	49	40	51	Cont.
NW024	200	480	358	371	Cont.
NW026			115	33	Cont.
OPN(BA7)	See CAP Budget @ NAVDAC				

* WIS MOD not in this FY-90/91 submit.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603392N Budget Activity: 3
Program Element Title: Anti-Satellite Program
Project Number: W2046 Project Title: ASAT

NO PHOTO AVAILABLE

POPULAR NAME: ASAT

A. (U) SCHEDULE/BUDGET INFORMATION: (Detailed Program Plan and Funding Breakout TBD)

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		2ND QTR M/S O	1 QTR MS/ I		1997
Engineering Milestones					TBD
T&E Milestones					TBD
Contract Milestones					TBD

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract					TBD
Support Contract					TBD
In-House Support					TBD
GFE/Other					TBD
Total	0	0	94,572	124,281	Continuing

Program Element: 0603392N Budget Activity: 3
Program Element Title: Anti-Satellite Program
Program Number: W2046 Project Title: ASAT

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Navy studies have confirmed a need for an anti-satellite (ASAT) weapon to protect Naval Forces from satellite-based surveillance and targeting. The

This project is a new start. The lead service for the ASAT effort is the Army. The Navy element is managed by the Strategic Systems Program Office (SSPO).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable

2. (U) FY 1989 Program: The Air Force is funding concept definition studies.

3. (U) FY 1990 Plans:
° Perform engineering analysis to adapt technology from the to be compatible with the Navy's
° Development and definition of program plan.
° Perform design modification analysis of present
° Perform design modification analysis of the launch platform including mission.

4. (U) FY 1991 Plans:
° Fabricate, assemble and ground test front end designs.
° Fabricate and test VLS compatable booster sections.
° Develop test plans and prepare TEMP.
° Prepare detailed plans in support of MSII decision.

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

D. (U) WORK PERFORMED BY: In-house: Naval Surface Weapons Center (NSWC), Dahlgren, VA; JHU/APL; Other TBD. Contractors: TBD.

Program Element: 0603392N Budget Activity: 3
Program Element Title: Anti-Satellite Program
Program Number: W2046 Project Title: ASAT

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	N/A	+94,572

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: N/A
2. (U) SCHEDULE CHANGES: N/A
3. (U) COST CHANGES: This is a new start in FY 1990.

F. (U) PROGRAM DOCUMENTATION:
Navy TOR: Approval chain
MROC: US SPACECOM Multi-Command Required Operational Capability (MROC 3-87) for a Space Control Anti-Satellite capability (validated by JCS 5 Feb 88).
MNS: Mission Needs Statement approved 20 Jan 88.

G. (U) RELATED ACTIVITIES: This program will take advantage of SDI technology. The related programs include:

° Kinetic Energy Weapons (PE 0603222C) development of the [redacted]

° Surveillance, Acquisition, Tracking and Kill Assessment (PE 0603220C)
- Development of Space-based Surveillance and Tracking System (SSTS)
- Development of the Boost Surveillance and Tracking Systems (BSTS)

° Directed Energy Weapon/High Energy Laser development (PE 0603221N) including the mid infrared advanced chemical laser (MIRACL).

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
1. (U) PROCUREMENT	No funds budgeted FY1988-1994. Procurement beyond the FYDP.				

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

J. (U) TEST AND EVALUATION DATA: N/A

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1845	TADIX-B	(6,111)*	1,781	1,973	0	0	9,865
X1846	SLOW WALKER	4,670	3,716	1,769	1,876	0	13,255
X2055	Space-based Wide-Area Surveillance Tracking and Targeting	0	0	1,956	1,932	Cont.	Cont.
Total		4,670	5,497	5,698	3,808	Cont.	Cont.

* Funded under PE 0604232N

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT:

(U) This program develops the capability to provide deployed forces with

]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. This equipment will allow the fleet to maintain an essential wide area surveillance capability

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Project X1845 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 1988 Accomplishments: (Funded under 0604232N)
   a. (U)
   b. (U)
   c. (U)
   d. (U)
   e. (U) Developed procurement package.
   f. (U) Developed specifications in support of a competitive fixed priced contract.
   g. (U) Completed TECHEVAL and OPEVAL.
2. (U) FY 1989 Program:
   a. (U) Address OPEVAL/TECHEVAL action items.
   b. (U) Identify and implement required software corrections.
   c. (U) Conduct Technical Evaluation Board.
   d. (U) Conduct Contract Award Review Panel.
   e. (U)
   f. (U) Transition Life Cycle System Support Activity (LCSSA) to the Fleet Combat Direction System Support Activity (FCDSSA), San Diego, CA.
   g. (U) Startup In-Service Engineering Agent.
   h. (U) Support Engineering Design Models and software improvements.
3. (U) FY 1990 Plans:
   a. (U) Test and evaluate any additionally required interfaces.
   b. (U) Evaluate required software changes.
   c. (U)
   d. (U) Evaluate state-of-the-art equipment for product improvement.
   e. (U) Support Engineering Design Models.
4. (U) FY 1991 Planned Program: Not Applicable.
5. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: In-House: NAVOCEANSYSCEN, San Diego, CA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATION FUNDS: None.

(U) APPN/P-1	FY 1988 Estimate	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
OPN #115	0	0	11,961	15,665	61,102

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: X1846 Project Title: SLOW WALKER

C. (U) PROJECT DESCRIPTION:

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Began software development for automatic data processing and reporting using Air Force SYS-1 F
   b. (U) Continued conversion of software for use with current Air Force mainframes
2. (U) FY 1989 Program:
   a. (U) Continue SYS-1 software development with AF.
   b. (U) Begin Communications Subsystem development.
   c. (U)
3. (U) FY 1990 Plans:
   a. (U) Continue SYS-1 software development with AF.
   b. (U) Continue Communications Subsystem development.
4. (U) FY 1991 Plans:
   a. (U) Continue SYS-1 software development with AF.
   b. (U) Continue Communications Subsystem development.
5. (U) Program to Completion:
   a. (U) Deliver SYS-1 software.
   b. (U) Perform system integration and software testing.
   c. (U)

E. (U) WORK PERFORMED BY: Contractors- IBM, Boulder, CO; Aerospace Corp., Los Angeles, CA. In-House- Navy Space Systems Activity, Los Angeles, CA; Naval Electronic Systems Engineering Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren, VA.

F. (U) RELATED ACTIVITIES: Program Element 0603717N, Project X0709, Navy Command and Control Systems Afloat, Project X1847, Afloat Correlation System; Program Element 0102431F, Defense Support Program.

G. (U) OTHER APPROPRIATION FUNDS: None.

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: SWAST2

C. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(S) The Navy plans to participate with the other armed Services in the development of a Space-based Wide Area Surveillance. Tracking, and Targeting (SWAST?) System.

To this end, the SWAST2 program would investigate and select from the most promising surveillance technologies the most affordable sensor(s) with the highest tactical pay-off for deployment as a SWAST2 system. Currently, only concept studies have been undertaken on various promising technologies.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: Not Applicable.
2. (U) FY 1989 Program: Not Applicable.
3. (U) FY 1990 Plans:
a. (S)

b. (U) Select and concentrate effort on most promising and affordable technology.
4. (U) FY 1991 Plans:
a. (U) Evaluate correlation and fusion requirements for SWAST2 data processing and tactical reporting strategies.
5. (U) Program to Completion:
a. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Lab (NRL), Washington, DC. CONTRACTORS: TBD

F. (U) RELATED ACTIVITIES: Program Element 0603717N, Navy Command and Control System Afloat. Program Element 0604230N, Warfare Support Systems (including Relocatable Over-the-Horizon Radar). Program Element 0102417F, CONUS Over-the-Horizon Backscatter Radar. Program Element 0603428F, Space Surveillance Technology.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: International Exchange Program (IEP) established 24 Sep 87 for exchange of space-based radar, infrared, and radiometry technical data with the United Kingdom.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603588N Budget Activity: 3 - Strategic Programs
Program Element Title: SSBN Survivability
Project Number: S-1871 Project Title: SSBN Survivability

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1871	SSBN Survivability	6,276	9,512	11,918	16,874	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
   - Developed initial[ ]test bed system for laboratory analysis and algorithm development.
   - Initiated Navy Industry Combined Research and Development Studies (NICARDS), established functional specification and commenced data collection.
   - Developed prototype design of[ ]equipment and conducted initial concept test.
   - Measured different sea environment[ ]
   - Characterized[ ]Advanced Development Model (ADM) algorithms and conducted at-sea data collection.
   - Conducted standard[ ]exercise and commenced data analysis.
   - Fabricated[ ]Advanced Development Model (ADM).

2. (U) FY 1989 Program:
   - Continue development of[ ]Advanced Development Model (ADM).
   - Continue standard data analysis for Atlantic test and run at-sea test in the Pacific and commence data analysis.
   - Conduct
   - Continue[ ]d perform at-sea evaluation for standard[ ]
   - Initiate project[ ]

Program Element: 0603588N Budget Activity: 3-Strategic Programs
Program Element Title: SSBN Survivability
Project Number: S-1871 Project Title: SSBN Survivability

- Establish project [ ] system to detect and localize [ ].
- Initiate new project [ ] (when multiple detection threats exist.

3. (U) FY 1990 Plans:
   - Define project [ ].
   - Complete [ ] ADM system and conduct sea testing.
   - Develop standard [ ] actics and ADM system.
   - Conduct [ ] performance test and evaluation.
   - Perform data analysis of collected standard [ ] data.
   - Continue development of [ ].
   - Continue prototype development for [ ].
   - Continue programming development for [ ].
4. (U) FY 1991 Plans Program:
   - Develop [ ] algorithms.
   - Continue standard [ ] tactics and ADM development.
   - Investigate feasibility of integrating [ ] Communications and Navigation systems.
   - Commence transition of standard [ ] formulas as a result of data analysis.
   - Incorporate sensor outputs to computerized tactical guidance for [ ].
   - Continue development of [ ].
   - Continue [ ] prototype development.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	-42,647

Program Element: 0603588N Budget Activity: 3-Strategic Programs
Program Element Title: SSBN Survivability
Project Number: S-1871 Project Title: SSBN Survivability

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: As the result of higher priority programmatic requirements this program was reduced -42,647 and the program has been restructured to remain within funding allocation.

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. The submarine Countermeasures Project (PE 0101221N, Project S1265) develops only acoustic countermeasure launchers and devices which protect the submarine from active sonar detection and torpedo attack.

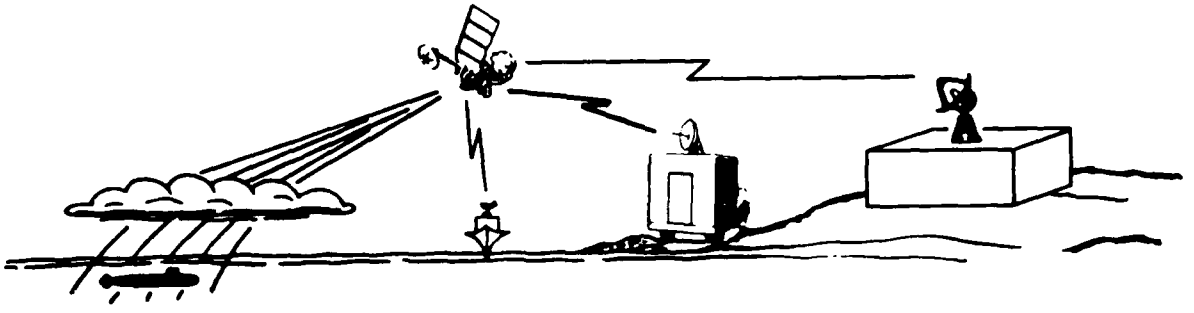
H. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:
1. (U)
2. (U)
3. (U) Transition
4. (U)

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603741N Budget Activity: 3
Program Element Title: Satellite Laser Communications
Project Number: X1879 Project Title: Satellite Laser Communications



SLC System

POPULAR NAME: SLC

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MS I 12/89		Continuing
Engineering Milestones	Demo Blue Downlink				Continuing
T&E Milestones					Continuing
Contract Milestones		Award Laser & Concept Contr			Continuing
BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total
Major Contract	(11,288)	17,500	1,000	1,000	Continuing
Support Contract	(850)	829	477	281	Continuing
In-House Support	(7,139)	6,560	524	528	Continuing
GFE/ Other	(0)	0	0	0	Continuing
Total	(19,277)*	24,889	2,001	1,809	Continuing

*Funded under 0604232N

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603741N Budget Activity: 3
Program Element Title: Satellite Laser Communications
Project Number: X1879 Project Title: Satellite Laser Communications

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Satellite Laser Communications (SLC) program will develop and deploy an operational laser communications system to provide time-critical and mission-essential information to submarines, virtually independent of depth and speed, through all phases of conventional and nuclear conflict. SLC will enhance the survivability of submarine forces by allowing them to receive tactical communications while remaining at operational depths and speeds. Major system components consist of satellite-based laser transmitters, submarine-based optical receivers, and appropriate ground communications support and interface equipment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded under PE 0604232N)

a. (U) Installed experimental blue laser and receiver in P-3 aircraft and operational SSN, respectively. Conducted open ocean end-to-end field tests of blue Xenon-Chloride (XeCl) laser system.
b. (U) Completed the Extended Life Test (ELT) project.
c. (U) Expanded system models and specifications to account for all available environmental and component performance data. Developed initial system and communication architectures.
d. (U) Performed additional XeCl laser technology development.
e. (U) Supported limited component improvement programs for the receiver, laser, and Raman converter.

2. (U) FY 1989 Program:

a. (U) Continue development of improved system modeling techniques, architectures and specifications.
b. (U) Continue limited component improvement programs for the receiver, laser and Raman converter.
c. (U) Issue multiple contracts for system conceptual design and general system specifications for the SLC system.
d. (U) Award Phase II laser contract for deep red detector.
e. (U) Award receiver improvement contract.
f. (U) Award Raman converter improvement contract.

3. (U) FY 1990 Plans:

a. (U) Continue laser component improvement efforts.
b. (U) Continue system engineering and program technical management support.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603741N Budget Activity: 3
Program Element Title: Satellite Laser Communications
Project Number: X1879 Project Title: Satellite Laser Communications

4. (U) FY 1991 Plans:

a. (U) Continue laser component improvement efforts.
b. (U) Continue system engineering and program technical management support.

5. (U) Program to Completion:

a. (U) Continue laser component improvement efforts.
b. (U) Continue system engineering and program technical management support.
c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT; Naval Air Development Center, Warminster, PA; Los Alamos National Laboratory, Los Alamos, NM. Contractors: General Dynamics/Laser Systems Lab., San Diego, CA; GTE Government Systems-Western Div., Mt. View, CA; McDonnell Douglas Astronautics Co., St. Louis, MO; Northrop Research & Technology Center, Palos Verdes, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact On FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	IOC Delay 5 or more years	-30,654

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603741N Budget Activity: 3
Program Element Title: Satellite Laser Communications
Project Number: X1879 Project Title: Satellite Laser Communications

NARRATIVE DESCRIPTION OF CHANGES

Impact of Changes:

1. (U) TECHNOLOGY: None.

2. (U) SCHEDULE: None.

3. (U) COST: Department reductions total $30,654K in FY-90. As a result the initial operational capability (IOC) of the SLC system has been delayed five or more years.

F. (U) PROGRAM DOCUMENTATION:

MOA (Navy/DARPA)	Aug 1984
TOR	May 1986
JRMB (Approval for new start)	Aug 1986
JMSNS	Dec 1986

G. (U) RELATED ACTIVITIES: Other government programs related to laser hydrography, airborne laser communications, strategic defense, atmospheric and oceanographic research, laser technology development, etc., have some areas of common technology. DARPA Tactical Airborne Laser Communications (TALC) development is coordinated with Navy to maximize efficiency of similar technology developments.

H. (U) OTHER APPROPRIATION FUNDS: NONE.

	FY 1988 Estimate	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
(U) PROCUREMENT					
OPN	NA	NA	NA	NA	Cont

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3 - Strategic Programs
Program Elemennt Title: TRIDENT II

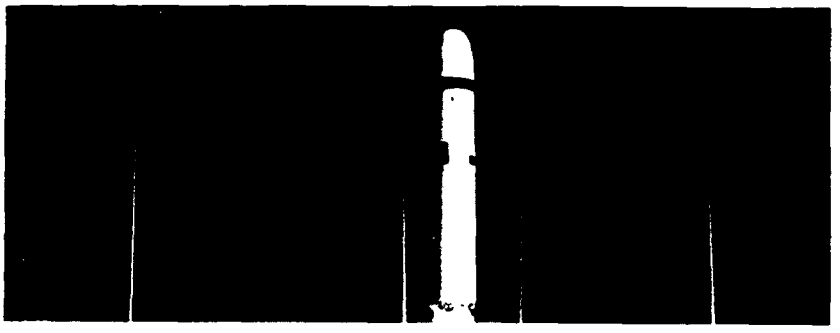
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1990 Estimate	To Complete	Total Program
J0951	TRIDENT II MISSILE	1,031,871	573,264	221,318	66,685	Continuing	Continuing
J1546	TRIDENT II SHIP SYSTEMS	6,000	1,488	836	3,985	Continuing	Continuing
Total		1,037,871	574,752	222,154	70,670	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF ELEMENT: The TRIDENT II (D5) Strategic Weapon System program (Project-J0951) 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 sprectrum 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3-Strategic Program
Program Element Title: TRIDENT II
Project Number: J0951 Project Title: TRIDENT II



POPULAR NAME: TRIDENT II

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		DAB III B: September			
Engineering Milestones		First DASO: AUG	IOC: DEC		
T&E Milestones		DT Ends:Jul Begin OT II: JAN	End OT II:DEC OT III Begins:JAN		
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Completion
Major Contract	779.1	392.8	163.4	33.5	6,998.0
Support Contract	170.8	103.9	22.8	1.8	1,630.2
In-House Support	79.5	57.3	9.6	.4	743.3
GFE/Other 1/	2.5	19.3	25.5	31.0	Continuing
Total	1,031.9	573.3	221.3	66.7	2/ 9,371.5 Continuing

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3-Strategic Program
Program Element Title: TRIDENT II

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 1988 Accomplishments:
   - Development flight test program continued through the fiscal year.
   - Comprehensive flight confidence ground testing and ground qualification testing of flight configured assemblies continued together with system level testing of first, second and third stage motors, and missile electronic and electrical systems.
   - The joint effort with the Department of Energy on the qualifications, fabrication, assembly and test of initial production type MK 5 reentry bodies was completed.
   - Missile and reentry body production disciplines were implemented for the fabrication, assembly and test of vehicles to be in the last series of pad launched development flight tests and in the subsequent development flight test series of submarine launched Performance Evaluation Missiles.
   - Design qualifications of second sources for MK 6 guidance critical components were evaluated.
   - System level tests of development launcher hardware at Hunters Point were completed.
   - The first deliverable fire control software programs were completed for use in system evaluation, training, and shipyard testing.
   - The fully integrated D5 navigation subsystem was tested at-sea on the USNS VANGUARD using prototype tactical equipment.
   - The test array used in development testing of accuracy instrumentation was installed at Cape Canaveral.
   - Major subsystem installations on board the SSBN 734 were completed allowing for the start of grooming tests.

2. (U) FY 1989 Program:
   - The TRIDENT II (D5) development flight test program will be completed late in the year with the launch of the last Performance Evaluation Missile from a D5 configured TRIDENT submarine.
   - Major effort will be expended on analyses of flight test results and preparation of design documentation.
   - A major underground test will be completed for survivability assessment of the missile body, MK 5 reentry body, and Department of Energy components.
   - Second sources of MK 6 guidance system critical components will deliver qualification hardware.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3-Strategic Program
Program Element Title: TRIDENT II

- Testing will be completed of the flight test support system at the Eastern Space and Missile Center and the system will have the capability of tracking both TRIDENT I (C4) and TRIDENT II (D5) missiles.
- Launcher/missile interface tests at Hunters Point will be completed.
- A fire control reliability demonstration will be conducted in the engineering development test berth at the subsystem contractor's plant.
- Reliability demonstration testing of new navigation equipments will be completed.
- Final testing of the Strategic Weapon System subsystems installed in the SSBN 734, the first D5 configured TRIDENT submarine, will be completed prior to planned delivery of the SSBN in December 1988.
- Weapon system accuracy evaluation will gain 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 will be issued that reflects these evaluations.

3. (U) FY 1990 Plans:
   - Meet a Dec 1989 IOC for the TRIDENT II (D5) Strategic Weapon System on OHIO Class SSBN 734. Initial operational capability may occur with less than a full load-out due to the reduction of procurement quantities.
   - Major effort will continue to be expended on analysis of development flight test results.
   - Development documentation for all D5 subsystem will be finalized.
   - Deployable software for the fire control subsystems will be finalized.
   - Navigation subsystem performance and availability, during at sea operations, will be validated.
   - D5 weapon system accuracy evaluation will continue to gain confidence based on analysis of development flight test results.
   - Laboratory installations at the TRIDENT Training Facility will be completed.
   - Performance of subsystem prime development contractors will be evaluated for purposes of determining incentive fees.
   - Effort will intensify for the SLBM Effectiveness Enhancement (SEE) Program which is needed to resolve critical technology issues associated with maintaining and enhancing the effectiveness of TRIDENT II (D5) in the face of the Soviet efforts to blunt the effectiveness of D5. This program has evolved from the Ballistic Missile Defense Penetration System effort initiated in FY 1984.
   - Effort will be expended in developing an SLBM Retargeting System (SRS).
4. (U) FY 1991 Plans:
   - TRIDENT II development Training Program efforts will conclude with the completion of contractor led development/curricula.
   - Evaluation of the performance of subsystem prime development contractors will continue for the purpose of determining incentive payments.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3-Strategic Program
Program Element Title: TRIDENT II

- 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) in the face of Soviet efforts to blunt its effectiveness.
- Effort will intensify to develop an SLBM Retargeting System (SRS).

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:
IMPACT OF CHANGES:

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIES	IMPACT ON SCHEDULE	IMPACT ON FY 1990 COST
TECH	None	None	None
SCHD	None	None	None
COST	None	None	-117,025

NARRATIVE DESCRIPTION OF CHANGES

1. TECHNICAL CHANGES: None
2. SCHEDULE CHANGES: None
3. COST CHANGES: The FY 1990 reduction of -117,025 reduces support for SLBM Effectiveness Enhancement (SEE) reduces SLBM Retargeting System (SRS); eliminates funding for Maneuvering Re-entry Vehicle (MARV) and Ballistic Earth Penetrating Weapon (EPW).

F. (U) PROGRAM DOCUMENTATION: DCP - 2/87; NAPDD #171-02 (SEE)-9/87 TEMP - 3/87; OR #196-02-88 (SRS)-1/88

G. (U) RELATED ACTIVITIES:

- Program Element 0604363N, Project J1546, TRIDENT II Submarine System. Identifies necessary subsystem changes to incorporate the TRIDENT II (D5) into the TRIDENT Submarine Baseline and develop the necessary weapon support systems and/or components.
- Program Element 0101221N,s Fleet Ballistic Missile System. Developments related to deployed POSEIDON (C3) and TRIDENT I (C4) Strategic Weapon Systems.
- 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3-Strategic Program
Program Element Title: TRIDENT II

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
WPN #3, #4	2,041.3	1,865.6	1,676.6	1,353.9	Cont.	Cont.
MILCON Kings Bay GA, Bangor, WA	18.1	15.4	7.6	115.6	Cont.	Cont.

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

J. (U) TEST AND EVALUATION: This information is contained in the FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604363N Budget Activity: 3-Strategic Program
Program Element Title: TRIDENT II
Project Number J1546 Project Title: TRIDENT II Ship Systems

B. (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 will be accomplished during initial construction of the submarine. Ship delivery is being extended one year, to December 1988, to accommodate the required ship modifications and weapon system installation, but will still support the December 1989 Initial Operational Capability of the TRIDENT II (D5) missile.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - Continued development of weapon support system interfaces and components.
   - Continued evaluation of weapon and weapon support systems operational parameters and installation of equipments in the weapon support system land based evaluation facility.
2. (U) FY 1989 Program:
   - Continuing development of weapon support system interfaces and components in response to submarine launched Performance Evaluation Missile (PEM) development flight test results.
   - Continuing evaluation of weapon and weapon support system operational parameters and installation of equipments.
3. (U) FY 1990 Plans:
   - Continue development of weapon support system interfaces and components in response to submarine launched Performance Evaluation Missile (PEM) development flight test results.
   - Continue evaluation of weapon and weapon support operational parameters and installation of equipments.
4. (U) FY 1991 Plans:
   - Complete development of weapon support system interfaces and components.
   - Complete evaluation of weapon and weapon support operational parameters and installation of equipments.
5. (U) Program to Completion: Complete necessary modifications..

D. (U) WORK PERFORMED BY: In-house: Naval Sea Systems Command, Washington, DC. Contractors: General Dynamics Electric Boat, Groton, CN.

E. (U) RELATED ACTIVITIES: TRIDENT Submarine Systems, Program Element 0101228N/S0004.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605856N Budget Activity: 3 - Strategic Program
Program Element Title: Strategic Technical Support

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0100	Biomed Spt Subsys	700	0	1,199	1,203	Cont.	Cont.
R0128	Mgmt and Tech Support, Strat	3,406	3,146	4,036	4,155	Cont.	Cont.
T1038	Acoustic & Non-Acoustic Anal Spt	0	0	999	1,184	Cont.	Cont.
	Total	4,106	3,146	6,234	6,542	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: M0100 Biomedical Support for Submarines 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 capbilities 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 targeting 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.

DECLASSIFY ON: OADR

Program Element: 0605856N Budget Activity: 3-Strategic Program
Program Element Title: Strategic Technical Support
Project Number: M0100 Project Title: Biomedical Support for Submarine System

C. (U) PROJECT DESCRIPTION: Increase effectiveness and enhance performance of critical submarine tasks. Upgrade target acquisition, identification, and tracking capabilities to maximize effectiveness of defensive and offensive systems. Evaluate man-machine interface in auditory and visual systems 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 1988 Accomplishments: Reported improvement gained by color-coding critical bearings. Reported drawbacks of using sealed circumaural headsets. Reported magnitude and significance of operator hearing loss.

2. (U) FY 1989 Program: N/A

3. (U) FY 1990 Plans: Report operator performance using 1,2,3, 4 bit visual displays. Recommend optimal color coding and symbology for main HP-9000 display. Specify detection decrement if optimal bandwidth filters not used. Report efficacy of auditory protection provided by output limiting. Report efficacy of digital adaptive filtering.

4. (U) FY 1991 Plans: Specify optimal method for encoding ocean noise for visual sonar. Report on background noise in sonar control room and performace effects. Report ability of temporally based processing to improve detection. Report requirement for different digital processing strategies.

5. (U) Program to Completion: Report at-sea test results of binaural display technique. Report performance effects of a spectrally based processor. Recommend optimal color coding for second category of HP-9000 display. Report optimal filtering techniques for waterfall display. Analyze adding color coded narrowband data to broad band display. This is a continuing program.

E. (U) WORK PERFORMED BY: Inhouse: NAVSUBMEDRSCLAB, New London, CT. Contractors: None.

F. (U) RELATED ACTIVITIES: None

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

Program Element: 0605856N Budget Activity: 3-Strategic Program
Program Element Title: Strategic Technical Support
Project Number: R0128 Project Title: Mngt and Tech Supp, Strat

C. (U) PROJECT DESCRIPTION: 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. 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 1988 Accomplishments: Trade-off analyses of system mixes and reduction in forces due to arms limitation and INF treaty negotiations. Wargame seminars training senior staff in nuclear implementation procedures. Studied optimization of special nuclear material resources. Analyzed SIOP 6D SLBM footprints in graphic format. SSBN security studies. Started analysis of weapon systems requirements related to relocatable targets. Charted Strategic Think Tank to determine future directions of Navy strategic forces, define role of nuclear capable general purpose forces, evaluate arms control concepts and proposals, and assess implications of Strategic Defense.

2. (U) FY 1989 Program: Continue: to assess 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 C^3I assets; analysis of weapon systems requirements related to relocatable targets; wargame seminars to train senior staff in nuclear implementation procedures; Strategic Think Tank Effort. Assess future technologies, threats, and long term requirements for Navy strategic systems.

3. (U) FY 1990 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 C^3I assets; Strategic Think Tank effort. Evaluate sea-based strategic and strategic related nuclear forces to meet the needs of future national policy.

4. (U) FY 1991 Plans: Continue: to assess tradeoffs relating to weapon configuration, targeting policy, ASW threat and operational requirements for current and future sea-based strategic and strategic related nuclear forces and C^3I assets; Strategic Think Tank effort. Evaluate sea-based strategic and strategic related nuclear forces to meet the needs of future national policy.

5. (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 Corp.; Sonalysts, Inc; Johns Hopkins University/Applied Physics Laboratory.

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.

Program Element: 0605856N Budget Activity: 3-Strategic Program
Program Element Title: Strategic Technical Support
Project Number: T1038 Project Title: Acoustic and Non-Acoustic Analysis Support

C. (U) PROJECT DESCRIPTION: Data collection and analysis for exploitation of acoustic and non-acoustic sensor data in support of sensor and weapons systems development. Also supports development of effective ASW tactics and , Program provides analysis, unique hardware and software development for processing sensor data at Naval Technical Intelligence Support Center (NISC).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments (funded under 0605853N): NTIC' A developmental memory system is in production which will allow data storage and transfer of digital , displays from the new acoustic processing system.

2. (U) FY 1989 Plans (funded under 0605853N) In addition, a developmental distributed acoustic processing architecture will be identified for the NTIC laboratory in order to provide an increase in acoustic data processing efficiency.

3. (U) FY 1990 Plans: NTIC will begin implementation of a fully digital architecture for acoustic signal processing.

4. (U) FY 1991 Plans: Incorporated into the acoustic laboratory architecture.

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

E. (U) WORK PERFORMED BY: In-house: NTIC. Contractors: ESL Inc.

F. (U) RELATED ACTIVITIES:
- (U) Program Element 0603784N: Fixed Distributed System (FDS)
- (U) Program Element 0204311N: Integrated Undersea Surveillance System (IUSS)
- (U) Program Element 0204313N: Surveillance Towed Array Sensor System

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

H. (S) INTERNATIONAL COOPERATIVE AGREEMENTS:
- (U) - Exchange of acoustic intelligence between U.S. and Japan.
- (U)

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			E250 DT	E250 OT	
Engineering Milestones	E250 PDR	E250 CDR	E250 VRR	E260 SCRB	
T&E Milestones			E250 TECHEVAL	E250 OPEVAL	
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract					
Support Contract					
In-House Support	3,331	1,432	6,915	6,877	Continuing
GFE/ Other (Trainers)			16,300	14,200	Continuing
Total	3,331	1,432	23,215	21,077	Continuing Continuing

Program Element: 0204134N Budget Activity: 4
Program Element Title: A-6 SQUADRONS
Project Number: W1638 Project Title: A-6E WEAPONS INTEGRATION

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Enhances A-6 all-weather capability and survivability. System Weapons Integration Program (SWIP) provides for integration of a variety of standoff weapons (HARM, Harpoon IC, IR Maverick, Laser Maverick and SLAM) along with the advanced data link pod (AWW-13). A Forward Air controller-Target Data Communicator unit (FAC-TDC), has been developed and is completing Navy and Marine Corps evaluation. Lessons learned during the REAL NIGHT ANALOG Night Attack Navigation system development will also be examined for possible retrofit. In addition, the completion of development of the A-6/F-14 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 1988 Accomplishments:
   a. (U) Commenced SWIP and FAC-TDC airborne unit OPEVAL.
   b. (U) Commenced integration of the AWW-13 and the SLAM missile.

2. (U) FY 1989 Program:
   a. (U) Complete FAC-TDC OPEVAL.
   b. (U) Commence weapon delivery accuracy (WDA) Improvement program.
   c. (U) Continue integration of the AWW-13 and the SLAM missile.

3. (U) FY 1990 Plans:
   a. (U) Commence TECHEVAL and OPEVAL of AAW-13 and SLAM integration (E250).
   b. (U) Commence extended range Harpoon, Integrated Night Vision Systems (INVS), 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 the F-14/A-6 WST.

4. (U) FY 1991 Plans:
   a. (U) Complete OPEVAL of AAW-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 the F-14/A-6 WST.

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

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.

Program Element: 0204134N Budget Activity: 4
Program Element Title: A-6 SQUADRONS
Project Number: W1638 Project Title: A-6E WEAPONS INTEGRATION

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+$14,549

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Budget transfer of the F-14/A-6 WST to PE 0204134N from PE 0603257N has incrased R&D allocation in FY90 by +$14,549. This does not represent an increase in RDT&E,N efforts.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: P.E. 0205601N, HARM Improvement; PE 0204271N Harpoon; PE 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: See Congressional Data Sheet for A-6.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1662	F/A-18 Imp.	11,829	12,957	14,900	14,100	Cont.	Cont.
W2065	Radar Upgrade	0	0	35,744	63,780	Cont.	Cont.
TOTAL		11,829	12,957	50,644	77,880	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element contains two projects, W1662 F/A-18 Aircraft Improvements and W2065, F/A-18 Radar Upgrade. The F/A-18 is capable selected use of external equipment of performing either fighter or attack missions through. 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 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					
Engineering Milestones					
T&E Milestones					
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	5,438	9,487	3,900	4,840	Continuing
Support Contract					
In-House Support	6,391	3,470	11,000	9,260	Continuing
GFE/ Other					
Total	11,829	12,957	14,900	14,100	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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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, reconnaisance, 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 pre-planned product improvements (i.e., capabilty enhancements).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Integrated and tested new antenna technologies to improve EW aircraft effectiveness.
   b. (U) Conducted developmental, technical and operational evaluations of a Night Attack configured F/A-18.
   c. (U) Continued contractor effort for integration of AMRAAM.
   d. (U) Continued integration test of the ASPJ.
2. (U) FY 1989 Program:
   a. (U) Continue technical and operational evaluations of Night Attack configured F/A-18.
   b. (U) Continue integration tests for the ASPJ.
   c. (U) Conduct evaluations of the following integrations: I²R MAVERICK, HARM Block III, AWW-13 Advanced Data Link.
   d. (U) Analyze data from Navy flight testing and operational flights and initiate appropriate software modification/development.
   e. (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.
   f. (U) Engineering and technical support for AAS-38 tracker and F/A-18 C/D WSSA.
   g. (U) Provide support to ATARS program (PMA-253) for preliminary testing of RECCE/ATARS common nose and associated air data computer (ADC) algorithms.
   h. (U) Initiate integration of full HARPOON and SLAM capability.
   i. (U) Continue contractor effort for integration of AMRAAM.
   j. (U) Contribute toward a shared development program for an AYK-14 upgrade.
   k. (U) Contribute toward system development of ALE-47 CMDS.

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

3. (U) FY 1990 Plans:

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 (PMA-253) for testing of mission computer software.

g. (U) Initiate pre-planned product improvement (P^3I) design efforts to integrate an all weather reconnaissance capability in to the upgrade APG-65 radar.

4. (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 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) Initiate shared development of Morning After.

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

f. (U) Provide support to ATARS program for ATARS system integration flight testing.

g. (U) Initiate software development and hardware design required to integrated an all weather reconnaissance capability into the upgraded APG-65 radar.

5. (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, DC. 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, Hawthorne, CA (center/aft fuselage subcontractor to McDonnell); Pratt & Whitney, East Hartford, CT. (F-404 engine).

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

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	None

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:

NDCP	9/86
TEMP	9/87

G. (U) RELATED ACTIVITIES: The Secretary of the Navy approved an F/A-18 Night Attack program on 24 December 1984 to be conducted in parallel with a similar AV-8B effort (PE 0604214N), with a joint R&D cap of $90M. The program consists of development and integration of the following sub-systems: fixed-mode-field-of-view navigation FLIR, raster scan heads-up display, night vision goggles compatibility, and decoupled aft cockpit/independent displays. Production deliveries of both F/A-18 and AV-8B Night Attack aircraft will begin in October 1989. The F/A-18 program is currently integrating AMRAAM (PE 0604314N) and ASPJ (PE 0604226N) capabilities respectively into two F/A-18 validation aircraft. These integration programs are separate RDT&E efforts which do not duplicate RDT&E efforts conducted by the AMRAAM or ASPJ program office.

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

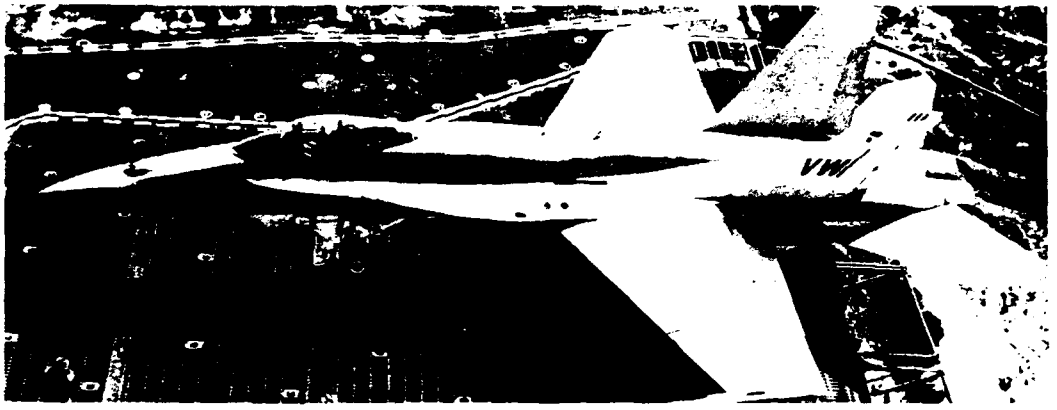
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) PROCUREMENT	Not Applicable				Cont.
APN-5/#43					
APN-1#11					

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Technical discussions are underway for a multi-national, multi-aircraft Morning After/NATO Night Attack system (A-12, 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 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL 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

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		II 03/89			IIIA 1/93 IIIB 10/93
Engineering Milestones			PDR 05/90	CDR 05/91	
T&E Milestones		TEMP 01/89		BNCH TST 06/91	DT II 05/92 OT II 07/93
Contract Milestones		PR AP J&A AUDIT	FSD CONTRACT 10/89		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract			33,606	59,436	Continuing
Support Contract					
In-House Support			2,138	4,344	Continuing
GFE/ Other					
Total			35,744	63,780	Continuing Continuing

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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 a minimum developmental programs and maximizes SRA commonality, providing for minimum risk and affordable improvement to the F/A-18 to counter the common enemy threats.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) IR&D accomplished similarity with existing APG-65/70/71 radars (75% SRA commonality), dem/val phase considered complete due to commonality.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans:

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) Place orders for long-lead time parts.
f. (U) Initiate design of MCAIR/China Lake radar benches.

4. (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.

5. (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.

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

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 Center, 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).

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: This effort not previously budgeted in FY 1990.

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Increase APG-65 capabilities	None	+$35,744
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Department and Navy adjustment of $+35,744 provides funding for radar upgrade program.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: None.

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

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

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) APPN/P-1 APN #11, 43		Not Applicable			Cont.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Technical discussion are underway with Canada and Australia explore the possibility of a cooperative development program. Both countries currently own and operate the F/A-18 and have signed Statements of Intent (SOI's) to actively work to define a cooperative development program.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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

POPULAR NAME: HAWKEYE

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	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/ OT IIC	UDP II TECH UDP II DTIIE UDP II OT IID	UDP II OPEV
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	13,432	10,800	25,000	11,700	62,932 0
Support Contract					
In-House Support	8,295	11,974	13,932	25,195	67,029 9,561
GFE/ Other					
Total	21,727	22,774	38,932	36,895	129,961 9,561

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

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 replacable 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 Group 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 1988 Accomplishments:

a. (U) Completed flight and lab testing of Group I software.
b. (U) Conducted DT-II-E on Group I software.
c. (U) Continued flight testing and integration of Group II hardware.

2. (U) FY 1989 Program:

a. (U) Conduct OT-IIB of Group II.
b. (U) Complete DT-IIF/DT-IIIA (TECHEVAL/BIS) of Group I.
c. (U) Commence Operational Evaluation, OT-II-C, of Group I.
d. (U) Continue flight testing and integration of Group II hardware.

3. (U) FY 1990 Plans:

a. (U) Conduct Navy flight evaluation of Group II, DT-IIC/OT-IIC.
b. (U) Complete Operational Evaluation of Group I.

4. (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-IID, for Group II.

5. (U) Program to Completion:

a. (U) Complete Operational Evaluation of Group II.

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

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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-$60,560

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Navy and Department adjustment of -$60,560 eliminated adaptive system development and delays Group II IOC by one quarter.

F. (U) PROGRAM DOCUMENTATION:

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

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, ATSA. There is no unnecessary duplication of effort within the Navy with respect to this program.

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

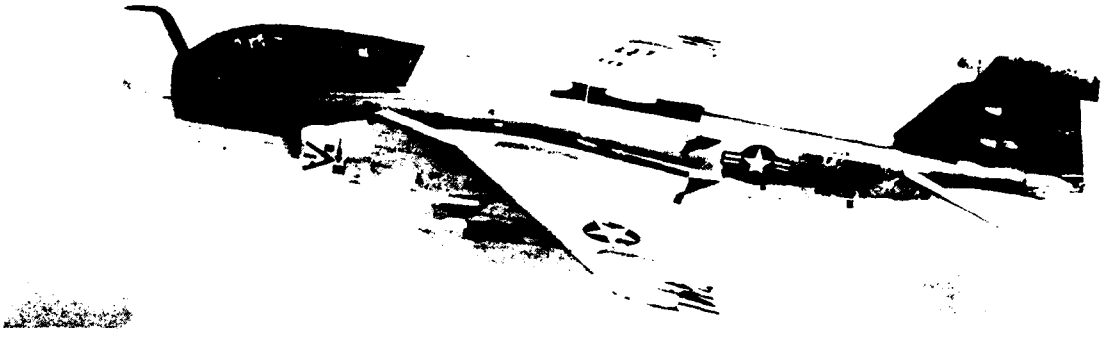
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) APPN/P-1 APN#23, 24, 54	Procurement justification material does not contain this level of detail.					

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

J. (U) TEST AND EVALUATION DATA: Not applicable to OSD/OMB Budget submission.

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			Production Release		Complete
Engineering Milestones	Critical Design Review				
T&E Milestones		Performance Verification	Performance Test	Flight Test	Complete
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	0	0	10,300	1,000	11,300
Support Contract	0	0	1,200	1,000	2,200
In-House Support	0	0	1,519	106	1,625
GFE/Other	0	0	0	0	0
Total	0	0	13,019	2,106	15,125

FY 1990/1991 BIENNIAL 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

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This program/project will develop enhancements necessary for the EA-6B airframe, flight avionics and related systems, and a J52 derivative engine. The derivative engine, the 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) Insure 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Not Applicable.

2. (U) FY 1989 Program:

a. (U) Not Applicable.

3. (U) FY 1990 Plans:

a. (U) Conduct altitude performance tests by Pratt and Whitney and the Naval Propulsion Center.

b. (U) Conduct the Accelerated Simulated Mission Endurance Test (ASMET) by Pratt and Whitney.

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

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

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 Aerospace Corporation, and the Naval Air Test Center.

b. (U) First production engine delivered.

5. (U) Program to Completion:

a. (U) Program complete in FY91.

FY 1990/1991 BIENNIAL 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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Propulsion Center, Trenton, NJ; Naval Air Test Center, Patuxent River, MD. CONTRACTORS: Pratt and Whitney, West Palm Beach, FL.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+13,019

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: Realignment of funding for J52/P409 engine development.

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

G. (U) RELATED ACTIVITIES: Advanced Capability (ADVCAP) Weapons System for the EA-6B is being developed under Program Element: 0604270N Consolidated EW Program.

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

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN/#4, #15	Procurement justification material does not contain this level of detail.				Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: See Congressional Data Sheets.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0661	Combination Radio	5,872	7,059	8,383	8,180	Cont.	Cont.
X0725	Communications Automation	(1,880)*	1,552	893	702	Cont.	Cont.
	Total	5,872	8,611	9,276	8,882	Cont.	Cont.

* Funded under PE 0604232N in FY 1988

B. (U) BRIEF DESCRIPTION OF ELEMENT: Included in this Program Element are the development of anti-jam radios, antennas, VHF Relay Pallets and integration of ECCM radios into Navy ships. Developments will significantly improve the Navy's ability to maintain reliable communications in a hostile environment. Such capability is essential to effective command and control and support of mobile military forces.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204163N Budget Activity: 4
Program Element Title: Fleet Telecommunications (Tactical)
Project Number: W0661 Project Title: Combination Radio

C. (U) PROJECT DESCRIPTION: (U) This project develops airborne/shipboard 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. Shipboard SINCGARS will provide VHF(FM) jam resistant communications, a Digital Communications Terminal (DCT) and a VHF relay pallet aboard Naval Gun Fire Support and Amphibious ships. Shipboard SINCGARS will be an NDI radio but filters and multicouplers must be developed.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued AN/ARC-210 development/integration (F/A-18).
   b. (U) Completed AN/ARC-210 software design review.
   c. (U) Started shipboard SINCGARS program documentation preparation.
   d. (U) Commenced analysis of shipboard SINCGARS EMI.
2. (U) FY 1989 Program:
   a. (U) Conduct AN/ARC-210 Design Approval Tests.
   b. (U) Continue AN/ARC-210 integration into F/A-18.
   c. (U) Start AN/ARC-210 reliability development test.
   d. (U) Continue shipboard SINCGARS EMI analysis.
3. (U) FY 1990 Plans:
   a. (U) Conduct TECHEVAL for AN/ARC-210 ECCM Radio.
   b. (U) Complete AN/ARC-210 reliability development test.
   c. (U) Start AN/ARC-210 Helo integration.
   d. (U) Complete shipboard EMI analysis/programmatic documentation package for SINCGARS.
   e. (U) Issue RFP for shipboard SINCGARS.
4. (U) FY 1991 Plans:
   a. (U) Complete AN/ARC-210 OPEVAL and interoperability tests.
   b. (U) Obtain Milestone III production decision for AN/ARC-210.
   c. (U) Award development contract for shipboard SINCGARS.
5. (U) Program to Completion:
   a. (U) 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., NAVELEXACT, St. Inigoes, MD. CONTRACTORS: Rockwell International Corp., Collins Defense Communications, Cedar Rapids, IA; McDonnell Aircraft Co., St. Louis, MO; VITRO Corp, Silver Spring MD; Chelton Electrostatics, London, U.K.

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

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION:

(U) Afloat Automated Network (AAN): This effort develops the provisions for high data rate message transfer within the Navy Modular Automated Communication System (NAVMACS). Phased development provides stand alone network for processing messages intra-battle group. Later development will integrate it into NAVMACS.

(U) Navy Standard Teleprinter (NST) Ongoing effort establishes a replacement equipment for teletypes which have been in Navy inventory for 30 plus years. The project completed the Development Testing (DT-II)/ Operational Evaluation (OT-II) stage leading to a production decision in December 1988.

(U) High Speed Fleet Broadcast (HSFB): Resolves long standing throughput and system flexibility shortcomings in a vital command and control fleet broadcast link by replacing the existing Fleet Broadcast with a more efficient, volume responsive, broadcast.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded under PE 0604232N).
   a. (U) AAN: Began lab feasibility demonstration Phase I.
   b. (U) NST: Completed DT-II (1/88) and OT-II (6/88).
   c. (U) HSFB: Prepared development options paper.
2. (U) FY 1989 Program:
   a. (U) AAN: Continue software protocol development.
   b. (U) NST: Obtain production decision and transition to production.
   c. (U) HSFB: Conduct feasibility demonstration and begin implementation.
3. (U) FY 1990 Plans:
   a. (U) AAN: Complete lab demonstration feasibility Phase I
   b. (U) HSFB: Continue implementation.
4. (U) FY 1991 Plans:
   a. (U) AAN: Complete lab demonstration feasibility Phase II.
   b. (U) HSFB: Continue implementation.
5. (U) Program to Completion:
   a. (U) AAN and HSFB are continuing programs.

E. (U) WORK PERFORMED BY: IN-HOUSE: Space and Warfare Systems Command, Washington, DC; Naval Research Laboratory, Washington, DC; 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)

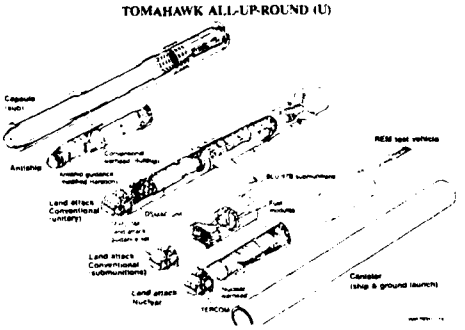
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
OPN #134	0	64	8,675	11,967	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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

TOMAHAWK ALL-UP-ROUND (U)



POPULAR NAME: TOMAHAWK Cruise Missile

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	IOC 109D	MS 2 BLK 3 MS 3A 109D MS 3B SWG-3	MS 3B 109D	MS 3A Blk 3 IOC Flex	MS 2 TASM Upgrade MS 3B Blk 3 IOC Blk 3
Engineering Milestones	Eng Dev Blk 3	Eng Dev Blk 3, Flex	DES Rev. Blk 3		
T&E Milestones	OPEVAL 109D		DT. Blk 3	DT/OT Blk 3	DT/OT TASM Upgrade
Contract Milestones	TLAM/D;Flex VLS Int. Blk 3	Dev. VLS Int., Blk 3, Flex	Flex, Blk 3 VLS Int.	Flex, Blk 3, VLS Int.	Blk 3, VLS Int. TASM Upgrade

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(24,611)*	(23,848)*	31,763	22,760	1,179,753
Support Contract					
In-House Support	(11,116)*	(10,770)*	14,389	10,325	539,254
GFE/Other					
Total	(35,727)*	(34,618)*	46,152	33,085	Continuing Continuing

BLK 3 = TLAM/C Block III

* Costs associated with Mission Planning 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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The TOMAHAWK Cruise Missile provides an attack capability against targets at sea (Anti-ship TOMAHAWK) and on land (Land-Attack TOMAHAWK). 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 1988 Accomplishments: (From P.E. 0604367N) Complete development of TLAM/D submunition dispenser and the TOMAHAWK Weapons Control System Block II. Begin TLAM/C Block III engineering development which consolidates product improvements for navigation (GPS), guidance (DSMAC IIA), Insensitive Munition (IM) and propulsion (402 Engine). Continue Flexible Targeting, VLS Integration and Independent Software Nuclear Safety Analysis (ISNSA).
2. (U) FY 1989 Program: (From PE 0604367N) Continue the development engineering of TLAM/C Block III, Flexible Targeting, VLS integration and ISNSA.
3. (U) FY 1990 Plans: Continue the development engineering of TLAM/C Block III, Flexible Targeting, VLS integration, ISNSA.
4. (U) FY 1991 Plans: Complete the development of Flexible Targeting; and continue the development engineering of TLAM/C Block III, VLS integration ISNSA.
5. (U) Program to Completion: Complete Engineering Development of TLAM/C Block III, and TASM Upgrade developments. Continue ISNSA and VLS integration.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapon Center, China Lake, CA; Naval Underwater Systems Center, Newport, 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,

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

Indianapolis, IN; Naval Ocean System Center, San Diego, CA. Contractors: McDonnel Douglas Astronautics, St. Louis, MO; General Dynamics/Convair, San Diego, CA; Logicon, San Pedro, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Insen. H.E./Ex. Range	None	None
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

No accurate cost comparison possible as previously included mission planning efforts consolidated elsewhere (PE 0604367N).

1. (U) TECHNICAL CHANGES: High explosive warhead modified to incorporate insensitive munition requirement. This may also reduce warhead size to allow more fuel (thus greater range).
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: Not applicable.

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 Elements 0604367N (Theater Mission Planning Center) and 0604707N (Over-The-Horizon Targeting) contain resources for development of land attack mission planning capabilities and for Over-The-Horizon (OTH-T) detection and targeting in anti-surface (TASM) scenarios. A TOMAHAWK vertical launch capability for SSN-688 class attack submarines is being developed in Program Element 0604370N. Although these programs are related, each has a separate mission; the TMPC provides the actual flight mission to the missile and the VLS provides the platform. There is no overlapping of effort, yet each system impacts the other.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
WPN/# 6,7,30	863,104	736,165	608,215	715,638	Continuing
OPN/# 230	49,059	34,676	42,077	23,140	139,281
OPN/# 231	7,109	2,808	6,171	5,465	14,189

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

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

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0766	Integrated Undersea Surveillance (IUSS) Development	33,424	40,488	48,069	50,927	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
IUSS provides the majority of the U.S. Navy's open capability and 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; the and SURTASS Reduced Diameter Array (RDA) tasks. Funding for Fixed Distributed System (FDS) shore signal processing system under this program was consolidated into PE 0603784N, X1312 by Department action for FY 1988 and beyond.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: FDS effort consolidated into PE 0603784N, X1312 (1Q/FY 1988); Conducted Adaptive Beamformer (ABF) and Integrated Acoustic Display/Wide Band Acoustic Recall (IAD/WBAR) testing; Continued IAD/WBAR development to meet fleet requirements; Continued development of subsystem software; Commenced installation onboard research vessel of Awarded RDA Engineering Development Model (EDM) contract and test components; Installed LUNAR EDM in Fleet for evaluation and prepared Surveillance Direction System (SDS) A-specification.

2. (U) FY 1989 Program: Continue IAD/WBAR development and continue development of NAVFAC Whidbey Island software; Test multiple select production Conduct critical design review for RDA.

3. (U) FY 1990 Plans: Commence development program for full-spectrum acoustic signal processing, phase III backfit, demux replacement, and lightwave cable locator; Award FSED fixed price contracts for and for to leader/follower; Deliver RDA EDM and

Program Element: 0204311N Budget Activity: 4
Program Element Title: Undersea Surveillance Systems
Project Number: X0766 Project Title: Integrated Undersea Surveillance (IUSS) Developments

Commence Advanced Surveillance Acoustic Prediction System (ASAPS) development; Commence development of Secure Acoustic Data Relay (SADR II) point-to-point between COSL and FDS I.

4. (U) FY 1991 Plans: Continue development program for signal processing, phase III backfit, demux replacement and lightwave cable locator; TECHEVAL/OPEVAL for SURTASS Block Upgrade. Point-to-point SADR II development in the Atlantic; Continue ASAPS development.

5. (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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHD	N/A	N/A	N/A
COST	N/A	N/A	N/A

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: N/A
2. (U) SCHEDULE CHANGES: N/A
3. (U) COST CHANGES: N/A

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 84-12	25 Aug 1985
OR 038-95-88	5 Jul 1985
AP 86-16	27 Oct 1986

G. (U) RELATED ACTIVITIES: PE 0603784N, Fixed Distributed Systems (FDS) - a PE 0204313N, Surveillance Towed Array Sensor (SURTASS) System - provides a mobile, long range, passive undersea surveillance capability; PE 0603747N, Advanced ASW Technology Demonstration - proves active and passive concepts through at sea experiments; PE 0603792N, Critical Sea Test - provides a series of extensive at sea experiments.

Program Element: 0204311N Budget Activity: 4
Program Element Title: Undersea Surveillance System
Project Number: X0766 Project Title: Integrated Undersea Surveillance (IUSS) Development

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. OPN #70	54,332	29,836	21,096	38,687	Cont.	Cont.

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0758	SURTASS	8,093	4,390	5,546	7,550	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 1988 Accomplishments: Completed system specification review; Incorporated Enhanced Modular Signal Processor (EMSP) (AN/UYS-2) into design.

2. (U) FY 1989 Program: Complete Preliminary and Detailed Design Review; Complete Critical Design Review; Begin software code and test.

3. (U) FY 1990 Planned Program: Continue Block Upgrade Software code and test; Begin in-plant acceptance testing of Block Upgrade.

4. (U) FY 1991 Planned Program: Complete Block Upgrade software code and test; Begin Manpower Control Upgrade software development to offset and limit the manpower requirements for the Block Upgrade; Develop Operational Readiness Inspection (ORI) hardware specifications.

5. (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 0203411N, 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. SCN #20	0	58,800	68,700	0	Cont.	Cont.
OPN #74	47,313	7,465	15,347	24,600	Cont.	Cont.

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

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OTH Amphibious Assault Command & Control	0	0	0	4,011	1,004	5,015

B. (U) PROJECT DESCRIPTION OF ELEMENT: Deployment of the Landing Craft Air Cushion (LCAC) allows amphibious task forces to launch surfaceborne assault units from much greater off-shore distances, i.e., 24nm or more. Because of its dependency on surface radars, the current capability to identify, track, and control such units is degraded at distances beyond the radar horizon (12-15 nm). This project adapts the USMC's Position Location Reporting System (PLRS) for OTH position location, identification, and track of the surface assault.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.
2. (U) FY 1989 Program: Not Applicable.
3. (U) FY 1990 Plans: Not Applicable.
4. (U) FY 1991 Plans:
   a. (U) Contract for development of system prototypes.
   b. (U) Commence full-scale engineering development (Milestone II).
5. (U) Program to Completion:
   a. (U) Complete full-scale engineering development.
   b. (U) Conduct DT-II and OT-II and Milestone III review.

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

E. (U) RELATED ACTIVITIES: Program Element 0206626M Position Location Reporting System (PLRS); Program Element 0603260N NAVSTAR GPS; Program Element 0204163N Single Channel Ground and Airborne Radio System (SINCGARS).

F. (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 (SCN) #27	Not Applicable				Cont.	Cont.

G. (U) International Cooperative Agreements: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0431	Tactical Aircrew Combat Training Syst.	2,870	4,164	6,928	6,889	Cont.	Cont.
W1414	Integrated Air Warfare Training Complex (Fallon)	2,452	0	0	0	0	57,046
X1823	Enhanced Naval Warfare Gaming System	3,064	2,059	2,145	2,116	Cont.	Cont.
TOTAL		8,386	6,223	9,073	9,005	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops state-of-the-art instrumentation systems to support fleet proficiency training and tactics assessment. It develops Tactical Aircrew Combat Training System (TACTS) capabilities which support the Naval Strike Warfare Center (NSWC) at NAS Fallon, NV, 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 is also improving 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. This program develops advanced state-of-the-art instrumentation to support fleet proficiency training and tactics assessment. The Enhanced Naval Warfare Gaming System (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, ENWGS will focus on strategy and tactical deployment, operational planning, war gaming and decision making, tactics evaluation and post-exercise analysis. The capabilities are not available in any other system.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204571N Budget Activity: 4
Program Element Title: SPECIAL PROJECTS
Project Number: W0431 Project Title: TACTICAL AIRCREW COMBAT TRAINING SYS.

C. (U) PROJECT DESCRIPTION: This project develops state-of-the-art capabilities for the TACTS to include: (1) full strike training capability including war-at-sea, (2) capability of interfacing TACTS to the F/A-18 and future aircraft weapon system data buses, (3) capability to present computer generated electronic warfare threats and (4) evaluate aircrew performance.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued development of an encryption for TACTS/MSR.
   b. (U) Continued development of HARM and PHOENIX capabilities.
   c. (U) Continued testing of new aircraft interfaces, AISI, and EW.

2. (U) FY 1989 Program:
   a. (U) Continue development of encryption capability.
   b. (U) Initiate universal POD development.
   c. (U) Develop and/or update weapons and EW simulations.

3. (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) Continue universal POD development.

4. (U) FY 1991 Plans:
   a. (U) Complete the AIM-54 (PHOENIX) and laser training capability.
   b. (U) Continue the AGM-88A training capability development.
   c. (U) Initiate an AGM-84 (HARPOON) training capability.
   d. (U) Continue universal POD development.

5. (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 (with the Navy as lead) 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)

(U) APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APN #71	675	7,796	7,270	6,913	Cont.
OPN #214	7,642	6,500	13,986	7,301	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 00204571 Budget Activity: 4
Program Element Title: SPECIAL PROJECTS
Project Number: W1414 Project Title: TACTS FALLON

C. (U) PROJECT DESCRIPTION: The Fallon Integrated Air Warfare Training Complex is a state-of-the-art, computer-driven instrumentation system designed to provide advanced tactical training for operational aircrews. The system is capable of tracking 36 high-activity aircraft. Fallon TACTS is the prototype for all future Navy TACTS systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Incorporated additional threat emitters.
   b. (U) Initiated range expansion.
   c. (U) Completed Link 11 installation.
   d. (U) Incorporated disk based display subsystem.

2. (U) FY 1989 Program: Program Completed.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN#214		Not Applicable			Cont.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0204571N Budget Activity: 4
Program Element Title: SPECIAL PROJECTS
Project Number: X1823 Project Title: ENHANCED NAVAL WAR GAMING SYS (ENWGS)

C. (U) PROJECT DESCRIPTION: The Enhanced Naval Warfare Gaming System will provide realistic Battle Group-level training for senior Naval officers and staff, and will support the Tactical Warfare Training Curriculum at Tactical Training Groups. ENWGS will focus on strategy and tactics, operational planning, wargaming and decision making, tactics evaluation, and post-exercise analysis. These capabilities are not available in any other system.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Activated ENWGS Network (DDN) and remote sites.
   b. (U) Delivered Release 2 software to Government and host sites.
   c. (U) Began development of Release 3 software.

2. (U) FY 1989 Program:
   a. (U) Delivery of Release 3 software (installment 1).
   b. (U) Full Network operation for large-scale games.
   c. (U) Begin research on new system architecture.

3. (U) FY 1990 Plans:
   a. (U) Install Development Release 3B software and test at System Support Activity (SSA).
   b. (U) Conduct Development Release 4 training.

4. (U) FY 1991 Plans:
   a. (U) Install Development Release 1C software at SSA.
   b. (U) Conduct Development Release 5 training.

5. (U) Program to Completion:
   a. (U) Replace hardware/re-host software on ENWGS follow-on.
   b. (U) Incorporate Ada and other wargaming technology into target system.
   c. (U) Procure hardware and software based on new system architecture.
   d. (U) Complete remaining two installments of Release 3 Software.
   e. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Electronic Systems Engineering Center, Portsmouth, VA. CONTRACTORS: Computer Sciences Corp., Morristown, NJ.

F. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) OPN	Procurement justification material does not contain this level of detail.				

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0205601N Budget Activity: 4
Program Element Title: HARM IMPROVEMENT

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1780	High Speed Antiradiation Missile Imp.	4,149	3,882	5,096	0	0	33,626

B. (U) BRIEF DESCRIPTION OF ELEMENT: The element supports two upgrades to the HARM guidance section: Block III and Block IV.

HARM Block IV will address antenna, receiver, and video processor hardware and software changes to the HARM guidance section improving HARM's performance against new and anticipated threats. Block IV and Low Cost Seeker (LCS) are interchangable and are in direct competition for HARM C production.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Block III software CDR, coding and validation completed.
   b. (U) Flight testing and aircraft OFP integration testing began.
   c. (U) Block IV contractor testing began.
   a. (U) Block III - complete DT/OT IIIA.
   b. (U) Block IV - complete CTE, commence DT-III.
2. (U) FY 1989 Program:
3. (U) FY 1990 Plans:
   a. (U) Block III - complete OT-IIIB.
   b. (U) Block IV - complete DT-III, and OT-IIIA.
4. (U) FY 1991 Plans: Not Applicable.
5. (U) Program to Completion: Competition with HARM Low Cost Seeker starts in FY 1992.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA. and Pacific Missile Test Center, Pt. Mugu, CA. CONTRACTOR: Texas Instruments, Incorporated, Dallas, TX.

E. (U) RELATED ACTIVITIES: P.E. 0604360N, High Speed Antiradiation Missile (completed in FY 1983). P.E. 0603320N Low Cost Antiradiation Seeker.

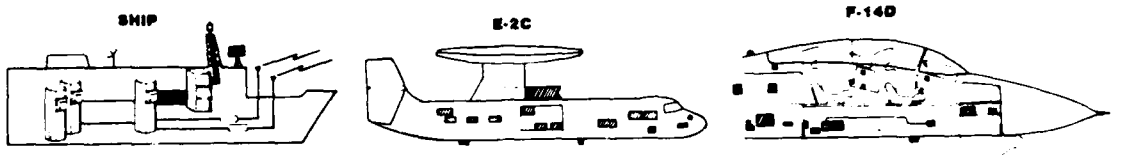
F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN/#14	186,118	300,803	283,590	334,781	Cont.

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

FY 1990/1991 BIENNIAL 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)



Highlighted areas are JTIDS/TADIL J components or modifications required for an operational system.

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

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				IIIA	IIIB IOC
Engineering Milestones	CDR AIR	F-14D/E-2C Inst	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 I	FSD Terminal Award Blk II		LRIP	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(72,452)*	67,969	52,790	35,287	284,315
Support Contract	(3,053)*	3,278	3,200	3,075	22,810
In-House Support	(3,248)*	4,731	4,407	4,312	25,620
GFE/ Other	(26,646)*	38,589	36,156	37,090	215,448
Total	(105,399)*	114,567	96,553	79,764	**548,193 110,448

* Funded under PE 0604232N in FY 1988.
** Funding for the procurement of the Navy Full Scale Development terminals is in OSD PE 0604771D and is not included in these totals.

FY 1990/1991 BIENNIAL 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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) Combat experience gained during the Southeast Asia conflict, Middle East incidents and most recently, in 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 communication link would increase force effectiveness and substantially reduce losses due to hostile action. These capabilities are critical in the hostile electronic environment envisioned in a NATO-Warsaw Pact conflict and war at sea engagements with Soviet Block Naval Air/Surface/Subsurface forces.

(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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded under PE 0604232N)

a. (U) Awarded contract modification for Navy Full Scale Development terminals (Block I). (OSD PE 0604771D)

b. (U) Continued the design of Navy interface units, and shipboard cabinets.

c. (U) Continued development of shipboard JTIDS antenna.

d. (U) Continued TADIL J/TDMA conversion of Ship Integration Facility (SIF).

e. (U) Continued F-14D and E-2C aircraft integration.

f. (U) Continued shipboard integration design.

g. (U) Developed approved network scheme to support IOC.

h. (U) Delivered Navy Interface Unit (IU) terminals for E-2C and F-14D.

2. (U) FY 1989 Program:

a. (U) Commence delivery of Block I FSD terminals and shipboard antennas.

b. (U) Continue TADIL J/TDMA conversion of the Shipboard Integration Facility (SIF).

c. (U) Continue F-14D and E-2C aircraft integration with Navy IU terminals.

d. (U) Continue shipboard integration.

e. (U) Award contract modification for Navy Block II Full Scale Development Terminals (OSD PE 0604771D).

FY 1990/1991 BIENNIAL 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 1990 Plans:
   a. (U) Continue F-14D, E-2C and ship integration.
   b. (U) Conduct first flights of JTIDS terminals installed in F-14D and E-2C aircraft.
   c. (U) Deliver first JTIDS Network Library.
   d. (U) Begin multi-platform testing on F-14D, E-2C, and ships.
   e. (U) Complete TADIL J/TDMA conversion of SIF.
   f. (U) Complete delivery of Navy FSD terminals (Block 1) and interface units (OSD PE 0604771D).

4. (U) FY 1991 Plans:
   a. (U) Continue E-2C and ship integration and multi-platform testing.
   b. (U) Conduct OT-IIA to support limited production decision for ship and aircraft terminals.
   c. (U) Complete F-14D integration.
   d. (U) Conduct OT-IIB to support continued limited production of ship and aircraft terminals.
   e. (U) Deliver second JTIDS Network Library.
   f. (U) NPDM IIIA for limited-production decision for ship and aircraft terminals; commence limited production.

5. (U) Program to Completion:
   a. (U) Complete delivery of Navy FSD terminals (Block II) (OSD PE 0604771d).
   b. (U) Complete E-2C and ship integration.
   c. (U) Conduct TECHEVAL.
   d. (U) Conduct OPEVAL.
   e. (U) NPDM IIIB for full production decision.
   f. (U) Initial Operational Capability (IOC).
   g. (U) Complete production and delivery to the Fleet.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center (NOSC), San Diego, CA; Naval Air Test Center (NATC), Patuxent River, MD. CONTRACTORS: Singer Company, Rockwell Corporation, Great Falls, MN; Grumman Aerospace Corp., Bethpage, Long Island, NY; Plessey Electronic Systems Corporation, Wayne, NJ.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	$28,291

FY 1990/1991 BIENNIAL 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)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: Departmental and Navy actions resulted in a net increase of $28,291, fully funding Navy's portion of the Joint JTIDS TDMA program.

F. (U) PROGRAM DOCUMENTATION: SDDM (JTIDS Milestone II) 1/81; JCSM 39-81 (JOR for JTIDS), 1/81; SECNAV Memo (TDMA directed), 10/85; Joint JTIDS Navy TEMP Annex, 8/87.

G. (U) RELATED ACTIVITIES: Command and Control Processor (C2P), PE 0603717N; F-14 Upgrade, PE 0205667N and Early Warning Aircraft Squadrons Upgrade, PE 0204152. Beginning in FY 1988, this Program Element 0205604N funds the Navy requirements for integration of the JTIDS terminals on the Navy's platforms, test and evaluation, and logistics costs. Program Element 0604771D, Joint Tactical Information Distribution System (JTIDS) contains funding to develop and procure the Navy's full scale development terminals, related spares, logistics and pre-operational support through the JTIDS Joint Program Office at Electronic Systems Division, Hanscom AFB.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
APN (BA1) #10,	14,000			19/	522/	541/
11, 24, 25		0		16,426	310,562	340,988
APN (BA5) #55,			3,803	14/	91/	105/
140	0	0		9,186	58,860	71,849
APN (BA6) #167	0	0	0	6,922	30,555	37,477
OPN (BA2) #96				15/	83/	98/
	0	0		26,000	150,749	176,757
OPN (BA8) #303	0	0	0	8,437	45,876	54,313

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0896	ASW CSI	10,573	14,014	16,159	19,018	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 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 1988 Accomplishments:
   a. (U) Continued modification of the Mod 5/6 programs for combat direction system interface upgrades (includes On Board Trainer (OBT) development effort).
   b. (U) Developed the Mod 6 program to interface with VLS/VLA.
   c. (U) Continued Mod 8 development effort.
   d. (U) Completed integrated combat system test and AN/SQQ-89 certification for Mod 6 program (B/L 0 and B/L 1 versions).
   e. (U) Continued development efforts for non-vertical launch systems for Mod 9 (variant of Mod 8). DD 974 is lead ship for this effort.
   f (U) Defined requirements to correct noted OPTEVFOR deficiencies.
   g (U) Defined requirements to develop UFCS MK 116 Mod 7 computer program for DD 963 Class combat system. DD 978 is lead ship for this effort.
   h. (U) Completed barge firings off YD 197 for VLA test shots using Mod 6 B/L 1 (Build 003A) computer program.
   i. (U) Partially completed safety study and received approval from the Weapons Explosive Safety Review Board (WESRB) to support VLA test shots from DD 963.

Program Element: 0205620N Budget Activity: 4
Program Element: Title: Anti-Submarine Warfare System Integration
Project Number: S0896 Project Title: Anti-Submarine Warfare System Integration

2. (U) FY 1989 Program:
   a. (U) Complete development efforts to implement OBT in Mod 5/6/8/9 computer programs.
   b. (U) Continue efforts to modify Mod 7 for DD 963 Class ships.
   c. (U) Complete and deliver Mod 8/9 computer programs (for DD 977 and DD 974) to ICSTF and LBITS (combat system and AN/SQQ-89 certifications, respectively).
   d. (U) Implement partial OPSPEC 411.2 changes to ASWCS in DD 963 Class ships.
   e. (U) Continue planned ASWCS Upgrades to support new AN/SQQ-89 sensor capabilities (includes implementation of some noted OPTEVFOR deficiencies).
   f. (U) Initiate efforts to modify UFCS MK 116 Mod 7 for non-vertical launch systems on DD 963/CG 47/DDG 993 Class ships with DD 976 as lead ship for this capability.
   g. (U) Initiate efforts to establish ASWCS/SIMAS (Desktop) Interface.
   h. (U) Continue safety efforts in support of VLS/VLA testing and obtain certification from WESRB.
   i. (U) Initiate efforts to modify all ASWCS programs to interface with Sea Lance.
3. (U) FY 1990 Plans:
   a. (U) Implement OPTEVFOR deficiencies in UFCS MK 116 5/6/8/9 computer programs (Mod 5). Lead Ship is DD 965.
   b. (U) Implement ASWCS/SIMAS (Desktop) interface for all Mods.
   c. (U) Initiate development efforts to implement MK 50 into the ASWCS/VLS interface.
   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) Continue development of non-vertical launch Mod 7 variant (ASWCS Mod 10).
   g. (U) Deliver UFCS MK 116 Mod 7 to Production Test Site (PTS) and ICSTF for certification.
   h. (U) Continue safety efforts.
   i. (U) Continue ASWCS/Sea Lance interface development efforts.
4. (U) FY 1991 Plans:
   a. (U) Complete development and delivery ASWCS Mods 5/6/8/9 computer programs with full OPSPEC 411.2 and MK 50 capabilities.
   b. (U) Continue Mod 10 development and deliver to PTS/ICSTF for certification.
   c. (U) Continue development and test of upgrades to ASWCS to support improved AN/SQQ-89 sensor capabilities.
   d. (U) Continue implementation of OPTEVFOR deficiencies determined to be new requirements.

Program Element: 0205620N Budget Activity: 4
Program Element: Title: Anti-Submarine Warfare System Integration
Project Number: S0896 Project Title: Anti-Submarine Warfare System Integration

e. (U) Provide support to other combat systems upgrades (i.e., CDS, C&D, VLS).
f. (U) Continue safety efforts.
g. (U) Implement first build of ASWCS/Sea Lance capable program for combat system testing.

5. (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, DC; 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 AMENDED FY 1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact On System Capabilities	Impact on Schedule	Impact on Budget Year Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	- $2,983

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The Department/Navy adjustment of -$2,983 reflects afffordability accommodations.

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

G. (U) RELATED ACTIVITIES: Program Element 0604212N, Project W2074 (Light Airborne Mult-Purpose System MK III): development of an anti-submarine warfare helicopter for deployment with surface ships. Program Element 0604713N, Project S0234 (Tactical Towed Array Sonar, AN/SQR-19): development of towed array sonars for surface ship hull-mounted AN/SQS-53A/B sonar. Program Element 0604713N, Project S1916 (ASW Systems Improvement): develops upgrades to the sensors to counter recently identified threat improvements, including reductions in radiated noise.

Program Element: 0205620N Budget Activity: 4
Program Element: Title: Anti-Submarine Warfare System Integration
Project Number: S0896 Project Title: Anti-Submarine Warfare System Integration

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U) AN/SQQ-89 (OPN #58)	147.2	218.3	240.1	285.6	1,919.0	3,965.0

2. (U) MILCON: Not applicable

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1041	(AERMIP)	1,776	0	1,004	1,412	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The AERMIP is the only product improvement program specifically for inservice, out-of-production aircraft equipment with costly R&M deficiencies. It provides a 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 the readiness and reduce operation and support costs. Return On Investment (ROI) regularly exceeds 500% with payback normally achieved in less than two years. AERMIP facilitates the Operational, Safety and Improvement Program (OSIP) by providing an approved design.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed S-3 Communication Control Group improvement.
   b. (U) Completed Ejection Seat Initiator improvement.
   c. (U) Continued AAU-19 Altimeter improvement.
   d. (U) Continued Helicopter/Ship Dynamic Interface testing.
   e. (U) Initiated Air Navigation Computer (ANC) Interface Improvement.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans:
   a. (U) Initiate ASW-50 Flight Control System improvement.
   b. (U) Complete ANC Interface improvement task.
   c. (U) Complete AAU-19 altimeter improvement.

4. (U) FY 1991 Plans:
   a. (U) Continue previous task(s).
   b. (U) Initiate new tasks based upon most urgent Fleet requirements.

5. (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; various others.

E. (U) RELATED ACTIVITIES: Not Applicable.

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: 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	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0834	Laboratory Fleet Support	6,016	5,460	6,521	6,553	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 communications between the technology producer (RDT&E community) and the technology user (Navy/Marine Corps operating forces). In FY 1988, 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 1988 Accomplishments:
   a. Assisted COMIDEASTFOR in substantially reducing mine, small craft and antiship cruise missile threats.
   b. Developed interim capability and program plan for laser eye protection.
   c. Evaluated ground proximity indicator for A-6 aircraft.
   d. Demonstrated tranmission of graphic data via HF.
   e. Provided corrosion-resistant E-2C aircraft antenna coupler.
   f. Demonstrated submarine acoustic readiness.
2. (U) FY 1989 Program:
   a. Demonstrate rule-based navigation selector.
   b. Demonstrate filter against geomagnetic noise.
   c. Evaluate theater-wide communication linkage table.
   d. Establish tactical sensor-to-battle group connectivity.
   e. Demonstrate reduction in radar intercept vulnerability.
   f. Demonstrate improved submarine bearing accuracy.
   g. Adapt Army MK-19 trainer to COMIDEASTFOR use.
   h. Demonstrate substantial radar clutter reduction.
   i. Support for 25 scientists and engineers in field team.
3. (U) FY 1990 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) 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.
5. (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 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		IIIA 10/88	IIIB 10/89	IIIC 10/90	
Engineering Milestones					
T&E Milestones	DT/OT IIA	DT/OT IIB	DT/OT IIC		
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	107,899	37,583	19,884	57,581	1,038,247
Support Contract					
In-House Support	21,201	35,000	44,300	25,300	203,100
GFE/ Other	38,899	80,304	105,667	36,856	617,300
Total	167,999	152,887	169,851	119,737	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 OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 improved 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 performance 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), Advanced Self-Protection Jammer (ASPJ) and Infrared Search and Track System (IRSTS), which is a forward hemisphere, passive, target detection, tracking and ranging sensor. The upgraded radar will ensure a multi-target, multi-shot capability in the more severe electronic countermeasures environment now projected. A pre-deployment (primarily software) update (PDU) which includes HARM, AMRAAM, fighter-to-fighter data link, Multi Sensor Mechanization, Baseline Software update, 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 begins in FY 1988 with deliveries commencing in March 1990.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) First F-14A(PLUS) delivered November 1987.
b. (U) Commenced radar/avionics flight testing (Nov 87) to include Communication/Navigation Intercom (CNI) displays, radar lock-on modes, radar/stores management system (SMS) integration.
c. (U) Conducted radar/avionics quick-look DT and DT/OT-IIA.
d. (U) Commenced fabrication of 2 longwave IRST systems and commenced flight tests at PMTC on midwave systems.
e. (U) Commenced PDU preliminary design.

2. (U) FY 1989 Program:
a. (U) Conducted NPDM IIIA for limited production decision for 12 F-14D aircraft.
b. (U) Continue avionics and radar hardware/software integration and development.
c. (U) Integrate Grumman software tape updates with increased capabilities.

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

d. (U) Continue flight testing to demonstrate: ECCM improvements, mixed missile launch, fault isolation, TCS/ALR-67/ASPJ operation, full radar modes/additional live weapons firing (East Coast).

e. (U) Conduct DT/OT IIB.

f. (U) Complete flight test of mid wave systems and commence flight tests of longwave IRST system at PMTC.

g. (U) Continue PDU full scale development.

3. (U) FY 1990 Plans:

a. (U) Integrate final Grumman software tapes.

b. (U) Demonstrate IRSTS/JTIDS on F-14D.

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 PDU Hardware and Software design, integration and test.

g. (U) Commence preliminary design for data fusion integration.

h. (U) Continue initial trainer development.

4. (U) FY 1991 Plans:

a. (U) Conduct NPDM Milestone IIIC for full production decision.

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.

5. (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 Air Rework Facility, Norfolk, VA; Naval Air Rework Facility, North Island, CA; Naval Training Engineering Center, Orlando, FL. CONTRACTORS: Grumman Aerospace Corporation, Long Island, NY; General Electric, Evandale, OH and Hughes Aircraft Company, El Segundo, CA.

Program Element: 0205667N Budget Activity: 4
Program Element Title: F-14 UPGRADE
Project Number: W1408 Project Title: F-14 UPGRADE
E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	Transfer and Adjustment	+38,469

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: FY90 Department and Navy changes of +38,469 due to PE 0604708N (trainers) transferring to this PE.

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

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).

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) APN F-14 Procurement cost APPN/P-1 APN/#9, 10, 39	615,400	951,500	1,227,900	1,347,600	18,898,100
(U) MILCON	6,500	0	0	3,200	4,900

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

FY 1989 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0205670N Budget Activity: 4

Program Element Title: Tactical Intelligence Processing Support

Project Number: X0521 Project Title: Shipboard Tac. Intel. Process.

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0521	SHPBD TAC INTEL PROCESSOR	2,036	2,121	4,314	4,792	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides continuing improvements to the Naval Intelligence Processing System (NIPS) which provides commanders with an organic capability to process, analyze, and disseminate tactical intelligence aboard aircraft carriers, amphibious command and amphibious assault ships. The NIPS program includes the Fleet Imagery Support Terminal (FIST), Shipboard Secure CCTV, Analytical Photogrammetic Positioning System (APPS), Modular Image Interpretation System (MIIS), and the SYQ-9 ADP System. These systems have been, or are being, made compatible with joint service programs including the Joint Services Imagery Processing System (JSIPS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Modified message standards to achieve joint interoperability.

b. (U) Completed FIST OT-IIB testing and Milestone IIIB.

2. (U) FY 1989 Program:

a. (U) Begin SYQ-9 conversion to the Military Intelligence Information Data System/Integrated Data Base (MIIDS/IDB). Begin development of database transfer system between afloat and ashore systems using the Tactical DoD Intelligence Information System (DODIIS)).

b. (U) Begin developing the interface with Navy Command and Control System-Afloat (NCCS-A) data base, Tactical Afloat/Airborne Mission Planning System (TAMPS), Tactical EA-6B Mission Planning System (TEAMS), Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES) and Stand-off Land Attack Missile System (SLAM).

c. (U) Begin engineering development of improved communications interface between FIST and Imagery Processing Intelligence Exchange (IPIX).

3. (U) FY 1990 Plans:

a. (U) Begin developing interface for NIPS and Tomahawk cruise missile Afloat Planning System (APS) and Digital Imagery Workstation (DIWS).

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

4. (U) FY 1991 Plans:

a. (U) Continue NIPS, APS, DIWS, interface and engineering development.

b. (U) Test interface developments with TEAMS, TAMPS, NCCS-A, TERPES, SLAM and IPIX.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVELEXSYSENGACT Activity, St. Inigoes, MD; NAVELEXSYSENGACTDFT Philadelphia, PA. CONTRACTORS: Planning Research Corporation, McLean, VA.

E. (U) RELATED ACTIVITIES: Marine Corps C3 System, Program Element 0206626M; FDDS; JSIPS, TARPS.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN BA-2 #88	8.9	5.5	6.9	7.7	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1303	Operational Reactor Development	27,749	37,319	53,762	55,788	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The objective is to assure and improve the useful lives of operating reactor plants. Accordingly, designs, developments, tests and evaluations are pursued to improve system and component reliability, and to develop the equipment and methods needed for servicing, inspections and evaluation. By 1990, selected work funded in PE 0603570N, Advanced Nuclear Reactor Components and Systems Development will evolve to the point where funding in Operational Reactor Development is appropriate. This increase is partially offset by transferring a portion of existing work to Operating Reactor Plant Technology. This shift has no effect on the overall Navy budget.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Designed and developed reactor refueling and servicing equipment methods and techniques to overhaul naval nuclear propulsion plants.
   b. (U) Developed and tested improved methods to evaluate and corrosion.
   c. (U) Performed thermal, hydraulic, and mechanical analyses to evaluate nuclear components and systems performance, including testing operating plant components and materials to identify potential stress corrosion cracking concerns and improving stators for control rod drive mechanisms.
   d. (U) Prototypically tested propulsion plant systems and components to identify potential design deficiencies and resolve problems before they affect the fleet.
   e. (U) Performed diagnostic evaluations to determine plant noise performance. Developed design changes to improve quieting.
   f. (U) Investigated and developed ways to continue operation of plant systems and components beyond original design lives.

2. (U) FY 1989 Program:
   a. (U) Design, develop, test and evaluate reactor servicing and refueling equipment and methods, and techniques for:
      - first TRIDENT and NR-1 (deep submergence vehicle) refuelings;
      - first defueling of power units in CVN 65;
      - first NIMITZ class refueling; will include capability to disassemble and reuse NIMITZ core components:
      - first defueling of D1G reactor plants and
      - shipment of nuclear fuel and irradiated core components;
      - developing methods to repair reactor vessels.

Program Element: 0205675N Budget Activity: 4
Program Element Title: Operational Reactor Development
Project Number: S1303 Project Title: Operational Reactor Development

b. (U) Develop and test improved methods and techniques to slow [ ] efforts will help avoid premature component replacements, minimize maintenence costs and increase operating time.
c. (U) Testing propulsion plant systems and components in prototypical environment to identify potential design deficiencies and resolve problems before they affect the fleet.
d. (U) Continue thermal, hydraulic, and mechanical analyses to confirm operating procedures and limits. Efforts will include qualifying structural integrity of various operating plant material alloys. Investigate and develop ways to support operation of plant systems and components beyond the original design lives.
e. (U) Evaluate diagnostic test results to determine plant noise performance, and develop design changes to improve quieting.

3. (U) FY 1990 Plans:
a. (U) Continue to design, develop, test and evaluate reactor servicing and refueling methods and equipment. Qualify containers for shipping radioactive components.
b. (U) Test operating plant materials for corrosion resistance; evaluate material erosion to better characterize corrosion damage.
c. (U) Continue to improve [ ] and inspection techniques for use in steam generator corrosion [ ] evaluation; 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; evaluate data to identify problems.
i. (U) Develop methods and capabilities to backfit equipment into operating plants; develop systems to model plant operations.

4. (U) FY 1991 Plans:
a. (U) Continue to design, develop, test and evaluate reactor servicing and refueling methods and equipment. Qualify containers for shipment of radioactive components.
b. (U) Continue to test corrosion resistance of materials in operating plants; develop models to characterize corrosion; evaluate rates of corrosion in various plant configurations.

Program Element: 0205675N Budget Activity: 4
Program Element Title: Operational Reactor Development
Project Number: S1303 Project Title: Operational Reactor Development

c. (U) Continue development of inspection methods; continue work on improved testing and inspection techniques; corrosion resistance capability.
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 structure analyses to establish reactor operating limits and resolve performance 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 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.

5. (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, N.Y.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+10,727

NARRATIVE DESCRIPTION OF CHANGES

Cost Changes: This increase reflects work assigned in PE 0603570N, Advanced Nuclear Reactor Components and Systems Development maturing and migrating to PE 0205675N and selected ORD work items migrating to Operating Reactor Plant Technology.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: PE 0602324N (Nuclear Propulsion Technology) and PE 0603570N (Advanced Nuclear Reactor Components and Systems 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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0048	Communications Terminal Improvements	2,936	3,844	2,065	1,683	Continue	Continue
C1931	Communications Ancillary Equipment	550	945	1,239	852	Continue	Continue
C1975	Tactical Communications Center	3,712	3,613	2,834	2,919	Continue	Continue
PROGRAM ELEMENT TOTAL		**7,198**	**8,402**	**6,138**	**5,454**	**Continue**	**Continue**

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments: PROPHET development of version 4.0. Developed Fire Support Application Program for the Digital Communications Terminal (DCT), AN/PSC-2. Digital Wideband Transmission System (DWTS), CRS (AN/TRC-170(V)3) Milestone III.

2. (U) FY 1989 Program: Publish a HARDMAN II analysis for the Marine Corps Single Channel Ground Airborne Radio System (SINCGARS) program. Short Term Anti-Jamming (STAJ) Milestone III. DWTS, LRS (AN/MRC-139) Milestone III.

3. (U) FY 1990 Plans: Procure and test ICOM SINCGARS Radios (ITT). MD-1230 DT/OT and Milestone III Decision. PROPHET Milestone III Decision. Conduct a Timing Feasibility Study on HAVE QUICK as related to Position Location Reporting System (PLRS).

4. (U) FY 1991 Plans: Conduct SINCGARS MCPDM III/IPR.

5. (U) Program to Completion: This is a continuing program. STAJ Adaptive Radio Upgrade Milestone III. DWTS, LRS & BRS achieve IOC in FY 1993.

E. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA; MCTSSA, Camp Pendleton, CA; NAC, Indianapolis, IN. Contractors: Hughes Aircraft, Fullerton, CA; ITT, Ft. Wayne, IN; LORAL TERRACOM, San Diego, CA; Canadian Marconi Company, Montreal, Quebec, Canada.

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.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
	Communications Terminal Improvements						
68	DCT	17,316	0	3,600	10,100	31,016	TBD
76	STAJ	0	0	5,133	3,286	8,419	TBD
64	DWTS LRS MK 139	0	0	9,648	20,165	29,813	TBD
	BRS T170	0	0	32,842	16,788	49,630	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Monitor development of tactical UHF/SHF/EHF satellite communication (SATCOM) terminals. Modifications to the AN/TSC-96 to maintain interoperability with the Navy's UHF SATCOM network. Prototype and modification instruction development, and testing for induction of new COMSEC equipment in fielded systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Approximately 85% of the AN/TSC-96 PIP level II drawings were completed. The UGC-74C Teletype (TTY) was tested as a possible replacement for the TT-624 in the AN/TSC-96. Developed prototype and modifications instructions for installation of KG-84 in AN/TYC-5 and AN/TGC-7; KWR-46 in AN/TSC-96. Also developed interface cable between UGC-74 and KG-84.

2. (U) FY 1989 Program: Initiate development of the DAMA Secure Voice Modification, the DMC-122 Antenna Modification, and the UGC-74C/Model 28 Command TTY Modification to the AN/TSC-96. Develop prototype and modification instructions for KG-84 installation in AN/TYQ-3A and AN/TSC-95. Participate in joint service KY-99 operational testing.

3. (U) FY 1990 Plans: Initiate development of the MSC-63 Interface Modification, and the UGC-74C/TT-624 Modification to the AN/TSC-96. Monitor the U.S. Army development of the Advanced Manpack UHF Terminal (AMUT) and the Advanced Manpack EHF Terminal (AMET). Develop prototype and modification instructions for installation of KWR-46 into Meteorological Mobile Facility and KG-94 into various tactical communication systems.

4. (U) FY 1991 Plans: Initiate a Marine Corps EHF SATCOM network analysis if the AN/TSC-124 Single Channel Objective, Tactical Terminal (SCOTT) is procured. Continue to monitor the U.S. Army development of AMUT and AMET. Develop prototypes and modification instructions for installation of KY-99 in various fielded systems.

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

E. (U) WORK PERFORMED BY: In-house: NESEC, Vallejo, CA, NESSEC, Washington, DC, MCTSSA, Camp Pendleton, CA, MCRDAC, Quantico, VA; Contractors: None

F. (U) RELATED ACTIVITIES: Navy Program Element 0303109N, Satellite Communications; Army Program Element 0303142A, Satellite Communication Ground System; Air Force Program Element 0603431F, Advance Space Communications.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments: Achieved procurement authority for ten TCCs; continued TCC software development.

2. (U) FY 1989 Program: Marine Corps Combat Development Command (MCCDC) to validate and prioritize TCC Block Upgrades; continue TCC software development; continue Operator/Maintainer training material development; seek production authority to procure remaining twenty-one TCCs after completion of SSCC user acceptance test.

3. (U) FY 1990 Plans: Initiate block upgrades; conduct further DT.

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

5. (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 OC27GO, (Radio Battalion Modifications) SSCC developed by NOSC and funded by National Security Agency.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
67	Tactical Communications Center	63	9,419	7,723	0	10,000	27,205

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0010	SMAW	1,695	2,266	1,180	0	0	54,716
C0018	FSSI	2,600	3,454	2,386	1,508	Continue	Continue
C0021	AAV7A1 Pip	10,833	13,436	11,064	9,678	Continue	Continue
C1120	ADMS	1,034	5,505	9,607	6,478	Continue	Continue
C1555	LAV Pip	3,323	6,790	2,998	2,306	Continue	Continue
C1763	AAS Pip	2,192	17	820	1,323	Continue	Continue
C1901	Grnd Wpry Pip	21,976	6,588	4,421	3,187	Continue	Continue
C1960	LAV-AD*	(17,916)	(19,935)	20,208	17,793	Continue	Continue
C2057	DRAGON III	**	**	10,856	3,684	995	67,187
PROGRAM ELEMENT TOTAL		43,653	38,056	63,540	45,957	Continue	Continue

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

** Formerly contained in C1901, Marine Corps Ground Weaponry Product Improvement in this program element.

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

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:

a. (U) Completed development of High Explosive Anti-Armor (HEAA) round.

b. (U) Received approval for full production of HEAA round.

2. (U) FY 1989 Program: Continue with preplanned product improvements to the SMAW launcher and continue alternative explosive testing to meet insensitive munitions requirements for the HEAA.

3. (U) FY 1990 Plans: Continue SMAW launcher product improvements and insensitive munitions testing for the HEAA. Program Complete.

4. (U) FY 1991 Plans: None.

5. (U) Program to Completion: None.

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 APPROPRIATED FUNDS: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
29	SMAW HEAA	12,300	27,800	28,400	29,300	TBD	TBD
	(Qty)	(3,826)	(9,326)	(7,200)	(6,903)	TBD	TBD

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Fill requirements for improved/automated maneuver control, fire support and combat services support C2 systems. To provide the battalion and higher commander essential information and feedback; to translate and communicate the commander's decisions, plans and orders; provide fire planning, coordination and integration; and other information.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: To enhance the existing C2 (manual) systems. Conducted appraisals of various Army fire support automation systems. Monitored product improvement program for Army's AN/TPQ-36 countermortar radar. Continue to evaluate candidate systems.

1. (U) FY 1988 Accomplishments: Conducted a domestic and foreign market survey of existing maneuver control command and control systems; conducted limited technical demonstrations of potential candidate systems; monitored the Army's Maneuver Control System (MCS) and MCS 2.0. Initiated FMF appraisals of candidate fire support automation (FIREFLEX) systems; began COEA on FIREFLEX candidates; participated in related Army fire support C2 programs.

2. (U) FY 1989 Program: To rapidly prototype maneuver control and fire support systems based on fielded/soon-to-be fielded systems; conduct a technical demonstration of the Israeli infantry division Command and Control System Tactical Division Information System (TACDIS). Continue evaluations of automated fire support candidates; participate in related Army C2 programs.

3. (U) FY 1990 Plans: Field a baseline capability in the FMF and continue evaluation/development; participate in related Army C2 programs.

4. (U) FY 1991 Plans: Complete development of a baseline capability for maneuver control automation/C2 and for fire support automation/C2; participate in related Army CSS, maneuver control and fire support C2 programs.

5. (U) Program to Completion: To support fielding of mature CSS, maneuver control and fire support C2 systems; participate in related Army programs.

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, USA Fire Support Center, Fort Sill, OK. Contractors: Magnavox Electronic Systems, Litton Data Systems, Others TBD.

F. (U) RELATED ACTIVITIES: Army CSS, maneuver and fire support C2 programs.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0021	AAV7A1 PIP	10,833	13,436	11,064	9,678	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program 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 2004. This preplanned product improvement program will include the development and testing of enhanced applique armor, a collective nuclear, biological and chemical protective system, and improved suspension and propulsion systems. These actions will improve the combat capability, system reliability and battlefield survivability of the aging assault amphibious vehicle, first introduced in 1972, such that its battlefield utility will be sustained to the end of its service life.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The program has fully developed and tested currently or soon to be fielded product improvements that include Upgunned Weapons Station, Bow Plane, P-900 Applique Armor and Automatic Fire Sensing and Suppression System.

1. (U) FY 1988 Accomplishments:

a. (U) Enhanced applique armor developed.

b. (U) Bow Plane testing complete, item fielded.

c. (U) Continuing development of collective Nuclear Biological Chemical (NBC) protection system, improved track, improved transmission, improved suspension components, infantry weapons mount kit, composite hull technology and advanced propulsion system.

2. (U) FY 1989 Program:

a. (U) Complete testing of enhanced applique armor, improved track and improved transmission and infantry weapons mount kit.

b. (U) Continue development of collective NBC protection system, composite hull technology, advanced propulsion system and improved suspension components.

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)

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

4. (U) FY 1991 Plans: Continue testing of improved propulsion system and improved suspension system.

5. (U) Program to Completion: Complete development and testing of improved water and land propulsion systems, improved suspension system, and composite hull. Develop product improved upgunned weapons station. This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; David Taylor Research Center, Bethesda, MD. Contractors: Raytheon; Martin Marietta, Baltimore, MD; Rafael (Haifa, Israel).

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	N/A	-$6,713

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Department/Navy adjustment of -$6,713 resulted from updated cost estimates based on cost experience.

F. (U) PROGRAM DOCUMENTATION: Required Operational Capability No. MOB 1.13 of 22 Aug 85.

G. (U) RELATED ACTIVITIES: The projects within this program relate to all similar existing and developing assault amphibious vehicle systems.

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)

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
42	**AAV7A1 PIP (qty) (RCN 022421)**	21,021	47,678	12,947	18,094	Continue	Continue
	AAV Applique Armor (qty) (RCN 022421)	--- (---)	--- (---)	10,858 (476)	14,183 (661)	Continue	Continue
	AAV Automatic Fire Sensing & Suppression System (qty) (RCN 022421)	2,418 (250)	8,530 (936)	1,597 (137)	--- (---)	Continue	Continue
	AAV Upgunned Weapon Station (qty) (RCN 022421)	16,938 (230)	36,000 (583)	--- (---)	--- (---)	Continue	Continue
	AAV Improved Transmission (qty) (RCN 022421)	0 (-)	0 (-)	492 (90)	3,911 (840)	Continue	Continue
	AAV Bow Plane (qty) (RCN 022421)	1,665 (350)	3,148 (720)	0 (---)	0 (---)	Continue	Continue
PROJECT TOTAL		21,021	47,678	12,947	18,094	Continue	Continue

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	MILESTONE	DATE
a.	(U) Enhanced Applique Armor Kit IIIC	FY 1989
b.	(U) Night Sight Upgrade III	FY 1989
c.	(U) Collective NBC System	FY 1990

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Provides hardware/software improvements to the HAWK surface-to-air missile system. Provides tactical digital interface compatibility between HAWK and other USMC Tactical Air Command and Control Systems and Joint Tactical Air Operations Systems. Participates in joint development lightweight ADMS.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Began Joint US Army/USMC Launcher Mobility Upgrade (LMU); finalized design documents; and prepared RFP. Stinger Night Sight (SNS) ROC approved and assigned program to US Army Night Vision Lab. Completed Lightweight Early Warning Detection Device (LEWDD) Test Evaluation Master Plan (TEMP) and issued Non-developmental Item (NDI) RFP. Approved Pedestal Mounter Stinger (PMS) ROC.

2. (U) FY 1989 Program: Develop HAWK LMU. Complete LEWDD Operational and Technical Evaluation and award procurement contract. Begin FSED on SNS. Begin to develop Low Altitude Air Defense (LAAD) C2. Continue T&E on PMS. Complete Mobile Surface to Air Weapons System (MSAWS) analysis.

3. (U) FY 1990 Plans: Enter FSD of HAWK LMU. Evaluate LAAD C2 candidate systems. Complete SNS development.

4. (U) FY 1991 Plans: Complete development for HAWK LMU/LAAD C2 system.

5. (U) Program to Completion: Field HAWK LMU and LAAD C2 system. Complete fielding of LEWDD, SNS, and HAWK.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Rosslyn, VA. Contractors: Raytheon, Bedford, MA; Lear-Astronics, Santa Monica, CA.

F. (U) RELATED ACTIVITIES: All US Army HAWK and PMS activities.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
	Air Defense Missile Systems						
58	HAWK Modification	30,129	5,828	1,073	4,890	TBD	TBD
82	LEWDD	0	5,000	2,400	9,800	9,800	TBD
	(qty) (RCN 035401)		(4)	(10)	(42)	(39)	(95)

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: US Army Memorandum of Understanding with the Netherlands on a portion of the LMU.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This program is directed toward modified "off the shelf" light armored vehicles which will be improved and used for a number of mission roles. These armor-protected, swimmable, helicopter transportable vehicles increase the mobility and firepower of USMC ground combat elements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Develop and correct the LAV-Mortar mounting system which fires the M300 and M800 series ammunition. Pursue the recoiling mount system as the fix for the LAV-Mortar (LAV-M) mission role vehicle.

b. (U) Conduct initial testing of the upgraded intercom system for the LAV-Command and Control Vehicle.

2. (U) FY 1989 Program: Continue the development of the LAV-M recoiling mount system. Develop the LAV Automatic Fire Sensing and Suppression System (AFSSS), Central Tire Inflation System (CTIS), mobility enhancements and the Nuclear Biological Chemical (NBC) central filtration system for the family of vehicles.

3. (U) FY 1990 Plans: Develop the LAV Day/Night thermal sight, vehicle navigation system, LAV Logistics trailer, and the commander's weapon station.

4. (U) FY 1991 Plans: Develop HF radio communications suites for LAVs, Hypervelocity missile for LAV - Anti Tank (LAV-AT), 120 mortar for the LAV-M and stowage enhancement for all LAVs.

5. (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 APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This 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 1988 Accomplishments: Initiate full scale development DWFK/ amphibious ship tie-downs/PLRS integration for the M1A1 tank.

2. (U) FY 1989 Program: Complete development of amphibious ship tie down/PLRS integration.

3. (U) FY 1990 Plans: Initiate Marine Corps unique RDT&E tank recovery vehicle. Product improvement of M88A1 recovery vehicle.

4. (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 APPROPRIATED FUNDS: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
43,44	Amphibious Armor Systems Product Improvement Program						
	M1A1 Tank	30,228	156,500	516,640	653,420	---	1,356,788
	(qty) (RCN028091)		(66)	(155)	(255)	---	(476)

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Develop joint and USMC unique improvements to infantry weapons, artillery and naval gunfire systems; monitor national/ international ground weapon developments.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Participated in M198/M109 Battery Computer System (BUCS) software PIP and Joint Service Small Arms Program (JSSAP).

2. (U) FY 1989 Program: Complete Master Acquisition Plan (MAP) for proposed Modular Universal Laser Equipment (MULE) PIPs. Analysis of M109 howitzer PIP. Analysis of M110 and M578 artillery systems PIP. Participate in Light Weight 155 Program; US Army fire support; and JSSAP.

3. (U) FY 1990 Plans: Complete MK19 advanced penetrator round and analyses of M110 and M578 systems PIP's. Begin advanced machine gun (MG) with sight fire control. Participate in US Army fire support and JSSAP.

4. (U) FY 1991 Plans: Continue advanced penetrator round for advanced MG. Selection of towed howitzer mid-life PIP's. Test plan for naval certification of Multiple Launch Rocket System (MLRS). Participate in US Army fire support and JSSAP.

5. (U) Program to Completion: Complete small arms technologies and artillery system PIP's. Naval qualification of MLRS. Participate in US Army fire support and JSSAP.

E. (U) WORK PERFORMED BY: In-house: NSWC, Dahlgren, VA; ARDEC, Dover, NJ. Contractors: None.

F. (U) RELATED ACTIVITIES: All ground weapons systems. Army artillery fire support developments and improvements.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
52	Marine Corps Ground Weaponry Product Improvement						
	5.56mm Squad Auto	0	1,769	5,417	0	0	7,186
	(qty) (RCN 021113)		(572)	(1297)	0	TBD	7,241
54	MK19 Machine Gun	0	4,970	1,858	4,995	0	11,823
	(qty) (RCN 021173)		(350)	(123)	(321)		(794)
50	Mach Gun 50 Cal SLAP	0	0	0	4,123	0	4,123
	(qty) (RCN 020453)				(456)		(456)

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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: C1960 Project Title: Light Armored Vehicle - Air Defense (LAV-AD)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1960	LAV-AD*	(17,916)	(19,935)	20,208	17,793	Continue	Continue

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

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project will develop a mobile air defense system on a LAV chassis to provide air defense for rapidly maneuvering ground combat elements in the Marine Air Ground Task Force (MAGTF). The weapons system will consists 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 1988 Accomplishments: (Funded under 0604656M)

a. (U) FSD contracts awarded (GE/FMC) December 1987.

b. (U) Began 20 month prototype development and built in second quarter FY 1988.

c. (U) Marine Corps Tactical System Support Activity (MCTSSA) designated as software support activity for the LAV-AD program.

2. (U) FY 1989 Program: (Funded under 0604656M) Deliver turret mockups.

3. (U) FY 1990 Plans: Complete prototype in second quarter FY 1990. Commence DT II April 1990.

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) FY 1991 Plans: Commence OT II March 1991.

5. (U) Program to Completion:

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

b. (U) Marine Corps Program Decision Memorandum (MCPDM) December 1991.

c. (U) Production request for proposal issue April 1992.

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

e. (U) Commence DT IIB during July 1993.

D. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; PM-LAV Tank Automotive Command, Warren, MI; Naval Surface Warfare Command, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	Prototype build extension results in increased cost	Six month slip	+11,911
COST	N/A	N/A	N/A

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: The Navy/Department adjustment of $11,911 needed to cover a six month schedule slip.

3. (U) COST CHANGES: 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)

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) Required Operational Capability	May 1985
b. (U) Temp	July 1988

G. (U) RELATED ACTIVITIES: Pedestal Mounted Stinger.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Prototype Deliveries	February 1990
b. (U) DT II	April - September 1990
c. (U) Prototype Refurbishment	October 1990 - February 1991
d. (U) OT II	March - September 1991
e. (U) MCPDM III	December 1991
f. (U) DT IIA	October 1991 - March 1992
g. (U) Production RFP	April 1992
h. (U) Production Contract Award	December 1992
i. (U) DT IIB	July - September 1993
j. (U) Full Rate Production	Fiscal Years 1994-1996
k. (U) First Unit Equipped	Fiscal Year 1995

FY 1990/1991 BIENNIAL 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: C2057 Project Title: DRAGON III

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C2057	DRAGON III	*	*	10,856	3,684	995	67,187

* Formerly contained in C1901 Marine Corps Ground Weaponry Product Improvement in this program element.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops product improvements for the DRAGON anti-tank weapons. The M47 DRAGON Weapon System is a lightweight, man-portable, medium range anti-armor weapon system used by the Marine Corps and Army. DRAGON III is the second product improvement to the DRAGON system and includes a new day/night tracker, increased missile accuracy/range/speed, increased countermeasure protection, reduced gunner training and maintenance times, and a warhead precursor charge which will make DRAGON effective against reactive armor.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Formerly project C1901, Marine Corps Ground Weaponry Product Improvement. Commenced retrofit and fielding of improved DRAGON warhead. Continued development of DRAGON III's countermeasure-hardened day/night tracker, rocket motor improvements, and advanced armor-killing capability until halted by Congressional reduction of funds.

2. (U) FY 1989 Program: Formerly project C1901, Marine Corps Ground Weaponry Product Improvement. Pending restoration of FY 1988 funds through reprogramming, continue development of DRAGON III's countermeasure-hardened day/night tracker, rocket motor improvements, and advanced armor-killing capability.

3. (U) FY 1990 Plans: Complete development of DRAGON III's countermeasure-hardened day/night tracker, rocket motor improvements, and advanced armor killing capability.

4. (U) FY 1991 Plans: Complete system testing and prepare for production.

5. (U) Program to Completion: Produce a man-portable anti-armor system that is effective against reactive armor.

Program Element: 0206623M Budget Activity: 4
Program Element Title: Marine Corps Ground Combat/Supporting Arms Systems (Operational Systems)
Project Number: C2057 Project Title: DRAGON III

D. (U) WORK PERFORMED BY: In-house: NSWC, Dahlgren, VA. Contractors: McDonnel-Douglas Astronautics Company, Titusville, FL.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: There are no significant changes to be discussed.

F. (U) PROGRAM DOCUMENTATION: ROC Number NO INS211.3.3 of 14 May 1986.

G. (U) RELATED ACTIVITIES: AAWS-M.

H. (U) OTHER APPROPRIATION FUNDS: PMC starting in FY 1992.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Egypt MOU in staffing for co-production.

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Milestone I	Second Quarter FY 1986
b. (U) Milestone IIA	First Quarter FY 1989
c. (U) Milestone IIB	First Quarter FY 1990
d. (U) Milestone III	Second Quarter FY 1991
e. (U) Initial Operational Capability	First Quarter FY 1994

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0076	Combat Service Support Product Improvement	1,808	1,972	944	1,125	Continue	Continue
C0085	Amphibious Raid Equipment*	636	533	1,840	2,361	Continue	Continue
PROGRAM ELEMENT TOTAL		**2,444**	**2,505**	**2,784**	**3,486**	**Continue**	**Continue**

* In FY 1988 this project was titled Combat Support.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program element provides for product improvement to Marine Corps Combat Service Support systems and equipment.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Evaluate CSS systems for improvements in operational capability and reductions in ILS footprint. Systems are: Bulk Fuel Systems; Construction Material Handling Equipment (MHE); Utility systems; Marine Corps Expeditionary Shelter System (MCESS), Containers, and survey/mapping equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: DT/OT Logistics Vehicle System Rearbody Unit 20,000 gallon fabric tank, and soft shelters. Completed earthmoving operator protection kit and completed tire/drum handling unit. Tested USMC Helicopter External Lift electromagnetic interference (EMI) sniffer. OT Field Survey Data Collector.

2. (U) FY 1989 Program: Develop Fuel System Booster Station Manifold, Fuel Flow Indicator, "Bicycle" fuel pump, Large Aircraft Refueling Kit, and reverse osmosis filter-element cleaner. Fabricate armored kit for D7G Dozer. Improve electronic maintenance complex (EMC) interior modules. Evaluate US Army Standard Integrated Command Post Shelter (SICPS). Complete of Hydrographic Survey Set.

3. (U) FY 1990 Plans: OT Tactical Fuel System (TFS) Large Aircraft Refueling Kit, Hose Casters and Pantograph. DT 50,000 gallon collapsible fuel tank. Fabricate reverse osmosis filter element cleaner. Continue SICPS and EMC modules.

4. (U) FY 1991 Plans: Conduct OT of TFS and Water Supply Support Systems. Improve Container and Shelters. Improve Topgraphic Mapping Set and Hydrographic Survey Set.

5. (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 APPROPRIATED FUNDS: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
117	Combat Service Support Product Improvement Water Distribution (RCN 03064871)	3,900	2,900	3,200	1,400	TBD	TBD

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Testing of non-developmental items (NDI) to support the unique requirements of the Marine Corps reconnaissance units. Includes inflatable boats, parachutes, waterproof swimmer bags and similar equipment. Monitor commercial and other Service developments in specialized equipment for the Marine Expeditionary Unit (MEU) Special Operations Capable (SOC).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Monitored U. S. Navy and Army inflatable boat programs. Developed a specification for an inflatable boat to satisfy USMC requirements. Conducted preliminary evaluations on waterproof swimmer bags.

2. (U) FY 1989 Program: Monitor other service and commercial specialized equipment efforts. Participate in the US Army evaluation of new Military Free Fall (MFF) parachute. Develop a specification for a waterproof swimmer bag to meet an approved Required Operational Capability (ROC). Evaluate the Sniper Command Control and Communications System (Sniper C3).

3. (U) FY 1990 Plans: Continue to monitor other service and commercial programs for specialized equipment to meet the unique equipment requirements of Marine Corps reconnaissances units.

4. (U) FY 1991 Plans: Same as FY 1990 program.

5. (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 APPROPRIATED FUNDS: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
124	Amphibious Raid Equipment	0	1,700	200	200	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0062	IAS	1,822	3,984	4,500	7,721	Continue	Continue
C1296	JSIPS*	(13,929)	9,468	11,349	16,903	Continue	Continue
C1297	TRSS	6,104	4,210	1,918	1,607	Continue	Continue
C1928	TERPES**	(5,645)	(6,513)	8,687	10,142	Continue	Continue
PROGRAM ELEMENT TOTAL		**7,926**	**17,662**	**26,454**	**36,373**	**Continue**	**Continue**

* In FY 1988 this project was funded in Program Element 0604718M.

** Funding transferred from 0604270N, Navy Consolidated Electronic Warfare Programs.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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).

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: AN/TYQ 19 block upgrade is a response to identified field requirements using an evolutionary strategy, to product improve the AN/TYQ-19 Intelligence Analysis Center (IAC), a Marine Expeditionary Force (MEF) asset. The IAC is a vital component of the Marine Air Ground Intelligence System which is an integrated tactical data system. AN/TYQ 19 block upgrade will extend automated intelligence to all lower levels of the Marine Air Ground Task Force (MAGTF) through the use of micro-computers on a Local Area Network (LAN).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Purchased necessary micro-computers and other hardware/software (HW/SW) for the prototype and began integration effort. Incorporated intelligence data bases to insure inter/intraoperability with Navy and National Intelligence Systems/Data Bases.

2. (U) FY 1989 Program: Complete and field block upgrade prototype to FMF users for evaluation/input.

3. (U) FY 1990 Plans: Continue to refine core capability while planning a thorough incremental upgrade program to ensure compatibility, inter/ intraoperability, HW/SW upgrades, and begin R&D on a mobile shelter with communications which will provide the overall system capability.

4. (U) FY 1991 Plans: Prepare a Request for Proposal (RFP) for the block upgrade to build a mobile shelterized system with communications.

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

E. (U) WORK PERFORMED BY: In-house: NWSC, Crane, IN - Systems Integration/ SW Development Facility. Contractors: Calculon Inc., Dumfries, VA - System Eng/Prog Management Support, Columbia Research Corporation (CRC), Triangle, VA - Integrated Logistical Support (ILS).

F. (U) RELATED ACTIVITIES: DIA: DODIIS/MIIDS/IDS; Navy: ISS/AF, TIPS/NIPS-2000; Marine Corps: FMF-EUCE, TERPES, SSC.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1296	JSIPS*	(13,929)	9,468	11,349	16,903	Continue	Continue

* In FY 1988 this project was funded in Program Element 0604718M.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The JSIPS is not designed to counter a specific enemy threat. Its 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. The JSIPS will eventually replace 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 1988 Accomplishments: (Funded under 0604718M) Developed tactical portion of the engineering development model and interface with national receive location/ Marine equipment.

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

3. (U) FY 1990 Plans: Conduct testing of the Full Scale Development (FSD) model.

4. (U) FY 1991 Plans:

a. (U) Service acceptance of the JSIPS with approval for service use.

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)

5. (U) Program to Completion:

a. (U) Continue development of P3I 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	Requirements for National Program	N/A	+5,225

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy/Department adjustment of $5,225 covers part of the National Input Segment.

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

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)

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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)	First Quarter FY 1991
e.	(U) Milestone III	Second Quarter FY 1991
f.	(U) FOC	FY 1999

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project is to develop replacement data packages for reprocurement of 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 delays.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Continued integrated logistic support (ILS) documentation. Completed documentation for production of basic sensor set. Initiated procurement of basic sensor set. Initiated air certification on air delivered components.

2. (U) FY 1989 Program: Continue ILS documentation. Complete documentation for production sensor monitoring system (SMS). Initiate production of SMS and test equipment development. Continue air certification on air delivered components.

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

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

5. (U) Program to Completion: This is a continuing program. Complete pre-production of airborne components. Complete development of additional sensor capabilities. Complete 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 APPROPRIATED FUNDS: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
83	Tactical Remote Sensor System	3,205	6,956	4,379	11,564	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1928	TERPES*	(5,645)	(6,513)	8,687	10,142	Continue	Continue

* Funding transferred from 0604270N, Navy Consolidated Electronic Warfare Programs.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This system is a segment of the Marine Air Ground Intelligence System (MAGIS). It provides Electronic Intelligence (ELINT) collected from aviation reconnaissance assets. The system processes this intelligence to locate and identify enemy emitters. This intelligence is fused with electronic and missile orders of battle to identify air defense zones. This information is distributed to Command Control and Intelligence (C2I) elements of the Marine Air Ground Task Force (MAGTF). The system also provides Electronic Warfare (EW) mission planning in support of strike planning and order of battle intelligence support to the Air Combat Element (ACE). Without the AN/TSQ-90D upgrade system ceases to support intelligence and EA-6B aircraft by FY 1992.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: (Funded under 0206625M) Conducted AN/TSQ-90C system integration testing.

2. (U) FY 1989 Program: (Funded under 0206625M)

a. (U) Initial Operation Capability AN/TSQ-90C.

b. (U) Begin AN/TSQ-90D upgrade with integration of MIIDS, TRE, EA-6B data link, and Tactical Aircraft Mission Planning Systems (TAMPS).

3. (U) FY 1990 Plans: Integrate AN/TSQ-90D with Tactical Integrated Intelligence Management System (TIMS), Special Security Communication Center (SSCC), Tactical Communication Center (TCC).

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)

4. (U) FY 1991 Plans:

a. (U) Complete integration of EA-6B data link, TIMS, MIIDS, SSCC, TCC AND TRE interoperability. Begin shelter installation.

b. (U) Initiate AN/TSQ-90E block upgrade.

5. (U) Program to Completion: Complete integration AN/TSQ-90E block upgrade Advance Tactical Air Control Center (ATACC), EA-6B Advance Capability (ADVCAP), ALQ-149 Communications Jammer, Tactical Department of Defense Integrated Intelligence System (DODIIS), and Joint Source Imagery Processor (JSIP) interoperability during FY 1991-1995.

D. (U) WORK PERFORMED BY: In-house: PMTC, Point Mugu, CA; NAVAIR, Washington, DC; NWSC, Crane, IN. Contractors: Grumman Corporation, Long Island, NY.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	Delayed lowest priority block upgrade three years	-4,153

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy/Department adjustment of -$4,153 was due to higher priorities requiring funding.

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)

F. (U) PROGRAM DOCUMENTATION:

		DATE
a.	(U) Required Operational Capability	April 1988
b.	(U) Functional Operational Specification	April 1986
c.	(U) Program Performance Specification	August 1988
d.	(U) Draft TEMP	September 1988

G. (U) RELATED ACTIVITIES: 0206625M, Marine Corps Intelligence System, (Operational Systems) C0062, TIMS, shared development in MIIDS Database Handling System.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
83	TERPES	0	0	3,900	3,000	8,700	15,600

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

		DATE
a.	(U) AN/TSQ-90C System Integration Test	Fourth quarter FY 1988
b.	(U) AN/TSQ-90C Operational Test	First quarter FY 1989
c.	(U) AN/TSQ-90C Initial Operational Capability	Second quarter FY 1989
d.	(U) AN/TSQ-90D Initiate Block Upgrade	First quarter FY 1989
e.	(U) AN/TSQ-90D System Integration Test	Fourth quarter FY 1990
f.	(U) AN/TSQ-90D Operational Test	First quarter 1991
g.	(U) AN/TSQ-90D Initial Operational Capability	Second quarter 1991
h.	(U) AN/TSQ-90E Initiate Block Upgrade	Third quarter 1991
i.	(U) AN/TSQ-90E System Integration Test	Second quarter 1994
j.	(U) AN/TSQ-90E Operational Test	Third quarter 1994
k.	(U) AN/TSQ-90E Initial Operational Capability	First quarter 1995

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0036	MC C2 Systems	135	2,016	(Moved to Project C2035)			
C0045	TACSIIP	2,743	5,586	4,896	7,438	Continue	Continue
C0103	MACCS OPS	2,791	6,242	3,243	4,880	Continue	Continue
C1067	Aviation Radar Pip	3,938	3,851	3,848	5,724	Continue	Continue
C1443	Training Devices/ Simulators	4,943	1,279	1,334	2,802	Continue	Continue
C2035	PLRS/NAVSTAR GPS/ TCO			1,330	3,259	Continue	Continue
PROGRAM ELEMENT TOTAL		14,550	18,974	14,651	24,103	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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) PROJECT 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 1988 Accomplishments: PLRS - fielded 6 systems; conducted follow-on test and evaluation; began research on communications enhancements that will increase PLRS data transmission capability. GPS - monitored operational Test II of the NAVSTAR GPS manpack and fielding of the manpacks to the US Army; conducted capabilities briefings to the FMF; revised USMC acquisition strategy.

2. (U) FY 1989 Program:

a. (U) PLRS - Award contract for follow-on buy; field 7th PLRS and spares; develop test program sets; demo communications enhancements.

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

3. (U) FY 1990 Plans: Funding contained in C2035, PLRS/NAVSTAR GPS/TCO in this program element.

4. (U) FY 1991 Plans: Funding contained in C2035.

5. (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 APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Provides funds to ensure intra/interoperability of tactical Command Control Communications, Computers and Intelligence Systems to the extent required by the Marine Corps and Department of Defense.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Commenced work on the Marine Corps Tactical Communication Architecture (MCTCA). Continued development of the Interoperability Data Base (IDB). Revised and disseminated the Technical Interface Concept (TIC). Published changes to the Technical Interface Design Plan (TIDP) Volumes III, IV and V. Continued development of TIDP Volume II. Monitored integration of Marine Tactical Systems to the new LHD-1.

2. (U) FY 1989 Program: Complete development of the IDB. Continue revision/update of TIC and TIDP. Establish Interoperability Testbed at MCISSA. Publish MCTCA. Conduct Interoperability Test and certification of new C4I systems. Monitor future systems engineering for Marine Tactical Systems aboard amphibious ships.

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

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

5. (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 APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project supports the MACCS for Marine Corps and Joint/Allied interoperability and compatibility.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Updated and corrected deficiencies for the Tactical Digital Communications Central, Data Link Emulator Unit, Radar Bomb Directing Set, and AN/TYQ-23 Tactical Air Operations Module (TAOM) software and hardware.

2. (U) FY 1989 Program: Test and evaluate the Portable Heliport Lighting Set to meet an urgent safety related Fleet deficiency. Continue upgrading and testing each systems software and hardware to maintain interoperability with Joint/Allied commands. Test and evaluate Marine Air Traffic Control System (MATCS) upgrades.

3. (U) FY 1990 Plans: Continue upgrading, testing, evaluating and implementing current systems software and hardware to ensure compatibility and interoperability with Joint/Allied tactical command and control facilities.

4. (U) FY 1991 Plans: Continue Marine Air Command and Control System upgrades to current systems for a more cost effective means to maintain compatibility and interoperability with Joint/Allied tactical command and control facilities.

5. (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; SPAWAR, Washington, DC; CONTRACTORS: Advanced Computer Systems, Inc., Fairfax, VA; Litton, DSD, Van Nuys, CA.

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

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
79	Marine Air Command and Control Systems Operational Development						
	AN/TYQ-23	74,823	63,859	46,639	40,662	Continue	Continue
	(qty)(RCN 140034)	(9)	(9)	(5)	(5)		

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Modifications in response to field identified discrepancies for existing radars. Electronic counter-counter measures (ECCM) and anti-antiradiation missile capability for existing radars.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Completed the AN/TPS-59 Threshold Mapper and TAOM Interface modifications, AN/TPS-32 Digital Transmitter Control Unit (DTCU) and Decoy, and AN/TPS-63 Ultralow Sidelobe Antenna (ULSA) and TAOM interface. Began AN/TPS-32 Improved Radar Display Console (IRDC) and AN/TPS-63 Solid State Driver.

2. (U) FY 1989 Program: Complete the AN/TPS-32 IRDC and AN/TPS-63 Solid State Driver. Begin the AN/TPS-32 Receiver-Processor, AN/TPS-59 ECCM Analyzer, and AN/TPS-63 Solid State Transmitter (SSTX). Investigate radar quality deficiency reports (QDRs).

3. (U) FY 1990 Plans: Continue development of AN/TPS-59 ECCM analyzer and Energy Management/Track While Scan study and AN/TPS-32 Receiver-Processor. Investigate radar QDRs.

4. (U) FY 1991 Plans: Complete AN/TPS-59 ECCM analyzer. Continue EDM AN/TPS-63 Decoy and EDM MARK XV Interfaces for AN/TPS-32 and AN/TPS-59 radars. Begin EDM TPS-59 Energy Management Track While Scan. Investigate radar QDRs.

5. (U) Program to Completion: Complete anti-radiation missile defense system for the AN/TPS-63 radar. Continue RAM improvements and develop ECCM capabilities for all three radars. This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Washington, DC. Contractors: GE, Syracuse, NY; Westinghouse, Baltimore, MD; ITT Gilfillan, Van Nuys, CA.

F. (U) RELATED ACTIVITIES: None.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
97	Aviation Radar Product Improvement Mod Kit (RCN 147239)	15,216	0	8,669	2,675	10,886	37,446

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Develops tactical engagement simulators, precision gunnery training devices and combined arms training systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Continued supporting arms development of Tactical Warfare Simulation and Analysis System (TWSEAS) and Precision Gunnery Training System (PGTS).

b. (U) Completed Manual Wargames and Combined Arms Staff Trainer (CAST) prototype at Twentynine Palms, CA.

2. (U) FY 1989 Program: Continue improvement of TWSEAS and PGTS programs to include systems test and evaluation.

3. (U) FY 1990 Plans: Continue development of TWSEAS systems test and initiate Combined Arms Training System (CATS) program.

4. (U) FY 1991 Plans: Continue development of TWSEAS systems test and CATS and initiate product improvement of PGTS.

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

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, Electronic Warfare Simulation.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
133-135	Training Devices/Simulators Program	9,585	6,305	5,013	3,645	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Simfire, England, and Tadiran, Israel, Subcontractors for Fairchild-Weston (PGTS).

FY 1990/1991 BIENNIAL 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 Ground Positioning System/ Tactical Combat Operations (PLRS/NAVSTAR GPS/TCO)

C. (U) PROJECT 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 1988 Accomplishments: This project was contained in C0036, Marine Corps Command and Control Systems, this program element.

2. (U) FY 1989 Program: This project was contained in C0036, Marine Corps Command and Control Systems, this program element.

3. (U) FY 1990 Plans: Initiate development of PLRS/GPS interface unit.

4. (U) FY 1991 Plans:

a. (U) PLRS - Purchase remaining PLRS installation kits and spares.

b. (U) GPS - continue to develop GPS Interface Unit.

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

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Rosslyn, VA. Contractors: None.

F. (U) RELATED ACTIVITIES: None.

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

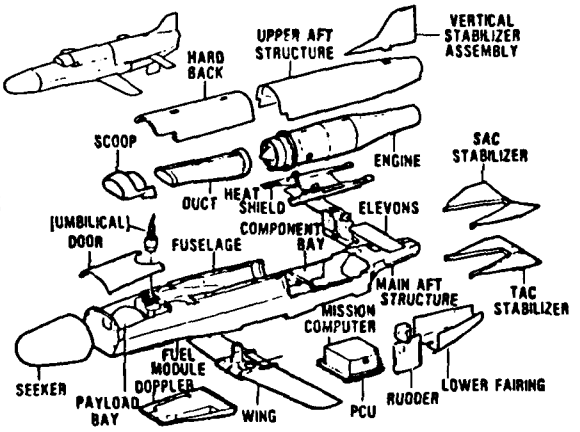
Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
78	Position Location Reporting System	0	29,213	59,815	26,773	TBD	TBD

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0207316N Budget Activity: 4
Program Element Title: TACIT RAINBOW
Project Number: W2002 Project Title: TACIT RAINBOW

SUBSYSTEMS:
- AIRFRAME
- PROPULSION
- AVIONICS
- ELECTRICAL
- ORDNANCE



POPULAR NAME: TACIT RAINBOW

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MS IIIA 3RD QTR		MS IIIB 4TH QTR FY92
Engineering Milestones					
T&E Milestones		IOT&E 4TH QTR			OPEVAL OT-II 1ST QTR FY92
Contract Milestones			ALP		AFP

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	1,900	1,569	0	0	3,469 0
Support Contract					
In-House Support	5,611	4,200	3,896	0	20,789 0
GFE/ Other					
Total	7,511	5,769	3,896	0	24,258 0

DECLASSIFY ON: OADR

Program Element: 0207316N Budget Activity: 4
Program Element Title: TACIT RAINBOW
Project Number: W2002 Project Title: TACIT RAINBOW

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Tacit Rainbow (TR) is a tri-service program with the Air Force and the Army to develop a near-term, low-cost, jet-powered, factory-modular, long-range, lethal, loitering, antiradiation homing missile. The Navy R&D effort is a unique portion of the total program in which the Air Force is the executive service. This program is currently in the full scale development (FSD) phase. FSD for TR began in November 1981 with an Air Force FFP contract award to Northrop Corporation, Ventura Division. The Defense Resources Board established TR as a tri-service program in November 1984.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Navy and Air Force participated in Contractor Development Test and Evaluation.
b. (U) A-6 integration completed.
d. (U)

2. (U) FY 1989 Program:

a. (U) Navy will participate in DT&E/IOT&E: 25 firings.
b. (U) System safety testing will complete.
c. (U) Navy mission planning development will commence.

3. (U) FY 1990 Plans:

a. (U)
b. (U)
c. (U) Milestone IIIA.

4. (U) FY 1991 Plans: Not Applicable.

5. (U) Program to Completion:

a. (U)
b. (U)

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA. CONTRACTOR: Northrop Corporation, Newberry Park, CA.; McDonnell Douglas Astronautics, St. Louis, MO.

Program Element: 0207316N Budget Activity: 4
Program Element Title: TACIT RAINBOW
Project Number: W2002 Project Title: TACIT RAINBOW

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	Sched slip	None
COST	None	None	None

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: DAB in Dec 88 slipped MS IIIA to Jun 90.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

JSOR 12/88
TEMP 10/87 (update in review)

G. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN/#26	0	89,400	0	0	Cont.

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

J. (U) TEST AND EVALUATION DATA: Not applicable to OSD/OMB Budget submission.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0049	ULS	1,829	1,217	115	1,147	Continue	Continue
C0065	TRITAC	737	1,468	477	899	Continue	Continue
PROGRAM ELEMENT TOTAL		2,566	2,685	592	2,046	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 TRITAC network planning (SPEED), control (SYSCON) and restoration (TECHCON) systems that are required to deploy and operate the digital communications TRITAC network. It also contains funds to support Marine Corps TRITAC Testing (MCTSE).

FY 1990/1991 BIENNIAL 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) PROJECT 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 and testing.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: ULCS production units entered First Article Test. ULTDS successful at Milestone III MCPDM.

2. (U) FY 1989 Program: ULCS deliveries and suitability testing begins. ULTDS evaluation by FMF.

3. (U) FY 1990 Plans: Field and evaluate ULCS. Evaluate FMF recommended improvements.

4. (U) FY 1991 Plans: Incorporate ULCS improvements. Incorporate ULTDS improvements.

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

E. (U) WORK PERFORMED BY: In-house: SPAWAR, Washington, DC. Contractors: Calculon Corp., 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 0208010N, 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 APPROPRIATED FUNDS: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
66	Unit Level Switches ULCS (RCN 041063)	61,055	75,740	48,217	31,495	16,879	233,386

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0208010M Budget Activity: 4
Program Element Title: Joint Tactical Communications Program
Project Number: C0065 Project Title: Marine Corps Unilateral TRITAC Test and Evaluation (TRITAC)

C. (U) PROJECT DESCRIPTION: This project consists of three programs; (1) System Planning, Engineering, and Evaluation Device (SPEED), (2) Operational System Control Center (SYSCON), and (3) Technical Control Facility (TECHCON). These systems are required to deploy, operate, and restore the digital TRITAC communications networks. This project also supports TRITAC testing.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Fielded prototype SPEED to FMF.

b. (U) Completed TECHCON requirements assessment.

2. (U) FY 1989 Program: Continue SPEED software development and prototype enhancement. Initiate TECHON and SYSCON development.

3. (U) FY 1990 Plans: Conduct MCPDM III for SPEED. Continue TECHON and SYSCON development.

4. (U) FY 1991 Plans: Complete development and conduct MCPDM III for SYSCON and TECHCON.

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

E. (U) WORK PERFORMED BY: In-house: ECAC, Annapolis, MD. Contractors: Calculon Corp., 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; and Program Element 0208010N, Tri Service Joint Tactical Communications Program, Navy.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
W1953	INEWS Adv. Dev.	6,471	0	2,736	4,810	Continuing
W1954	ICNIA Adv. Dev.	2,285	2,052	576	0	13,385
Total		8,756	2,052	3,312	4,810	Continuing

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 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 (MMIC) 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 specifications and standards developed by the Joint Integrated Avionics Working Group (JIAWG) for the Common Avionics Baseline (CAB) and the Advanced Avionics Architecture (A^3). 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. Supportablility in all areas will be a key INEWS/ICNIA design consideration. The integration of INEWS and ICNIA into an A^3 compatible aircraft will significantly raise aircrew 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 avionic systems through independent technology insertion efforts.

FY 1990/1991 BIENNIAL 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

POPULAR NAME: INEWS

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MSII FY90/4Q		
Engineering Milestones				PDR FY91/1Q CDR FY91/3Q	
T&E Milestones					DT FY93/4Q OT FY94/4Q
Contract Milestones			FSD FY90/4Q CONTRACT		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total
Major Contract (Funds were transferred to Air Force PE63109F in FY 1987)	4,000	0	0	1,326	Continuing
Support Contract	0	0	0	0	0
In-House Support	2,471	0	2,736	3,484	Continuing
GFE/Other					
Total	6,471	0	2,736	4,810	Continuing

FY 1990/1991 BIENNIAL 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

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
An Integrated Electronic Warfare System (INEWS) is required to raise airborne EW situation awareness, improve mission effectiveness, enhance survivability, and to reduce the overall aircrew workload. INEWS, a joint program with Air Force designated as lead Service, shall provide a next generation Electronic Warfare (EW) capability for the Navy Advanced Tactical Aircraft (A-12) and the Air Force Advanced Tactical Fighter. INEWS developed modules may also be used to update and enhance the capabilities of other Navy EW systems through independent technology insertion efforts. The INEWS equipment shall include the hardware and software required to perform all EW functions and EW situation awareness including sensing, processing, countermeasures, control, and integrated diagnostics. INEWS must also support offensive weapon system functions including passive targeting, cueing, and handoff. INEWS shall interface with and share assets with other aircraft subsystems to: (1) ensure the most effective response to threat situations; (2) improve the total aircraft weapon system effectiveness including situation awareness, identification and offensive functions; (3) minimize installation penalties; (4) reduce life cycle cost; and (5) increase weapon system availability. The INEWS development will permit compatibility with the Advanced Avionics Architecture (A3), application of advanced processing techniques, real time multi-sensor fusion and correlation, integration and sharing of Integrated Communications, Navigation, and Identification Avionics (ICNIA) and other A3 assets, EW resource management and control, threat alert and identification, and an automatic counter-measures response. INEWS features are expected to be:

a. (U) High level system integration within INEWS and with other avionics subsystems.
b. (U) Automatic and semi-automatic operation with aircrew override.
c. (U) Enhanced EW situation awareness.
d. (U) Multi-spectral threat warning and response.
e. (U) Modular internal installation in accordance with the Joint Integrated Avionics Working Group (JIAWG) Common Avionics Baseline (CAB).
f. (U) Threat tolerant and responsive to threat changes.
g. (U) Integrated diagnostics and fault isolation.
h. (U) Flexibility for growth/P3I options.
i. (U) Offensive weapon system cueing/passive targeting.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Continued Navy unique engineering analyses and support.
b. (U) Expanded risk reduction to include development of Navy tailored Advanced Development Models (ADM)/Service Test Models (STM) and special joint risk reduction projects.
c. (U) Supported development of the JIAWG CAB for defensive avionics.

FY 1990/1991 BIENNIAL 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

d. (U) Initiated INEWS design refinement and requirements definition for the Navy A-12 program.
e. (U) Continued core system risk reduction.

2. (U) FY 1989 Program:

a. (U) Continue development of ADM and joint risk reduction projects.
b. (U) Continue risk reduction and pre-FSD tasks.
c. (U) Work performed under major INEWS contract, funded by Air Force.

3. (U) FY 1990 Plans:

a. (U) Continue Navy unique engineering analyses and support.
b. (U) Complete development of ADMs and conduct Contractor laboratory/flight testing.
c. (U) Complete demonstration/validation (phase 1B).
d. (U) Continue to support integration into advanced Navy aircraft.
e. (U) Evaluate A-12 and NATF INEWS system digital models on the Strike Electronic Warfare simulator.

4. (U) FY 1991 Plans:

a. (U) Continue Navy unique engineering analyses and program support.
b. (U) Commence FSD for Navy unique modules.
c. (U) Continue to support integration into advanced Navy aircraft.

5. (U) Program to Completion:

a. (U) Develop Navy tailored EDMs.
b. (U) TECHEVAL 4Q/FY93.
c. (U) OPEVAL 4Q/FY94.
d. (U) Milestone IIIA review 1Q/FY95.
e. (U) Milestone IIIB review 1Q/FY96.

D. (U) WORK 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, Point 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.

FY 1990/1991 BIENNIAL 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

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	NONE	NONE

Impact of Changes:

Technology: None

Schedule: None

Cost: None

F. (U) PROGRAM DOCUMENTATION:

Navy/Air Force Phase 1A MOA	07/83
Program Decision Memorandum	08/84
Acquisition Plan	06/85
System Threat Assessment Report	08/86
Navy Operational Requirement	02/88
Navy/Air Force Phase IB MOA	06/88

G. (U) RELATED ACTIVITIES: P.E. 0604222N, Consolidated Electronic Warfare. P.E. 0602234N, Support Systems Technology. P.E. 0603217N, Advanced Aircraft Subsystems. P.E. 0603109F, INEWS/ICNIA. P.E. 0603706D, Microwave, Millimeter Wave Monlithic Integrated Circuits.

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN #2, #4, #5		Not applicable			(Continuing)

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603109N Budget Activity: 4
Program Element Title: INTEGRATED AIRCRAFT AVIONICS
Project Number: W1954 Project Title: Integrated Communications, Navigation Identification Avionics (ICNIA)

C. (U) PROJECT DESCRIPTION: This project will demonstrate the concept of modular communications, navigation and identification avionics equipment for future naval aircraft. The ICNIA program is a tri-Service program with Air Force the designated executive Service. The Air Force/Army program began in FY 1984 with the Navy joining the effort in FY 1986. All Navy funding in this project is for Navy unique waveforms and Navy development support only. Navy advanced development model (ADM) equipment will be an implementation of three Navy unique waveforms. By borrowing one of the other Service's terminals, this will allow the demonstration of the utility of the ICNIA architecture to simultaneously provide multiple Communications, Navigation, Identification (CNI) functions as required by Navy mission profiles.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Began development of software to implement Navy unique waveforms.
   b. (U) Coordinated with Air force and Army in DT&E planning.

2. (U) FY 1989 Program:
   a. (U) Continue development of Navy unique waveforms.
   b. (U) Participate in Air Force and Army DT&E as appropriate.

3. (U) FY 1990 Plans:
   a. (U) Conduct test and evaluation of Navy unique waveforms.
   b. (U) Demonstrate in a laboratory environment the utility of ICNIA architecture to simultaneously provide multiple CNI functions as required by Navy mission profiles.

4. (U) FY 1991 Plans: Not Applicable.

5. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD. CONTRACTORS: TRW, San Diego, CA; Rockwell Collins, Cedar Rapids, IA; Singer Kearfott, Little Falls, NJ.

F. (U) RELATED ACTIVITIES: PE 0603109F, Integrated Aircraft Avionics and PE 0603109A, Integrated Aircraft Avionics also support the tri-Service program for ICNIA. Coordination of the tri-Service program is delineated in a tri-Service MOU signed at the Assistant Secretary (for R&D) level in 1986.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	TO COMPLETE
This is a non-acquisition program					

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0513	Air/Ocean Prediction	1,744	1,448	1,841	3,054	Cont.	Cont.
X0514	Air/Ocean Shipbd. Measurements	1,617	1,613	2,094	2,150	Cont.	Cont.
X0948	Prec Time/Time Interval	1,546	1,998	2,932	2,793	Cont.	Cont.
X2008	Tac Ocean Data Assim and Prediction	5,805	2,652	4,299	4,317	Cont.	Cont.
	TOTAL	10,712	7,711	11,166	12,314	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program comprises the Navy support effort to provide a shipboard capability to optimize weapon and sensor performance as a function of the changing oceanographic and atmospheric environment. These projects represent the support infra-structure needed to provide Battle Group, Surface Action Group and Amphibious Task Force Commanders with timely environmental data to optimize the selection and employment of available weapons, sensors and platforms. Present shipboard environmental systems are outdated, slow, and incapable of meeting the atmospheric and oceanographic data requirements of Naval weapons systems and tactics. 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 Initiatives, satellite navigation improvements and jam-proof, secure communications are included. The Tactical Ocean Data Assimilation and Prediction project maximizes the effectiveness and availability of remotely sensed and conventional oceanographic data needed to enhance the warfighting capability of the fleet such as ASW Battle Group and area ASW operations.

UNCLASSIFIED

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project develops computer based numerical oceanic and atmospheric models to provide environmental data analyses and forecast necessary to support naval operations. The prediction system emphasizes the air/ocean interface, an area used exclusively for naval operations. Included are sea ice forecasting, ocean thermal structure analysis and forecasting, ocean circulation prediction and data assimilation for tactical application.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed the Navy Operational Global Atmospheric Prediction System (NOGAPS) 3.0 operational test.
   b. (U) Completed the Search and Rescue, and Ballistic Winds Tactical Decision Aids (TDAs); continued the Strike Warfare TDAs.
   c. (U) Completed Western Mediterranean Ocean Circulation Forecast Model.
   d. (U) Began development of the Advanced Tropical Cyclone Model.
   e. (U) Completed/implemented Optimum Thermal Interpolation System (OTIS).
2. (U) FY 1989 Program:
   a. (U) Begin development of on-scene tactical scale Ocean Thermal structure prediction system.
   b. (U) Evaluate and verify the Advanced Tropical Cyclone Model.
   c. (U) Implement upgrades to the Operational Global and Regional Atmospheric Prediction Systems.
3. (U) FY 1990 Plans:
   a. (U) Complete tactical routing and surf forecast TDAs.
   b. (U) Continue strike warfare TDAs and tropical cyclone forecast aids.
   c. (U) Begin development of Greenland/Norwegian Sea Ice Model.
   d. (U) Continue development of ocean thermal structure prediction system.
4. (U) FY 1991 Plans:
   a. (U) Initiate NOGAPS 4.0 model OPTEST.
   b. (U) Continue strike warfare TDAs and tropical cyclone forecast aids.
   c. (U) Continue development of Greenland/Norwegian Sea Ice Model.
   d. (U) Cont. dev. of ocean thermal structure prediction system.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Environmental Prediction Research Facility, Monterey, CA: Naval Ocean Research and Development Activity, Bay St. Louis, MS; and Naval Research Laboratory, Washington, DC.

F. (U) RELATED ACTIVITIES: Program Element 0602435N, Oceanographic and Atmospheric Support Technology.

G. (U) OTHER APPROPRIATION FUNDS: This is not an acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project provides for the advanced development of airborne and shipboard sensors to measure local atmospheric and oceanographic parameters essential to the optimum employment of naval warfare systems. With these sensors, the on-scene Commanders will continuously and automatically monitor the changing atmospheric and oceanographic environment in their immediate vicinity, allowing them to optimize performance of their weapons, sensors and platforms.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued the Shipboard Meteorological and Oceanographic Observing System (SMOOS) sensor technology development.
   b. (U) Continued exploration of Raman Laser water vapor and atmospheric temperature profiling technologies for LIDAR Atmospheric Profiler (LAP)
2. (U) FY 1989 Program:
   a. (U) Continue SMOOS sensor technology development.
   b. (U) Continue exploration of Raman Laser atmospheric temperature profiling technologies for the LAP.
   c. (U) Begin development of interfaces between LAP and shipboard environmental support systems.
   d. (U) Begin engineering study in support of EMCONSONDE requirement.
3. (U) FY 1990 Plans:
   a. (U) Demonstrate and validate Raman Laser atmospheric temperature profiling technologies for LAP.
   b. (U) Begin LAP EDM development.
   c. (U) Continue engineering studies of EMCONSONDE requirement.
4. (U) FY 1991 Plans:
   a. (U) Complete LAP EDM development and conduct shipboard T&E
   b. (U) Begin EMCONSONDE development.
5. (U) Program to Completion: Continue LAP EDM system engineering and complete shipboard T&E. This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminister, PA; Naval Research Laboratory, Washington, DC. Contractors: Lockheed, Austin, TX.

F. (U) RELATED ACTIVITIES: Program Element 0604218N, Air/Ocean Equipment Engineering; Program Element 0604230N, Warfare Support System.

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

	APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1.	OPN #207	0	0	2,984	3,351	3,858	10,193

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

UNCLASSIFIED

FY 1990/1991 BIENNIAL 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 Technology

C. (U) PROJECT DESCRIPTION: Upgrade accuracy of Naval Observatory's Master Clock System (MCS) for Department of Defense. Develop advanced detectors/optical interferometer to study radio/optical sources used for precise star determination. Establish time station located at Consolidated Space Operation Center (CSOC), Colorado Springs. Develop laser station to determine earth rotation/polar motion.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued upgrade of the MCS.
   b. (U) Completed procurement of hardware and development of software for the Consolidated Space Operations Center (CSOC) program.
   c. (U) Awarded construction contract for Charged Coupled Device (CCD) array detector camera for Advanced Light Detector Development ALDD programs.
   d. (U) Transitioned optical/IR interferometry results from tech base program.
   e. (U) Developed POA&M for the Very Long Baseline Interferometry (VLBI) needed for precise time measurements for secure communication/navigation.
2. (U) FY 1989 Program:
   a. (U) Upgrade of the MCS: test Raser vs Mercury Stored Ion device.
   b. (U) Assemble and test array detector camera.
   c. (U) Installation and final testing of CSOC clock ensemble.
   d. (U) Optical interferometry; procure prototype siderostat, site test.
   e. (U) VLBI programs: start fiber optics communication experiments.
3. (U) FY 1990 Plans:
   a. (U) Upgrade of MCS: subnanosecond switching experimentation.
   b. (U) Optical interferometry program: test siderostat, develop delay line
   c. (U) VLBI program: first fiber optics data transfer tests.
4. (U) FY 1991 Plans:
   a. (U) Upgrade of MCS: build subnanosecond system.
   b. (U) Optical interferometry program: laser metrology install./test.
   c. (U) Develop electronic astrograph detection system.
   d. (U) VLBI program: fiber optics terminal development.
5. (U) Program to Completion: MCS upgrade continues with new subnanosecond technology, complete optical interferometry, install VLBI fiber optics installed, develop supercorrelation, implement light detector development on astrograph, and begin laser ranging. This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Observatory, Washington, DC; Naval Research Laboratory, Washington, DC. Contractor: Hewlett Packard Co.,

F. (U) RELATED ACTIVITIES: None.

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: 0603207N Budget Activity: 4
Program Element Title: Air/Ocean Tactical Applications
Project Number: X2008 Project Title: Tactical Ocean Assimilation and Prediction

C. (U) PROJECT DESCRIPTION: This project develops dynamic ocean models, new means of environmental data collection, including conventional and remotely sensed data, and assimilation techniques for incorporating these data into the Navy operational forecast models.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Comp. dev. of ocean prediction model in Gulf Stream (GULFCAST)
   b. (U) Began Defense Meteorological Satellite Program (DMSP) Block 6 Concept Studies to integrate Navy sensor requirements into the next generation DMSP.
   c. (U) Developed operational demo of Alaskan Synthetic Aperture Radar (SAR) Facility to subsume SAR data in ice forecast models.
   d. (U) Demonstrated geophysical/geodetic satellites (GEOSAT) data input to Harvard Ocean Circulation Model in Pacific Sub-Arctic Front.
   e. (U) Assessed techniques to assimilate asynoptic data into num. models.
2. (U) FY 1989 Program:
   a. (U) Transition GULFCAST to operational use (1st quarter).
   b. (U) Complete DMSP Block 6 concept studies.
   c. (U) Continue development of Alaska SAR Facility.
   d. (U) Complete verification and transition of the Dynamic Ocean Circulation Model in North Pacific (NEPAC).
   e. (U) Begin validation of the European Space Agency (ESA) Remote Sensing Satellite (ERS) SAR and the Ocean Topography Experiment (TOPEX) ice, wind, and wave algorithms.
3. (U) FY 1990 Plans:
   a. (U) Transition NEPAC to operational use.
   b. (U) Begin DMSP Block 6 demonstration and validation contracts.
   c. (U) Cont. dev. and field validation of ocean circulation models.
   d. (U) Plan exploitation of new foreign satellite environmental sensors.
4. (U) FY 1991 Plans:
   a. (U) Continue the Block 6 Demonstration and Validation Contracts.
   b. (U) Cont. dev. and field validation of ocean circulation models.
   c. (U) Plan exploitation of new generation of foreign satellite environmental sensors.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Research and Development Agency, Bay St. Louis, MS: Naval Environmental Prediction Research Facility, Monterey, Ca; Naval Research Laboratory, Washington, DC. Contractor: Harvard University, Boston, MA.

F. (U) RELATED ACTIVITIES: PE 0305160F, Air Force Defense Meteorological Satellite Program; PE 0305111N, Weather Service; PE 0603704N, ASW Oceanography; PE 0604218N, Air/Ocean Equipment Engineering.

G. (U) OTHER APPROPRIATION FUNDS: This is not an acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603208N
Budget Activity: 4
Program Element Title: T45TS
Project Number: W1142 Project Title: T45TS

POPULAR NAME: GOSHAWK

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS IIIA 5/89	IOC 2/91	MS III AFP 3/91	
Engineering Milestones	1st Flt OFT ACCP TEST		ACFT BASE-LINE EST	OFT BASE-LINE EST	
T&E Milestones	DT-IIA 11/88 OT-IIA 11/88	DT-IIB 8/89 OT-IIB 8/89	TECHEVAL OPEVAL	BIS A 2/91	BIS B 12/92
Contract Milestones	DEL A/C #1 4/88	DEL S/M #1 2/89	DEL A/C #12 for IOC		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	90,975	83,765	23,836	9,963	529,539
Support Contract	701	1,017	289	250	6,257
In-House Support	2,903	3,994	2,350	4,390	21,248
GFE/ Other	0	0	0	0	0
Total	94,579	88,776	26,475	14,603	557,044 0

Program Element: 0603208N Budget Activity: 4
Program Element Title: T45TS
Project Number: W1142 Project Title: T45TS

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The mission is to provide undergraduate jet pilot training for prospective carrier-based Navy/Marine Corps pilots, and selected international students to meet aircrew requirements in the 1990's and beyond. Projected T-2/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. The complementary aspects of flight training, (flight, simulation, and academics) are integrated to develop an effective, affordable and efficient system.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Prototype aircraft first flight 16 Apr 88.
b. (U) Prototype OFT (2F138) provisionally accepted Aug 88 and final acceptance to occur after 40 hour flight test update.

2. (U) FY 1989 Plans:

a. (U) Continued T&E of aircraft and ground training systems.
b. (U) Initial Sea Trials (Aug 89).

3. (U) FY 1990 Plans:

a. (U) Continued T&E of aircraft and ground training systems.
b. (U) Conduct TECHEVAL, OPEVAL, SYSVAL.
c. (U) Accomplish IOC.

4. (U) FY 1991 Plans:

a. (U) Continued T&E of aircraft and ground training systems highlighted by High Angle of Attack (HAOA) evaluation for fleet spin training.
b. (U) Extended clearances for ordnance, baggage and fuel pods.
c. (U) Evaluation of Navy common avionics (MMR/GPS etc), and lower lifecycle cost components.

5. (U) Program to Completion: Plans to complete in FY 1991.

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: T45TS
Project Number: W1142 Project Title: T45TS

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	See narrative #2	N/A
COST	N/A	N/A	$2,783

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Aircraft T&E running 8 to 10 weeks behind due to late delivery of developmental aircraft.

3. (U) COST CHANGES: Department and Navy adjustment of $2,783 provided to accommodate change in dollar/pound exchange rate.

F. (U) PROGRAM DOCUMENTATION:

Mission Element Needs Statement	6/79
Acquisition Plan	6/87
Navy Training Plan	6/87 (M/S IIIA revision in OPNAV review)
TEMP	12/87 (M/S IIIA revision in OPNAV review)
NDCP	12/87 (M/S IIIA revision in OPNAV review)

G. (U) RELATED ACTIVITIES: Navy provides the following common equipment as Government Furnished Equipment (GFE): the Navy Aircrew Common Ejection Seat (NACES) (P.E. 0603216N); the Standard Attitude Heading Reference System (SAHRS) (P.E. 0604203N)

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 #26, 27					
QTY	(12)	(24)	(24)	(48)	
APN-3 #26/27	368.1	413.3	429.1	603.6	Cont.
APN-6 #66	24.1	13.5	34.0	45.2	141.2
MILCON	9.2		11.8		23.6

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

J. (U) TEST AND EVALUATION DATA: Included in Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603216N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEM

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0584	Aircrew Protective Clothing and Devices	1,437	5,515	5,903	6,622	Cont.	Cont.
M0097	Aircrew Impact Injury Prevention	1,683	2,752	2,874	2,957	Cont.	Cont.
Total		3,120	8,267	8,777	9,579	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Aviation Life Support Systems is a tri-service coordinated advanced development program. It consists of two complementary projects; Project M0097, Aircrew Impact Injury Prevention and Project W0584, Aircrew Protective Clothing and Devices. Project M0097 develops human dynamic and injury response models to impact acceleration and determines the correlation of these dynamic responses with physiological effects and injuries. Project W0584 uses these models to develop and functionally integrate systems of protective clothing and equipment to ensure crewman 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603216N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEM
Project Number: M0097 Project Title: AIRCREW IMPACT INJURY PREVENTION

C. (U) PROJECT DESCRIPTION: Develops human dynamic and injury response models of impact acceleration, 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 1988 Accomplishments:
   a. (U) Completed validating +Gz impact acceleration test.
   b. (U) Conducted mathematical preparation for -Gx injury model.

2. (U) FY 1989 Program:
   a. (U) Complete vertical accelerator man-rating certification.
   b. (U) Begin human data collection on vertical accelerator.
   c. (U) Collect human -Gx cadaveric impact data and human response to -Gx acceleration.
   d. (U) Collect +Gz injury model data.

3. (U) FY 1990 Plans:
   a. (U) Collect +Gz human cadaveric data.
   b. (U) Complete modeling +Gz/-Gx human impact response.

4. (U) FY 1991 Plans:
   a. (U) Extend the mathmatical injury model to +Gz direction.
   b. (U) Begin validation of biofidelic mannequin.
   c. (U) Complete updated injury-impact guide.

5. (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 Weapons Center, China Lake, CA; Naval Air Test Center, Patuxent River, MD; 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 Aerospace Medical Research Laboratory, Dayton, OH; USA Aeromedical Research Laboratory, Ft. Rucker, AL; NASA, Johnson Space Center, Houston, TX; Department of Transporation, Washington, DC.; Veterans Administration-Medical College of Wisconsin.

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 RDT&E Steering Committee, the Joint Environmental Working Group (Flight), the Triservice Aerospace Medical Research Panel and Technical Working Groups in biodynamics and vibrations/acoustics.

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 063216N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEM
Project Number: W0584 Project Title: A/C PROT CLOTHING AND DEVICES

C. (U) PROJECT DESCRIPTION: Develops functionally integrated system of protective clothing and equipment designed to ensure crew protection and enhance crew performance.

D. (U) PROGRAM ACCOMPLISHMENTS

1. (U) FY 1988 Accomplishments:
   a. (U) Transitioned multi-wavelength laser eye protection.
   b. (U) Initiated 21st Century Head Protection Program.
   c. (U) Continued Advanced Integrated Life Support System Program.

2. (U) FY 1989 Program:
   a. (U) Continue Advanced Integrated Life Support System, and 21st Century Head Protection Programs.
   b. (U) Initiate Advanced Technology Crew Station and Laser Eye Protection Visor.

3. (U) FY 1990 Plans:
   a. (U) Complete Advanced Integrated Life Support System Program.
   b. (U) Initiate Helicopter Protection and Survival programs and Aircrew Oxygen Delivery System.
   c. (U) Continue 21st Century Head Protection Program.

4. (U) FY 1991 Plans:
   a. (U) Complete 21st Century Head Protection Program.
   b. (U) Continue Advanced Technology Crew Station, Aircrew Oxygen Delivery System, Laser Eye Protection Visor, and Helicopter Protection, Survival, Programs.
   c. (U) Initiate Advanced Recovery System, and Long Range Sea Survival Programs.

5. (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: Boeing Advanced Systems Division, Seattle, WA: Gentex Inc., Carbondale, PA; OTHERS: USAF Wright Aeronautics 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 RDT&E 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 Life Support Systems; and P.E. 0604706F: Life Support Equipment all perform coordinated projects related to PE 0603216N.

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603220N Budget Activity: 4
Program Element Title: ADVANCE TACTICAL SUPPORT (ATS)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1689	ATS	0	0	999	1,504	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: ATS will provide long-range surveillance, battle management and EW; Mine Warfare; Anti-Surface Warfare; and outer zone ASW detection and prosecution over the entire naval task group battle space. This includes, but is not limited to, missions currently being performed by the E-2C, EA-3/ES-3, EA-6B and S-3A/B aircraft, which require replacement by the mid 90's to early 2000's.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.
2. (U) FY 1989 Program: Not Applicable.
3. (U) FY 1990 Plans:

a. (U) Initiate concept formulation to determine the most feasible host airframe(s). Current and under-development land and carrier-based aircraft, as well as manned and unmanned vehicles, will be evaluated against the whole ATS mission spectrum as well as each individual mission element.

b. (U) Initiate system design concepts, foremost will be the employment of evolutionary technology in combat systems and sensors, and weapons currently under development (e.g., MK-50 torpedo; AAAM or AMRAAM).

4. (U) FY 1991 Plans: Continue concept formulation and system design concepts, system configuration development and complete avionics core system definition.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; CONTRACTORS: TBD.

E. (U) RELATED ACTIVITIES: P.E. 0603217N, Advanced Aircraft Subsystems: Integrated Avionics, cockpit displays, antenna and electrical systems; P.E. 0602122N, Aircraft Technology: Aerodynamics, structures, propulsion and personnel reduction; P.E. 0604252N, Advanced Tactical Aircraft: Airframe, power plant and sensor development; Lighter-than-air Technology: Airframe and Sensor Development; P.E. 0305141D, Joint Remotely Piloted Vehicles Program: (UAV) airframe, propulsion and sensor development.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
TBD	Not Applicable				Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603222N Budget Activity: 4
Program Element Title: SKIPPER ENHANCEMENTS
Project Number: W2004 Project Title: New Skipper Upgrades

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W2004	New Skipper Upgrades	7,283	15,874	0	0		42,851*

* Funded in P.E. 0603306N prior to FY 1988.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides for the development of improvements to the Skipper air-to-surface weapon system. This project is a result of an FY 1986 Congressional initiative to provide a near-term, air-to-surface fighting capability with specific direction to develop a low-cost, laser guided training bomb (LGTR) and perform a tech demo program using the Army"s Fiber Optic Guided Missile (FOG-M) technology on SKIPPER (FOG-S).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued LGTR Full Scale Engineering Development (FSED).
   b. (U) Began a demonstration of Fiber Optic Guided Missile (FOG-M) technology on SKIPPER (FOG-S).
2. (U) FY 1989 Plans: Complete demonstration of the fiber optic data link from a single pylon mounting using off-the-shelf FOG-M hardware. Begin exploration of longer range payouts from alternative air vehicle (e.g. Recoverable Test Vehicle) and/or take steps toward exploring issues in powered Paveway vehicles (plume-fiber interaction) and advanced seekers. Continue LGTR FSED.
3. (U) FY 1990 Planned Program: Not Applicable.
4. (U) FY 1991 Planned Program: Not Applicable.
5. (U) Program to Completion: Not Applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA. CONTRACTOR: Fairchild Weston Inc. OTHER: U.S. Army Missile Command, Redstone Arsenal, AL.

E. (U) RELATED ACTIVITIES: Not Applicable.

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

PROCUREMENT (OPN)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN #193	0	0	0	5,334	Cont.

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0517	CV-ASW MODULE	0	957	3,505	3,518	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program develops software and equipment improvements required to upgrade the Aircraft Carrier Anti-Submarine 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; 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 aircraft ASW software programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Program: Continue Model 4.2 computer program development to support fleet introduction of S-3B(WSIP) aircraft. Conduct Model 4.2 IOT&E.

3. (U) FY 1990 Plans: Complete Model 4.2 S-3B revision. Implement Model 4.3 upgrade to support S-3A mission support changes. Conduct Model 4.2 TECHEVAL/OPEVAL.

4. (U) FY 1991 Plans: Complete testing of Model 4.3 program. Commence development of JINTACCS automatic message processing and digital interface with NAVMACS (Naval Message Automatic Center).

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC (Lead Laboratory), Warminster, PA. CONTRACTORS: Intermetrics, Inc., Warminster, PA.

E. (U) RELATED ACTIVITIES:
a. (U) PE 0604581N, Combat Information Center Conversion (provides ASW information to ACDS).
b. (U) PE 0604711N, Anti-Submarine Warfare Operations Center (interoperability with MPA mission support).

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OP,N (BA-2) #76 (224700)	15,983	5,232	5,005	5,172	Cont.	Cont.

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

FY 1990/1991 BIENNIAL 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

POPULAR NAME: NATF

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	NATF DEM/VAL			USAF MS IIA SOURCE SELECTION	
Engineering Milestones		DEM/VAL TRADE STUDIES			
T&E Milestones					
Contract Milestones	8/88	3/90	2nd QTR	2nd QTR	Continuing

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	1,900	60,000	60,000	60,000	Continuing
Support Contract		0	200	400	Continuing
In-House Support	40	4,286	4,285	4,075	Continuing
GFE/ Other	60	250	250	250	Continuing
Total	2,000	64,536	64,735	64,725	Continuing Continuing

Program Element: 0603231N Budget Activity: 4
Program Element Title: NAVY ADVANCED TACTICAL FIGHTER
Project Number: W2051 Project Title: NAVY ATF

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Navy Advanced Tactical Fighter (NATF) program will develop the next generation fighter for introduction in the mid-1990's to counter the emergence of large numbers of advanced Soviet fighters and long range threat platforms. The NATF is being designed to project fleet defense against these platforms and achieve a first-look, first-kill capability against multiple targets. Program emphasis from the outset has been balanced on affordability, reliability, maintainability, performance, and survivability.

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 1988 Accomplishments:

a. (U) In January 1988, a Memorandum of Understanding (MOU) was signed by the Under Secretary of the Navy and the Assistant Secretary of the Air Force for Acquisition establishing U.S. Navy participation in the ATF program to develop the Navy variant configuration and design.

b. (U) On 11 April 1988, the Under Secretary of the Navy approved Navy participation in the USAF DEM/VAL program leading to source selection.

c. (U) Contract modifications, negotiated with the ATF prime airframe and engine contractors, were awarded to begin studies to develop the Navy variant configuration and design.

2. (U) FY 1989 Program:

a. (U) Contractor awards will be made to increase the level of effort for the Navy variant design.

b. (U) Additionally, wind tunnel testing, structural and materials testing for marine environments, effectiveness, avionics integration, susceptibility, integrated logistics support, reliability, maintainability and supportability studies will commence.

3. (S) FY 1990 Plans:

a. (U) Results of the studies conducted in 1988 and 1989 will be evaluated and incorporated into source selection criteria and the design specification for Full Scale Development (FSD).

b. (U) Carrier suitability analyses will be conducted: structures analysis and capability with CV launch and recovery systems.

c. (U) Marinization of USAF ATF engine will be accomplished.

d. (S) Investigate use of

e. (U) Wind tunnel testing for Navy Variant will commence at Langley, AFB, and Arnold Engineering Development Center.

f. (U) Materials testing for composite structures in Navy variant will be conducted.

Program Element: 0603231N Budget Activity: 4
Program Element Title: NAVY ADVANCED TACTICAL FIGHTER
Project Number: W2051 Project Title: NAVY ATF

4. (U) FY 1991 Plans:

a. (U) USAF is scheduled for Milestone II. Follow-on Navy Pre-FSD effort will produce plans for and demonstrate aircraft carrier compatibility.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air System Command, Washington, D.C.; Aeronautical Systems Division, Wright-Patterson, AFB, Dayton, OH. CONTRACTORS: Northrop Corporation, Aircraft Division, Hawthorne, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

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: TOR June 1987

G. (U) RELATED ACTIVITIES: USAF Advanced Tactical Fighter (AFT) P.E. 0603230F.

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

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: 0603254N Budget Activity: 4-Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W1292 Project Title: Air Anti-Submarine Warfare

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1292	Adv ASW Sensors & Proc.	7,280	8,841	11,035	11,002	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
   a. (U) _ - Continued development option paper. Tested AIS algorithms in the laboratory. Investigated alternative sonobuoy configurations.
   b. (U) Air Deployable Active Receiver (ADAR) - Conducted initial demonstration tests with ship-deployed sources.
   c. (U) Advanced Active Sonobuoy/Air Active Adjunct (AAS/AAA) - Initiated Development Options Papers (DOP).
   d. (U) Tactical Arctic Sonobuoy (TAS) - Initiated DOP. Conducted investigation of penetration techniques.
   e. (U) Enhanced Tactical Surveillance Sonobuoy (ETSS) - Initiated system trade-off studies and acquisition planning for transition to FSED.
2. (U) FY 1989 Program:
   a. (U) - Select system development options. Commence demonstration/validation (DEM/VAL) testing. Continue systems engineering and detection algorithm development.
   b. (U) ADAR - Initiate system studies. Test alternative array configurations.
   c. (U) AAS/AAA - Complete DOP. Initiate advanced development model (ADM) procurement for selected candidates.
   d. (U) TAS - Complete DOP. Conduct geobuoy testing.
   e. (U) ETSS - Complete trade off studies, system design and initiate functional design for software and hardware. Conduct DEM/VAL tests for transition to FSED in FY90.

Program Element: 0603254N Budget Activity: 4-Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W1292 Project Title: Air Anti-Submarine Warfare

3. (U) FY 1990 Plans:
   a. (U) ADAR - Complete systems studies. Transfer to FSED.
   b. (U) Complete systems engineering, detection algorithm development, and demonstration/validation tests. Transition to FSED.
   c. (U) AAS - Award ADM contract and commence DEM/VAL tests.
   d. (U) AAA - Award ADM contract and commence DEM/VAL tests.

4. (U) FY 1991 Plans:
   a. (U) AAS - Conduct DEM/VAL tests. Initiate EDM procurement actions.
   b. (U) AAA - Conduct DEM/VAL tests. Initiate EDM procurement actions.
   c. (U) Improved Tactical Surveillance Sonobuoy (ITSS) - Conduct System Development Studies. Conduct trade-off analysis. Develop integration schedule.

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: Not applicable.

F. (U) PROGRAM DOCUMENTATION:

ETSS	OR	2/86	ADAR	OR	11/86
AIS	TOR	8/85	ITSS	OR	2/86
AAA	TOR	4/87	ILCS	OR	5/86
AAS	TOR	5/86	TAS	TOR	7/85

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) MILESTONES:

	MS II	IOC
ETSS	4Q90	
AIS	1Q91	
AAA	1Q94	
AAS	1Q94	
ADAR	2Q90	
ITSS	1Q96	
ILCS	1Q97	
TAS	2Q90	

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0528	Advanced Airborne Mine Countermeasures	2,996	5,547	3,166	2,084	Cont.	Cont.
W0529	Airborne Mine-hunting System	3,681	6,508	9,861	14,474	Cont.	Cont.
TOTAL		6,677	12,055	13,027	16,558	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Development of airborne mine countermeasures systems that are required to counter known and projected mine threats. Provides a minesweeping capability against mines, a mechanical minesweeping capability against and a capability to locate and neutralize at greater area coverage rates and by more means than by surface mine countermeasures platforms.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603260N Budget Activity: 4
Program Element Title: Airborne Mine Countermeasures
Program Number: W0528 Project Title: Advance Airborne Mine Countermeasures Equipment

C. (U) PROJECT 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 to

Systems developed include: AN/ALQ-166 Magnetic Sweep to sweep magnetic mines and A/N 37U-1 Controlled Deep Moored Sweep to and reduce streaming time.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) AN/ALQ-166 - Install TF-40 engines.
2. (U) FY 1989 Program:
   a. (U) AN/ALQ-166 - Conduct contractor demo, technical evaluation and initiate operational evaluation.
   b. (U) A/N 37U-1 - Conduct operational testing and obtain ALP.
3. (U) FY 1990 Plans:
   a. (U) AN/ALQ-166 - Complete operation evaluation, and obtain AFP.
   b. (U) A/N 37U-1 - Initiate limited production.
4. (U) FY 1991 Plans:
   a. (U) A/N 37U-1 - Conduct technical and operational evaluation.
5. (U) Program to Completion:
   a. (U) AN/37U-1 - Obtain AFP.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Center, Panama City, FL and DTNSRDC, Bethesda, MD;
CONTRACTORS: EDO Government Products Division, College Point, NY; Tetra-Tech, Inc., San Diego, CA.
F. (U) RELATED ACTIVITIES: Cable fairing and towed body technologies developed under PE 0602315N, Mine and Special Warfare; Sonar Technology under PE 0603502N, Surface Mine Counter-measures, Project S0260, Advanced Minehunting Systems and Project S1404, Neutralization.
G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) APPN/P-1 OPN #253	0	12,000	0	26,366	Cont.	Cont.
(U) Quantities:	AN/ALQ-166 Magnetic Sweep			A.N 37U-1		

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0529	Airborne Mine-hunting System	3,681	6,508	9,861	14,474	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This project includes sonars for mine detection and classification, and systems for mine neutralization by explosive charge, with equipment designed to provide capabilities against both There is currently being developed: Acoustic Tracking Device and Neutralization System Systems and AN/AQS-20 Sonar Mine Detecting Set

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Neutralization - Conduct preliminary and explosive safety tests.
2. (U) FY 1989 Program:
   a. (U) Neutralization - Conduct environmental, safety and contractor demonstration.
   b. (U) AN/AQS-20 Conduct critical components tests.
3. (U) FY 1990 Plans:
   a. (U) Neutralization - Conduct technical and initiate operational evaulation.
   b. (U) AN/AQS-20 - Conduct developmental and operational testing, obtain Milestone II, initiate full scale engineering development.
4. (U) FY 1991 Plans:
   a. (U) Neutralization - Complete operational evaluation.
   b. (U) AN/AQS-20 - Complete design and initiate fabrication of engineering development.
5. (U) Program to Completion:
   a. (U) Neutralization - Obtain AFP.
   b. (U) AN/AQS-20 - Conduct environmental and contractor demonstration tests, complete technical and operational evaluations and obtain AFP.

FY 1990/1991 BIENNIAL 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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCSC, Panama City, FL, DTNSRDC, Bethesda, MD and NSWC, Dahlgren, VA. CONTRACTORS: Lockheed Missiles and Space Company, Inc., Sunnyvale, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	1 Year	-1,389

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Neutralizer will be slipped one year and AN/AQS-20 will also slip due to $ -1,389 reduction.

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; Minehunt, Project #S0260, and Neutralization, Project #S1404.

Program Element: 0603260N Budget Activity: 4
Program Element Title: Airborne Mine Countermeasures
Project Number: W0529 Project Title: Airborne Mine Hunting System

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. APPN/P-1						
OPN #253	0	0	0	0	Cont.	Cont.
2. Quantities:	Neutralization		AN/AQS-20		(First buy 1993)	

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NOT APPLICABLE

J. (U) MILESTONE SCHEDULE:

1. (U) NEUTRALIZATION
   a. Complete FSED 2nd Qtr. 90
   b. Complete DT/OT II 2nd Qtr. 91
   c. AFP Milestone III 1st Qtr. 92
2. (U) AN/AQS-20
   a. Complete DT/OT I 3rd Qtr. 90
   b. Complete ADV DEV Milestone II 4th Qtr. 90
   c. Complete FSED 4th Qtr. 93
   d. Complete DT/OT II 3rd Qtr. 94
   e. AFP Milestone III 1st Qtr. 95

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
F/A-18D Recce Capable (RC) with SAR and ATARS EO/IR Sensors	8,269	8,215	26,225	34,478	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1993. 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).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued aircraft provisions and software design.
   b. (U) Monitored USAF EO/IR sensor development for Advance Tactical Airborne Reconnaissance System (ATARS). MIPR sent to USAF for opening USN options on contract.
   c. (U) Commenced modification of nose shape for flight control data.
   d. (U) Continued logistic and facility planning.
   e. (U) Initiated planning for USN FOTR capability.
   f. (U) Coordinated Test and Evaluation (T&E) planning through Joint Service Working Groups for sensors (ATARS), and the Joint Services Imagery Processing System (JSIPS) for ground stations.
   g. (U) Participated with US Air Force in acquisition of standoff EO system. Contract awarded.

2. (U) FY 1989 Program:
   a. (U) Initiated flight test of reconnaissance nose shape for flight control data.
   b. (U) Continue aircraft provisions design.
   c. (U) Initiate software development for F/A-18D(RC).
   d. (U) Coordinate with USAF the development of EO/IR sensors and standoff sensors and design for installation in the F/A-18D(RC). Fund MIRP to USAF for Navy options.
   e. (U) Develop test plans.
   f. (U) Commence design planning for provisions for recce SAR mod to APG-65 radar upgrade.

Program Element: 0603261N Budget Activity: 4
Program Element Title: TACTICAL AIR RECONNAISSANCE
Project Number: W0534 Project Title: TACTICAL RECONNAISSANCE SYSTEM

g. (U) Continue logistic, facility planning for F/A-18D(RC).
h. (U) Participate with USAF for planning Joint T&E of the ATARS system.
i. (U) Finalize planning for USN FOTR capable platform.
j. (U) Initiate planning for a shipboard Joint Service Imagery Processing System (JSIPS).

3. (U) FY 1990 Plans:
a. (U) Continue funding of ATARS USN options.
b. (U) Continue software development for F/A-18D(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 recce SAR Mod to APG-65 radar upgrade.
f. (U) Continue design effort for incorporation of clear air standoff EO.
g. (U) Commence design planning for provisions for the USN FOTR capable aircraft.
h. (U) Coordinate with USAF the integration of ATARS equipment into the USN FOTR capable aircraft.
i. (U) Begin design effort and development to ensure commonality of USN JSIPS with other shipboard intelligence/mission planning systems.
j. (U) Monitor USAF JSIPS development. Commence design planning for the shipboard JSIPS system.

4. (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) Continue provisions design for recce SAR Mod to APG-65 radar upgrade.
d. (U) Initiate integration of clear air "standoff" EO sensor into F/A-18C/D configuration for T&E.
e. (U) Initiate Low Rate Initial Production (LRIP) of ATARS sensors.
f. (U) Commence software development for USN FOTR capable aircraft.
g. (U) Initiate logistic, facility planning for the USN FOTR program.
h. (U) Develop test plans for the USN FOTR program.
i. (U) Complete design effort and continue development of the shipboard JSIPS capability.
j. (U) Begin funding USN options in joint JSIPS contract.
k. (U) Coordinate Test and Evaluation (T&E) planning for the shipboard JSIPS capability.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD; NWC, China Lake, CA. CONTRACTORS: Prime for aircraft; McDonnell Aircraft Co., St. Louis, MO; Prime for EO/IR sensors; Control Data Corp., Minneapolis, MN.

Program Element: 0603261N Budget Activity: 4
Program Element Title: TACTICAL AIR RECONNAISSANCE
Project Number: W0534 Project Title: TACTICAL RECONNAISSANCE SYSTEM

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	JSIPS Capbility	None	$7,499
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: FY90 Department adjustment of $7,499 will develop JSIPS.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

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). Update with follow-on capabilities in coordination. Inputs from CINCs received.
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: PE 0204136N, F/A-18 Squadrons: adds reconnaissance capability to multi-mission aircraft. PE 0206625M, Joint Service Imagery Processing Systems: receives EO/IR/SAR imagery. PE 0604710F, Tactical Reconnaissance: develops common EO/IR sensor suite. An 11 March 1985 Memorandum of Agreement provides for the U.S. Air Force to take the lead in development of electro-optical sensors and for the U.S. Navy to have the lead in definition of unmanned tactical reconnaissance vehicles. Joint Service programs will provide common sensors and unmanned vehicles. The Joint Potential Designator (JPD) to be determined at Milestone IIIB. The ground station program, Joint Service Imagery Processing System (JSIPS), will provide stations for the U.S. Air Force, U.S. Army and U.S. Marine Corps. MIL-STD-2179 and associated specifications provide for common data formats and recorder cassettes. BGPHES surface terminal will provide Miniaturized Interoperable Support Terminal (MIST) component essential for JSIPS afloat.

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)

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	
(U) APN-1/#12/13		48,803	51,811	56,975	Cont.	
(U) APN-6/#67			696	9,300	Cont.	
(U) Quantity						
Aircraft Prov.		1	18	4	8	31
ATARS Sensors				15	16	-31

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

o 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 B (Part III & EO)	JAN 90
ATARS Full Scale Development (FSD) Delivery	JAN 91
Initiate EO/IR Flt Test	MAR 91
USN MS IIIA	JUL 91
Hardware Development Test (DT) complete	DEC 91
Operational Evaluation	APR 92
Software Fleet Release	OCT 92
Production System	MAR 93
Follow-on Test and Evaluation (FOT&E) Complete	OCT 93

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: A/C SURVIVABILITY AND VULNERABILITY

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0591	Surv. and Vul.	4,895	6,361	1,793	2,961	0	30,661
W0592	A/C and Ord. Safety	2,521	2,958	4,090	4,032	Cont.	Cont.
W1277	FAANTAEL	695	937	1,256	3,710	Cont.	Cont.
W1819	CV ACFT Fire Supp. Sys.	875	1,192	2,002	1,959	Cont.	Cont.
TOTAL		8,986	11,448	9,141	12,662	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program addresses both the reductions in aircraft susceptibility (probability of being hit) to enemy threats and in aircraft vulnerabilities to conventional, nuclear, chemical, biological, radiological, and directed energy threats. This program expands the survivability technology base and develops prototype hardware which is required to improve the survivability of Naval aircraft. Additionally, this program addresses aircraft and ordnance safety.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: A/C SURVIVABILITY AND VULNERABILITY
Project Number: W0591 Project Title: SURVIVABILITY AND VULNERABILITY

C. (U) PROJECT DESCRIPTION: This project expands the survivability technology base and develops prototype hardware which is required to improve the survivability of Navy and Marine Corps aircraft. This project addresses the likelihood of an aircraft being hit by a threat weapon (susceptibility) and the probability of kill if the aircraft is hit (vulnerability). This program has developed prototype hardware for the reduction of the vulnerability and susceptibility of Navy and Marine Corps aircraft which has been or will be incorporated in production.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed the OUTLAW PHANTOM/OUTLAW AQUARIUM programs.
   b. (U) Contined development of a Jam Resistant Actuator.
   c. (U) Completed Phase I of OUTLAW BISHOP/OUTLAW ZEUS programs.
   d. (U) Continued development of technologies to protect EO sensors from laser irradiation.
   e. (U) Initiated Phase I of the OUTLAW KNIGHT Program.

2. (U) FY 1989 Program:
   a. (U) Phase II will be initiated for the OUTLAW ZEUS Program.
   b. (U) The Jam Resistant Actuator program will be completed.
   c. (U) Development of techniques to protect EO sensors from laser irradiation will continue.
   e. (U) OUTLAW KNIGHT Phase I program will be completed.

3. (U) FY 1990 Plans:
   a. (U) Complete Phase II of the OUTLAW ZEUS Program.
   b. (U) Complete development of an On-Board Inert Gas Generating System (OBIGGS) system for TACAIR.

4. (U) FY 1991 Plans: Complete Phase III of the OUTLAW ZEUS Program.

5. (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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: A/C SURVIVABILITY AND VULNERABILITY
Project Number: W0592 Project Title: AIRCRAFT AND ORDNANCE SAFETY

C. (U) PROJECT DESCRIPTION: This project develops methods to comply with CNO direction that all munitions carried aboard Navy ships be insensitive to fast cook-off, slow cook-off, bullet and Fragment Impact (FI), EMP and sympathetic detonation (SD).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Provide information baseline test data to AAAM contractor.
   b. (U) Commenced thermal characterization testing for AAAM.
   c. (U) Continued general purpose bomb fuze Insensitive Munitions (IM) improvement.
   d. (U) Initiated nozzle motor testing for TOMAHAWK.
   e. (U) Continued IM testing of the BLU-97/B for TOMAHAWK.

2. (U) FY 1989 Program:
   a. (U) Complete general purpose bombs fuze booster qualification.
   b. (U) Investigate low cost, retrofitable protection for GATOR.
   c. (U) Continue strip laminate motor case for HARM and evaluate Product Improvement Program (PIP) qualification for AMRAAM.
   d. (U) Conduct baseline JATO, SD and FI tests on MK 78 rocket motor.
   e. (U) Study use of insulation on rocket motors during FCO testing.

3. (U) FY 1990 Plans:
   a. (U) Continue baseline test on AAAM, transition IM technology into HARM, evaluate thermal protection materials.
   b. (U) Develop SD performance improvement technologies for aircraft rocket systems.
   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 an evaluation and identification of acceptable insensitive explosives in development of advanced insensitive explosives for GATOR.
   e. (U) Complete the IM testing of BLU-97/B for TOMAHAWK.

4. (U) FY 1991 Plans:
   a. (U) Complete baseline tests on AAAM.
   b. (U) Continue transition of IM technology into HARM.
   c. (U) Continue baseline SD testing with all-up-rounds.

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

E. (U) WORK PERFORMED BY: NWC, China Lake, CA; NADC, Warminster, PA; NSWC, Dalhgren, 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 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: A/C SURVIVABILITY AND VULNERABILITY
Project Number: W1277 Project Title: NUCLEAR SURVIVABILITY AIRCRAFT

C. (U) PROJECT DESCRIPTION: The Fleet Aircraft Assessment for Navy Testing and Analysis for EMP Limitations (FAANTAEL) project assesses the vulnerability of Navy tactical aircraft to damage/upset from electromagnetic pulse (EMP) radiation. FAANTAEL tests verify aircraft hardness and assess the ability of highly sophisticated aircraft systems to perform their mission in an EMP environment. In response to DOD direction to validate hardness through a cost-effective combination of testing, simulation and analysis, the Navy has developed a full scale, full threat testing capability at Naval Air Test Center (NATC), Patuxent River. The FAANTAEL Project also provides research into state-of-the-art current sensors, digital analytical instrumentation, test pulser development, and recommended solutions/work around to EMP problems. To date, five key fleet aircraft and one command and control aircraft have been tested: The A-7E, F-14A, F/A-18A, SH-60B, E-2B, and the VH-60.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Conducted EMP associated tests of SH-60B.
   b. (U) Commenced post test analysis of SH-60B.
   c. (U) Assisted Free Field and EMP Qualification tests of VH-60.
2. (U) FY 1989 Program:
   a. (U) Complete post test analysis of SH-60B and VH-60.
   b. (U) Conduct free field test and Post Test Analysis of E2C.
   c. (U) Initiate the assessment of the P-3C, perform pretest analysis.
3. (U) FY 1990 Plans:
   a. (U) Complete the assessment of the P-3C.
   b. (U) Conduct a complete assessment of the S-3B.
   c. (U) Upgrade facility antenna (new VPD).
4. (U) FY 1991 Plans:
   a. (U) Conduct a complete assessment of the AV-8B.
   b. (U) Conduct a complete assessment of the A-6E.
5. (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 EMP). 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603262N Budget Activity: 4
Program Element Title: A/C SURVIVABILITY AND VULNERABILITY
Project Number: W1819 Project Title: CV AIRCRAFT FIRE SUPPRESSION SYS

C. (U) PROJECT DESCRIPTION: This project develops improved fire fighting systems for aircraft carriers including the P-25 fire truck and improvements to the AFFF delivery systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Award contract for design and fabrication of P-25 Advanced Development Model (ADM).
b. (U) Analyzed new agent application techniques for aircraft related mishaps.

2. (U) FY 1989 Program:

a. (U) Developed an ADM for P-25 Mobile Firefighting Shipboard Vehicle.
b. (U) Conduct new agent application technique testing.
c. (U) Conduct tests on effectiveness/enhancement of Aqueous Film Forming Foam (AFFF).

3. (U) FY 1990 Planned Program:

a. (U) Continue fabrication of P-25 ADM.
b. (U) Conduct new agent application technique testing.
c. (U) Conduct tests on effectiveness/enhancement of AFFF.

4. (U) FY 1991 Planned Program:

a. (U) Conduct Naval Technical Evaluation (NTE) of P-25 ADM.
b. (U) Develop new dispensing concepts for new agents.
c. (U) Conduct test on effectiveness/enhancement of AFFF.

5. (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. OTHERS: Air Force Engineering Services Center, Panama City, FL.

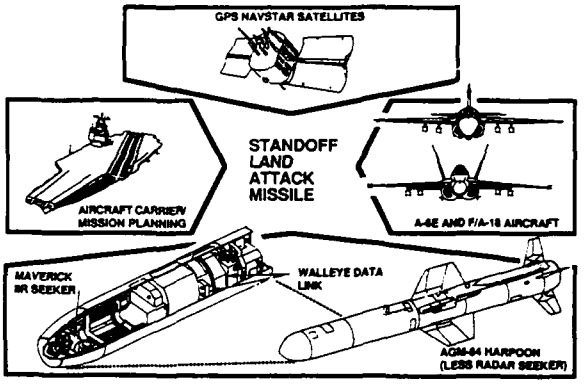
F. (U) RELATED ACTIVITIES: Not Applicable.

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: 0603306N Budget Activity: 4
Program Element Title: ADVANCED A/L AIR-TO-SURFACE MISSILE SYSTEM
Project Number: W1958 Project Title: SLAM (STANDOFF LAND ATTACK MISSILE)



POPULAR NAME: SLAM

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	M/S IIIB ALP 4/88	M/S IIIC ALP 3/89	AFP 1Q/FY90 82 units		
Engineering Milestones	AW/SW DEV	FLT READ DEV QUAL TESTS			Not Applicable
T&E Milestones	CAP FLT TEST REL QUAL	DT/OT FLT TEST 12/88 4/89			Not Applicable
Contract Milestones	ALP 4/88 29 units	ALP 3/89 72 units	M/S IIID AFP 12/89		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	26,159	13,346	0	0	52,900 0
Support Contract	0	0	0	0	0
In-House Support	5,329	8,993	0	0	19,911 0
GFE/ Other	0	0	0	0	0
Total	31,488	22,339	0	0	72,811 0

Program Element: 0603306N Budget Activity: 4
Program Element Title: ADVANCED A/L AIR-TO-SURFACE MISSILE SYSTEM
Project Number: W1958 Project Title: SLAM (STANDOFF LAND ATTACK MISSILE)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Standoff Land Attack Missile (SLAM) is a conventional standoff weapon suitable for launch from carrier-based or land-based Harpoon capable A-6 and F/A-18 attack aircraft.

The SLAM concept relies on the integration of proven, in-production components, primarily the Harpoon AGM-84 missile.

The missile will be compatible with existing Harpoon/Walleye capable attack aircraft (A-6 and F/A-18) and will benefit from the in-place logistics support systems of the major components. The concept of operation places emphasis on man-in-the-loop control, standoff delivery for launch aircraft survivability and minimum restrictions on post-launch maneuvers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed Phase II flight testing.
b. (U) Conducted subsystem developmental and qualification testing.
c. (U) Completed A-6 and F-18 integration testing.
d. (U) Completed software development and integration.
e. (U) Continued ILS efforts.
f. (U) Began second limited production lot.

2. (U) FY 1989 Program:

a. (U) Conduct Flight Readiness Review.
b. (U) Complete Carrier Suitability testing.
c. (U) Complete DT/OT testing (3Q FY 1989).
d. (U) Conduct program review leading to Approval for Full Production (AFP decision (1Q FY 1990)).

3. (U) FY 1990 Planned Program: Not Applicable.

4. (U) FY 1991 Planned Program: Not Applicable.

Program Element: 0603306N Budget Activity: 4
Program Element Title: ADVANCED A/L AIR-TO-SURFACE MISSILE SYSTEM
Project Number: W1958 Project Title: SLAM (STANDOFF LAND ATTACK MISSILE)

5. (U) Program to Completion: Not Applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD. CONTRACTOR: McDonnell Douglas Astronautics Company, St. Louis, MO.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on - FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	None

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:
CDR - Dec 87
Pre-Readiness Review - Jan 88
Pre-Prod. Reliability Design Review - Feb 88
NAVAIR Acquisition Review Board - Mar 88
Logistics Review Board - Apr 88

G. (U) RELATED ACTIVITIES: P.E. 0603313N, IIR Maverick: program provides IIR MAVERICK seekers; P.E. 0205645N, Walleye Data Link: program provides data link components; P.E. 0604778N, NAVSTAR GPS: provides user navigation equipment. NOTE: Two standoff weapons programs which previously resided in this P.E. have now been moved to new program elements: P.E. 0604727N, JSOW; P.E. 0603222N, SKIPPER.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN/#13	35,086	75,165	58,103	68,928	162,231

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

J. (U) TEST AND EVALUATION DATA: Supplied in SLAM Congressional Data Sheet.

FY 1990/1991 BIENNIAL 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)

POPULAR NAME: AEGIS ER

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones BLK IV	N/A	N/A			IIIB 1Q/FY92 IOC
Engineering Milestones BLK IV	Booster Firing Mar PDR Dec	CDR JUL	1st Flt APR	PRR NOV	N/A
T&E Milestones BLK IV	N/A	N/A			N/A
Contract Milestones BLK IV	N/A	N/A	N/A		N/A

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	51,732	90,442	79,067	25,132	276,640
Support Contract	4,282	6,142	6,202	4,948	26,678
In-House Support	9,007	6,142	5,123	2,840	28,069
GFE/Other	400	1,000	960	7,480	28,597
Total	65,421	103,726	91,352	40,400	359,984 32,951

Program Element: 0603318N Title: AEGIS ER (SM-2 Block IV)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 to,

in stringent environments. The resulting extension of the STANDARD Missile engagement envelope will permit utilization of the

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Raytheon subcontracts awarded.
   b. (U) Completed preliminary wind tunnel tests.
   c. (U) Continued system, elect/mech and TE design.
   d. (U) Booster motor qualification ground tests were started.
   e. (U) Continued VLS and AEGIS system modifications.
   f. (U) Completed plans for modifications to MK 104 Dual Thrust Rocket Motor (DTRM).
   g. (U) Began preliminary design of radome for MK 45 MOD 10 fuze.
2. (U) FY 1989 Program:
   a. (U) Booster qualification tests will be completed for lead contractor. Booster qualification test for follower will be started.
   b. (U) Complete round level preliminary design review.
   c. (U) Guidance, control and airframe contractors continue development of the baseline design to support flight test round design release.
   d. (U) Complete round level critical design review.
   e. (U) AEGIS and VLS preliminary design review will be completed.
3. (U) FY 1990 Planned Program:
   a. (U)
   b. (U)
   c. (U)
   at WSMR.
   d. (U) Begin Guidance Test Vehicle testing at WSMR.
4. (U) FY 1991 Planned Program:
   a. (U)
   b. (U)
   c. (U)
   d. (U)
   e. (U)
5. (U) Program to Completion: This is a continuing program.

Program Element: 0603318N Title: AEGIS ER (SM-2 Block IV)

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.

E. (U) COMPARISON WITH FY 1988 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

CHANGE	System Capabilities	Schedule	Budget Year Cost
TECH			
None	None	None	None
SCHED			
None	None	None	None
COST			
Adjust to match FFP Funding Profile	None	None	+12,494

NARRATIVE DESCRIPTION OF CHANGES

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 90 budget increase of +12,494 will match the cash flow requirements to the firm-fixed price development effort.

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-TBD initiated
NDCP initiated

G. (U) RELATED ACTIVITIES: Program Element 0604366N (STANDARD Missile Improvement Program) supports development of SM-2 Block IIIA. The ordnance section being developed for SM-2 Block IIIA is to be provided as GFE to the SM-2 Block IV program via Raytheon Corporation under a firm fixed price Block IV development contract.

Program Element: 0603318N Title: AEGIS ER (SM-2 Block IV)

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

Weapons Procurement, Navy:

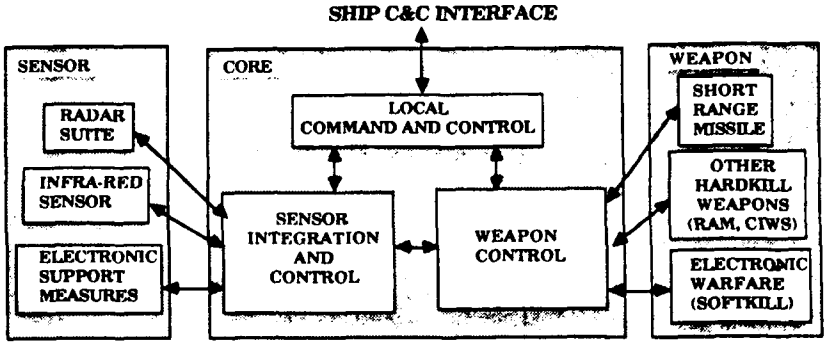
P-(82FE) WPN #15	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) FUNDS	N/A	N/A	N/A	248.2	Cont.	Cont.
(U) QUANTITY	N/A	N/A	N/A	300	Cont.	Cont.

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: 0603319N Budget Activity: 4
Program Element Title: NATO AAW SYSTEM
Project Number: S1973 Project Title: NATO AAW SYSTEM (NAAWS)



NATO AAW Weapon System Conceptual Block Diagram

POPULAR NAME: NATO AAW

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MILESTONE I 8/89			MILESTONE II 12/92
Engineering Milestones		IPR 12/88 CE PHASE RPT 7/89	COMMENCE D&V PHASE 10/89		COMMENCE FSD 1/93 PROD 4/98
T&E Milestones					DT/OT I FY92 DT/OT II FY96-97
Contract Milestones	CE STUDIES CONTRACT 5/88		D&V CONT 4/90		FSD 4/93 PILOT PROD 1/97

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	3,527		11,500	13,400	TBD
Support Contract	930	1,000	3,000	3,200	TBD
In-House Support	810	6,301	6,342	7,248	TBD
GFE/ Other					TBD
Total	5,267	7,301	20,842	23,848	800,000(est) 742,742(est)

Program Element: 0603319N Budget Activity: 4
Program Element Title: NATO AAW SYSTEMS
Project Number: S1973 Project Title: NATO AAW SYSTEMS

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This program provides for the development of a total AAW capability, detection through engagement, to meet the internationally agreed Staff Target (operational requirement) document. The system will include its own advanced sensors and engagement systems and will, in addition, totally integrate and control operations of other available sensors, electronic warfare and weapons systems for maximum effectiveness. In addition to providing the AAW suite for the NFR-90, key elements of the system will be adapted into short range AAW suites for a variety of other U.S. ship types. The "Fully Compliant System", which will IOC in , will completely satisfy the Staff Target. During Demonstration and Validation of the "Fully Compliant System", components will be developed that could be used to address the detection/integration/reaction shortfalls of present AAW systems. Capability to use these "Interim System" components is anticipated by .

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1988 Accomplishments:
   a. Approved International Memorandum of Understanding (MOU-I) for Concept Evaluation (CE) Phase and Staff Target Document.
   b. Established International Steering Committee and Management Groups in accordance with MOU.
   c. With U.S. identified as "Host Nation," initiated NAAWS development efforts in conjunction with ongoing NAVSEASYSCOM Short Range AAW System (SRAAWS) development efforts.
   d. Established internationally staffed NAAWS Program Office (NPO) as PMS-419, separate and distinct from the U.S. Short Range AAW System (SRAAWS) office.
   e. Initiated international government program of work (GPW) to evaluate critical issues.
   f. Awarded CE Phase study contracts to two international consortia of contractors.
2. (U) FY 1989 Program:
   a. Complete NFR-90 Coordination Plan, GPW Critical Studies, CE Studies.
   b. Evaluate CE Phase results and consolidate results in "A" Specification for Demonstration and Validation (D&V) competition.
   c. Update program documentation preparatory to Milestone I and D&V Phase MOU negotiations; achieve Milestone I.
3. (U) FY 1990 Plans:
   a. Approve NATO Staff Requirement and D&V Phase MOU.
   b. Award competitive D&V contracts to international consortia.
4. (U) FY 1991 Plans:
   a. Continue D&V.
   b. Complete design of interim Land Based Test Site (ILBTS).

Program Element: 0603319N Budget Activity: 4
Program Element Title: NATO AAW SYSTEMS
Project Number: S1973 Project Title: NATO AAW SYSTEMS

c. Begin fabrication of Advanced Development Models (ADM's).

5. (U) Program to completion:

a. Complete ADM's in FY 1992. Define and implement convergence of U.S. Short Range AAW (SRAAW) Systems with ADM Development.

b. Conduct DT/OT-I in FY 1992 using ADM's at ILBTS facilities and transition selected ADMs to integration effort as interim capability upgrade to present U.S. (SRAAW) Systems.

c. Conclude international MOU III for Full Scale Development (FSD) and achieve U.S. Milestone II in FY 1993.

d. Competitively award contract in FY 1993 for conduct of FSD by one international consortium.

e. Conduct DT/OT-2 at LBTS and aboard test ship in FY 1996 and FY 1997.

f. Receive authorizations and award pilot production contract in FY 1997.

g. (U) Achieve U.S. Milestone III in and conclude international MOU IV for Production.

h. Award rate production contracts in FY 1998.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NSWC, Dahlgren, VA; NRL, Washington, DC; NWC, China Lake, CA; NSWSES, Port Hueuene, CA; Johns Hopkins University/Applied Physics Laboratory; Laurel, MD; CONTRACTORS: Prime contractors for the Concept Exploration Phase Study; UNISAMS (Westinghouse) Baltimore, MD; RCA/GE, Moorestown, NJ.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-3,102

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Budget year funding reduced by -3,102 due to Department (-68) and Navy budget (-3,034) adjustments. This adjustment reduces the scope of early DEM/VAL phase work, but will not impact the project schedule.

Program Element: 0603319N Budget Activity: 4
Program Element Title: NATO AAW SYSTEMS
Project Number: S1973 Project Title: NATO AAW SYSTEMS

F. (U) PROGRAM DOCUMENTATION:

TOR	9/86
JMSNS	9/86
Staff Target	8/87

G. (U) RELATED ACTIVITIES: The following activities are closely coordinated to prevent unnecessary duplication of effort. NFR-90 International Program; Program Element P.E. 0603609N, (Conventional Fuze/Warhead Package); Program Element 0604354N,(AIM/RIM-7M Product Improvement Program); 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, (Infrared Search and Target Designation).

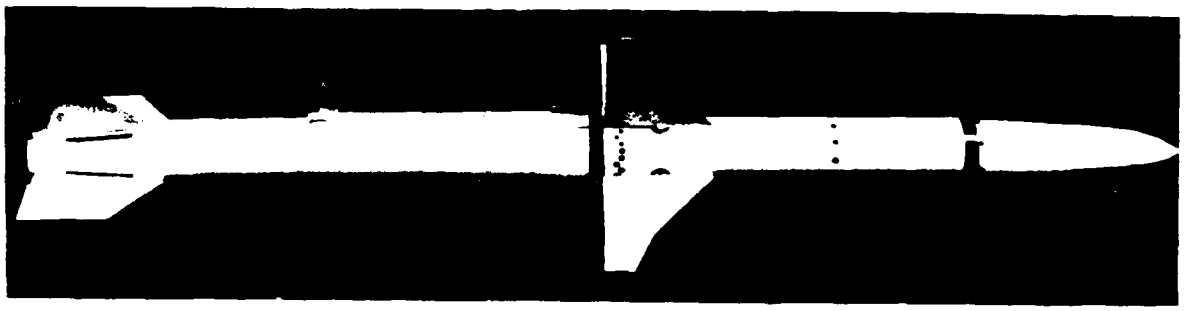
H. (U) OTHER APPROPRIATION FUNDS: Not Applicable. MS III scheduled in FY 1998.

I. (U) TEST AND EVALUATION DATA: Not Applicable.

J. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
- o Memorandum of Understanding for Concept Exploration Phase signed 19 October 1987.
- o US and five other participants (Canada, Germany, Netherlands, Spain, United Kingdom).
- o Requirements in NATO Staff Target.
- o Negotiations underway for Demonstration/Validation Phase MOU.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603320N Budget Activity: 4
Program Element Title: LOW COST ANTIRADIATION SEEKER
Project Number: W1807 Project Title: LOW COST SEEKER



POPULAR NAME: LCS

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	II approved 1/88			IIIA 5/91	III B 3Q/FY92
Engineering Milestones	HW CDR 1/89	Trans. SW NWC 6/89	SW CDR 7/90 PRR 11/90		
T&E Milestones	DT IIA	DT IIA	DT IIB/C OT IIA	OT IIB	
Contract Milestones	FSED FPI Cont. Award		Award pilot Op. 1 1/90	Award Op. 2 7/91	AFP 3Q/FY92

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	5,539	2,000	5,400	4,919	Continuing
Support Contract	902	500	700	700	Continuing
In-House Support	5,569	2,182	6,076	4,577	Continuing
GFE/ Other	60	50	50	50	Continuing
Total	12,070	4,732	12,226	10,246	Continuing Continuing

Program Element: 0603320N Budget Activity: 4
Program Element Title: LOW COST ANTIRADIATION SEEKER
Project Number: W1807 Project Title: LOW COST SEEKER

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments:

a. (U) Completed DT-IB test program.
b. (U) Awarded FSED contract to Ford Aerospace.
c. (U) DT-IIA testing began on EDM.

2. (U) FY 1989 Program:

a. (U) Transition software responsibility from NAVWPNCEN, China Lake, CA. to Ford.
b. (U) Conduct HW CDR.
c. (U) Deliver 4 brassboard LCS units to NAVWPNCEN.

3. (U) FY 1990 Plans:

a. (U) Deliver 45 Preproduction Missiles (PPMs) to Navy; RDT&E funded.
b. (U) Conduct DT-IIB/C (TECHEVAL)/OT-IIA (includes 21 missile firings).

4. (U) FY 1991 Plans:

a. (U) Obtain Approval for Limited Production, Milestone IIIA.
b. (U) Commence delivery of pilot production seekers.
c. (U) Commence OT-IIB/OPEVAL (includes 12 missile firings).

5. (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.

Program Element: 0603320N Budget Activity: 4
Program Element Title: LOW COST ANTIRADIATION SEEKER
Project Number: W1807 Project Title: LOW COST SEEKER

E. (U) COMPARISON WITH FY 1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	$5,188
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Department and Navy adjustment of $5,188 to buy test articles in RDT&E,N vice procurement funds.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

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 Improvement Project: Block IV upgrade programs.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN/#14			8,590*	20,100*	Cont.

* Procurement of LCS's only.

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: 0603321N Budget Activity: 4
Program Element Title: ADVANCED AIR-TO-AIR MISSILE
Project Number: W1671 Project Title: AAAM

POPULAR NAME: AAAM

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS I Aug 88		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	D&V Sep 88				

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	12,000	21,600	64,000	78,000	1,773,600 1,588,000
Support Contract					
In-House Support	2,657	3,666	4,946	5,282	131,551 115,000
GFE/ Other	1,455	4,709	5,705	1,638	225,507 212,000
Total	16,112	29,975	74,651	84,920	2,130,658 1,925,000

Program Element: 0603321N Budget Activity: 4
Program Element Title: ADVANCED AIR-TO-AIR MISSILE
Project Number: W1671 Project Title: AAAM

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The principal anti-air warfare mission of Naval TACAIR is the outer defense zone in protecting carrier battle groups from air-launched anti-ship missiles (ASMs) by the destruction of [ ] bombers prior to their weapons release. Threat projections of the mid-to-late 1990s indicate longer-range supersonic bombers with increased weapons loadout, potentially increased weapons release lines with lock-on-after-launch accompanied by jamming, and possible low observable technology applied to platforms and missiles. 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 1988 Accomplishments:

a. (U) Weapon control and guidance designs commenced.
b. (U) Airframe, propulsion and ordnance designs commenced.

2. (U) FY 1989 Program:

a. (U) Start fabrication of test articles.
b. (U) Perform preliminary platform integration.
c. (U) Commence wind tunnel testing.

3. (U) FY 1990 Plans:

a. (U) Commence guidance subsystem tests, seeker captive flights and booster firings.

4. (U) FY 1991 Plans:

a. (U) Commence Hardware-in-the-Loop (HWIL) development, fabrication of control test vehicles and aircraft integration.

5. (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

Program Element: 0603321N Budget Activity: 4
Program Element Title: ADVANCED AIR-TO-AIR MISSILE
Project Number: W1671 Project Title: AAAM

Joint Venture (General Dynamics/Westinghouse). (Competitive range established 9/87).

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-$8,698

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The $8,698 reduction is attributed to the competitive acquisition strategy adopted by the Department of the Navy.

F. (U) PROGRAM DOCUMENTATION:

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 to OSD/OMB Budget submission.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603382N Budget Activity: 4
Program Element Title: BATTLE GROUP ANTI-AIR WARFARE COORDINATION (BGAAWC)
Project Number: S0324 Project Title: BGAAWC

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
BGAAWC	8,469	7,535	9,491	10,856	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Soviet Union's ability to conduct high density attacks against Battle Groups in ever-increasing hostile electromagnetic environments demands more effective coordination of Battle Group sensors and weapons.

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.

(NISC Threat Assessment #018-87 dated Nov 87).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

2. (U) FY 1989 Program:

3. (U) FY 1990 Plans:

Program Element: 0603382N Budget Activity: 4
Program Element Title: BATTLE GROUP ANTI-AIR WARFARE COORDINATION (BGAAWC)
Project Number: S0324 Project Title: BGAAWC

4. (U) FY 1991 Plans:
a. (U)
b. (U)
c. (U)

5. (U) Program to Completion: This is a continuing program which transitions designs and technology to engineering and production programs.

D. (U) WORK PERFORMED BY: IN-HOUSE: Fleet Analysis Center, Corona, CA. CONTRACTORS: Johns Hopkins University Applied Physics Laboratory, Laurel, MD. OTHERS: LOGICON, San Diego, CA; ECI, St Petersburg, FL; and General Physics, Arlington, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	Remote Launch Engagement	Demo slipped 1 yr.	(-2839)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Cost change reflects adjustment for higher priority efforts. This reduction delays engineering design/evaluations required to support the Remote Launch Engagement demonstration.

F. (U) PROGRAM DOCUMENTATION:

NAPDD 19 Feb 1988

G. (U) RELATED ACTIVITIES: Program Element 0604303N (AEGIS Area Air Defense), provides for development of modifications to the AEGIS Weapon System; Program Element 0604307N (AEGIS Combat System Engineering), relates to engineering development of AEGIS Combat System for the CG-47 class and DDG-51 destroyer combat systems; Program Element 0603318N (AEGIS ER) relates to outer air battle development. Program Element 0604518N (CIC Conversion) provides for common baseline computer programs for non-AEGIS systems; Program

Program Element: 0603382N Budget Activity: 4
Program Element Title: BATTLE GROUP ANTI-AIR WARFARE COORDINATION (BGAAWC)
Project Number: S0324 Project Title: BGAAWC

Element 0603717N (Command and Control Systems (Advanced)) provides for development of communication links.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U) PROCUREMENT						
a. OPN		Not applicable (First Procurement in FY 92)			Cont.	Cont.

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0260	Minehunt	11,081	11,868	2,358	6,070	Cont.	Cont.
S1233	MCM Improvements	2,590	1,100	11,948	14,525	Cont.	Cont.
S1404	Neutralization	2,663	2,523	0	0	0	5,280
	TOTAL	17,054	15,491	14,306	20,595	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: 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 [ ] mines [ ] (2) A mine clearance system for clearing mines rapidly from the [ ] (3) a means of detecting mines that are [ ] d (4) a system which employs multiple, remotely controlled minehunting vehicles operated from a single platform to conduct MCM operations in amphibious objective areas and in other areas where conventional MCM forces are not available.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Conducted AN/SQQ-32 at-sea testing of Engineering Development Model (EDM).

2. (U) FY 1989 Program: Conduct AN/SQQ-32 OT-IIA; complete OPEVAL; conduct EDM shock and environmental tests; complete third EDM; award contracts for production units for MCM 10,11, and for refurb of EDM for MHC-51; obtain approval for production and award contract for three production units.

3. (U) FY 1990 Plans: AN/SQQ-32 complete Level III drawings, provisioning documentation and training material; begin correction of OPEVAL deficiencies; prepare Rapid Shallow Water Mine Clearance System (RSWMCS) requirements documentation for FY91 contract award.

4. (U) FY 1991 Plans: [ ] award contract for development of Rapid Shallow Water Mine Clearance System. Prepare requirements documentation for Buried Mine Detection and Remote Mine Hunting Systems.

5. (U) Program to Completion: RSWMCS: Conduct OPEVAL FY 1997; MS III FY 1998; [ ] Buried Mine Detection System: Award contract for full scale engineering development (FY 1992). Conduct OPEVAL FY 1998; MS III FY 1998; [ ] Remote Minehunt: Award contract for full scale engineering development (FY 1992) Conduct OPEVAL FY 1999; MS III FY 1999,

E. (U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, Florida and Naval Weapons Support Center, Crane, Indiana. Contractors: Raytheon Co., Portsmouth, Rhode Island; Thompson-Sintra, Brest, France; and ARL, University of Texas, Austin, Texas. Future development contractors TBD through competition.

F. (U) RELATED ACTIVITIES: Technologies, developed under Program Element 0602314N ASW Technology, are used in the development of the AN/SQQ-32. U.S. Marine Corps line charge development experience and submunitions will be considered in development of the RSWMCS.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
1. (U) PROCUREMENT (SCN) #16	---	37,891	80,007	33,651	291,393

H. INTERNATIONAL COOPERATIVE AGREEMENTS: not applicable

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1233	Mine Countermeasures Improvements	2,590	1,100	11,948	14,525	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Develops: (1) the AN/SSN-2 Precise Integrated Navigation System; (2) a new start FY 1990 Modular Mechanical Single Ship Deep Sweep (SSDS) for use by MHC's; (3) a new start FY 1990 modular influence minesweeping system for use by MHC's to be developed in a near-term and far-term phase.; (4) a new start FY 1990 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 1988 Accomplishments: Established AN/SSN-2 Phase III configuration and incorporated GPS into system design.

2. (U) FY 1989 Program: Complete AN/SSN-2 Phase III Preliminary design, conduct PDR and initiate coding and testing. Prepare requirements documentation for FY 1990 new start Modular Influence Minesweeping System, Modular Mechanical Single Ship Deep Sweep, and Closed Loop Degaussing System.

3. (U) FY 1990 Plans: AN/SSN-2 complete software code and test on Phase III system; award engineering development contracts for Single Ship Deep Sweep, near-term Modular Influence Minesweeping System, and Closed Loop Degaussing System.

4. (U) FY 1991 Plans: AN/SSN-2(V) conduct system integration and testing and DT on Phase III system. Continue development of SSDS, near-term MIMS, and Closed Loop Degaussing; start development of MIMS far-term system

5. (U) Program to Completeion: This is a continuing program.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603502N Budget Activity: 4
Program Element Title: Surface Mine Countermeasures
Number: S1233 Project Title: Mine Countermeasures Improvements

D. (U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, Florida; Naval Weapons Support Center, Crane Indiana; Naval Oceanographic Research and Development Activity, Bay St. Louis, MI. Contractor: TBD, through competion.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES:

TECH: None.

SCHD: None.

COST: None.

NARRATIVE DESCRIPTION OF CHANGES:

TECHNICAL CHANGES: None.

SCHEDULE CHANGES: None.

COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

AN/SSN-2 OR TEMP	(OR-1026-CC) 4 November 1977 #005-2 (Revision 1)
MIMS (New Start FY 1990)	PDD CNO memo Ser 03/6S389372 of 14 February 1986 CNO ltr 374C/8U580900 of 16 Sep 88
SSDS (New Start FY 1990	OR S--1163-MW of 8 March 1983
MTEDS	PDD CNO memo Ser 03/6S7674 of 7 April 1986
Closed Loop Deguassing	OR #060-03-88 of 19 December 1985

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603502N Budget Activity: 4
Program Element Title: Surface Mine Countermeasures
Number: S1233 Project Title: Mine Countermeasures Improvements

G. (U) RELATED ACTIVITIES:

a. (U) Program Element 0603260N, Airborne Mine Countermeasures is developing the controlled depth moored sweep which will be adapted for surface ship use as the Single Ship Deep Sweep (SSDS).

b. (U) Program Element 0603260N is also developing the Advanced Acoustic Sweep which may be used in the Modular Influence Minesweep System (MIMS).

c. (U) The UK AIOS being tested under FWEP is being considered for use in AN/SSN-2 Phase III.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
PROCUREMENT (SCN) #16	0	0	15,519	0	Cont.	73,941

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None except for FWE program on AIOS.

J. (U) MILESTONE SCHEDULE:

AN/SSN-2: MS II-FY 1981; OPEVAL (Phase III)-FY 1992; MS III (Phase III)-FY 1993; IOC (Phase III)-FY 1994

SSDS: MS II-FY 1990; OPEVAL-FY 1992; MS III-FY 1993; [redacted]

MIMS: Near-term MS II-FY 1990; OPEVAL-FY 1993; MS III-FY 1994;
Far-term MS II-FY 1991; OPEVAL-FY 1995; MS III-FY 1996; [redacted]

MTEDS: MS II - FY 1993; OPEVAL - FY 1997; MS III - FY 1997; [redacted]

Closed Loop Degaussing: MS II - FY 1990; OPEVAL - FY 1994; MS III- FY 1994;

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603502N Budget Activity: 4
Program Element Title: Surface Mine Countermeasures
Project Number: S1404 Project Title: Neutralization

C. (U) PROJECT DESCRIPTION: Develop equipment to neutralize moored and bottom mines in various environments such as ship channels, open ocean and amphibious objective areas. Consists of: AN/SLQ-48 Mine Neutralization System which is a tethered, remotely operated TV, and sonar-equipped submersible which neutralizes mines previously located by the ship's minehunting sonar by cutting the cable of moored mines and by placing an explosive charge alongside bottom mines.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Completed OT&E of AN/SLQ-48 system in MCM-1. Delivered eight production systems.
2. (U) FY 1989 Plans: Shock test of production AN/SLQ-48 system, receive approval for full production.
3. (U) FY 1990 Plans: None. Project phased out with FY 1989 program.
4. (U) FY 1991 Plans: Not applicable.
5. (U) Program to Completion: Not applicable.

E. (U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, California; Naval Mine Warfare Enginerring Activity, Yorktown, Virginia; Naval Surface Weapons Center (Det), White Oak, Maryland and Naval Coastal Systems Center, Panama City, Florida. Contractor: Honeywell Marine Systems, Seattle, Washington.

F. (U) RELATED ACTIVITIES: None

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. PROCUREMENT (SCN) #16	0	40,866	50,041	22,529		279,460

H. INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603504N Budget Activity: 4 - Tactical Programs
Program Element Name: Submarine ASW Development (Advanced)
Project Number: S0223 Project Title: Submarine ASW Improvements (Advanced)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0223	Submarine ASW	7,738	12,233	16,322	28,625	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This program supports the advanced development and testing of improvements to present and future sonar and combat control systems in order to maintain clear acoustic and operational superiority over the high performance submarine and surface threats, circa 1995-2020, particularly the increasingly quiet and capable Soviet submarines. One-of-a-kind hardware or software systems are developed under this program to demonstrate selected and promising exploratory technologies and concepts in an at-sea, submarine environment. Over fifteen different subprojects are funded by this program, including transducers, hull mounted and towed arrays, onboard sonar signal processing, target motion analysis, weapons presets and post-launch control, and multiple contact processing. Upon successful demonstration, improvements are transitioned to full-scale development in other programs with minimal and identifiable risks. Because of the many subprojects involved, the project is an ongoing program with subproject milestones and deliverables at different times.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Transducers. Continued development of design specifications for transducer reliability and [redacted]

b. (U) Towed Array. Developed a portion of technical requirements for next generation towed arrays. Continued development of [redacted]

c. (U) High Frequency Sonar. Continued system analysis and design. Continued fabrication of experimental model.

d. (U) Transient Acoustic Processor (TAP). Continued development of TAP II Advanced Development Model. Continued development of [redacted] capability and [redacted] capability.

e. (U) Multipath Processing. Analyzed [redacted] test results. Began planning sea test of processing equipment in RANGEX 1-89.

f. (U) Target Motion Analysis Improvement Program. Continued development of Performance Evaluation Plot techniques. Conducted sea test in RANGEX 1-88.

g. (U) RANGEX. Conducted analysis of data obtained in RANGEX 1-87. Conducted RANGEX 1-88. Began planning RANGEX 1-89.

Program Element: 0603504N Budget Activity: 4-Tactical Programs

Program Element Name: Submarine ASW Development (Advanced)
Project Number: S0223 Project Title: Submarine ASW Improvements (Advanced)

2. (U) FY 1989 Program:
a. (U) Transducers. Develop transducer technology for next generation hull-mounted arrays. Evaluate materials for [ ] Design [ ]
b. (U) Towed Array. Continue development of Cable. Develop designs for next generation Advanced Development Model.
c. (U) High Frequency Sonar. Continue development of [ ] Conduct sea testing of [ ]
d. (U) Transient Acoustic Processor. Continue development of [ ] capability. Conduct sea testing of [ ] capability.
e. (U) Multipath Processing. Conduct test in RANGEX 1-89 and [ ] Develop [ ] algorithms. Test Intermediate Range algorithm at sea.
f. (U) Automatic detection and classification. Develop [ ] algorithm.
g. (U) Target Motion Analysis Improvement Program. Conduct sea test in [ ] Integrate [ ] algorithms. Develop alternate solution [ ]
h. (U) RANGEX. Conduct RANGEX 1-89. Plan RANGEX 1-90 to assess tactical effectiveness of systems in development.
i. (U) Advanced Targeting. Develop interactive display for [ ]
j. (U) Command Decision Aids. Evaluate concepts to present information to decision makers in ways that will increase effectiveness.
k. (U) Multiple Target Management. Define data fusion problem and identify candidate algorithms.
l. (U) Advanced Detection System. Evaluate concepts for a sonar system that can [ ]

3. (U) FY 1990 Plans:
a. (U) Transducers. Develop [ ] prototype. Develop hull-mounted projector and hydrophone prototypes.
b. (U) Towed Array. Analyze results of [ ] tests. Develop construction techniques to improve towed array performance.
c. (U) High Frequency Sonar. Continue development of [ ] Develop [ ] capabilities.
d. (U) Advanced Detection System. Conduct verification tests of second stage model.
e. (U) Transient Acoustic Processor. Develop [ ] capability.
f. (U) Multipath Processing. Develop [ ] techniques for [ ]
g. (U) Automatic Detection and Classification. Test Automatic Classification algorithm at sea.
h. (U) Target Motion Analysis Improvement Program. Continue development of alternate solution [ ] Develop techniques for [ ]
i. (U) Advanced Targeting. Incorporate [ ]
j. (U) Post-launch Control. Develop [ ]

Program Element: 0603504N Budget Activity: 4-Tactical Programs

Program Element Name: Submarine ASW Development (Advanced)
Project Number: S0223 Project Title: Submarine ASW Improvements (Advanced)

k.(U) Multitarget Management. Develop algorithms for integration of data from multiple sources.
l.(U) RANGEX. Conduct RANGEX 1-90.
m.(U) Command Decision Aids. Develop specific aids for maneuver decision.
4.(U) FY 1991 Plans:
a.(U) Transducers. Fabricate [ ] prototype, and hull-mounted projector and hydrophone prototypes.
b.(U) Towed Array. [ ]
c.(U) High Frequency Sonar. Conduct [ ] sea test of [ ]
d.(U) Advanced Detection System. Conduct verification of third stage model.
e.(U) Transient Acoustic Processor. Develop [ ] capability. Conduct sea test of [ ] model.
f.(U) Multipath Processing. Conduct sea test of [ ] techniques. Develop [ ]
g.(U) Automatic Detection and Classification. Test algorithm in lab,
h.(U) Target Motion Analysis Improvement Program. Develop [ ] and automatic data editing techniques
i.(U) Advanced Targeting. Evaluate and incorporate [ ]
j.(U) Post-launch Control. Conduct laboratory evaluation of [ ]
k.(U) Multitarget Management. Continue development and evaluation of multiple target tracking algorithms.
l.(U) RANGEX. Plan RANGEX 1-92.
m.(U) Command Decision Aids. Expand maneuver decision aids to address multiple contacts.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NUSC, New London, CT, and Newport, RI; and NRL, Washington, DC and Orlando, FL. CONTRACTORS: Analysis and Technology, North Stonington, CT; ARL, University of Texas, Austin, TX; Epoch Engineering Inc. Gaithersburg, MD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	Cancels some [ ] and Multipath efforts.	Delays some ADS and Advanced Targets efforts by 1 year.	-2,792

Program Element: 0603504N Budget Activity: 4-Tactical Programs

Program Element Name: Submarine ASW Development (Advanced)
Project Number S0233 Project Title: Submarine ASW Improvements (Advanced)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY: None.
2. (U) SCHEDULE: None.
3. (U) COST: The reduction of -2,792 cancels [illegible] and cancels the FY 1990 test of [illegible] algorithms. The reduction also delays by one year development of the second stage sensor for the ADS and Advanced Targeting Development.

F. (U) DOCUMENTATION: NAPDD #037-02, 5/86

G. (U) RELATED ACTIVITIES: Program Element 0602314N, ASW Technology, contains exploratory development programs which provide the majority of the technologies and concepts in sonar and combat systems tested under this program. Program Element 0603562N, Project S1739, Submarine Arctic Warfare Development is a companion Advanced Development project with emphasis on Arctic efforts. Program Element 0604524N, Project S1347, AN/BSY-1 Development, and Program Element 0604503N, Project S0219, Submarine Sonar Improvements (Engineering), are full scale developments which received major transition products, e.g. the Mine Detection and Avoidance Sonar, the Submarine Active Detection Sonar and TB-12X Towed Arrays, from this Program.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

MILESTONE	DATE	Follow on SEA TEST
(U) Design for hull array Transducer	3Q/FY 90	FY 1992
(U) High Frequency Sonar sea test	4Q/FY 89	FY 1993
(U) [illegible] sea test	4Q/FY 89	FY 1992
(U) TAP [illegible] sea test	4Q/FY 89	FY 1993
(U) RANGEX 1-89	1Q/FY 89	FY 1990

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603506N Budget Activity: 4
Program Element Title: Surface Ship Torpedo Defense

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0225	US National SSTD Prog	23,763	33,682	39,743	35,066	16,052	148,306
S2026	Torpedo Detection	11,660	0	0	0	0	11,660
S2045	Joint US/UK SSTD Project	(7,000)[1]	(7,000)[1]	11,772	17,918	TBD[2]	TBD[2]
	TOTAL	35,423	33,682	51,515	52,984	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 $124M. The cost sharing ratio for FSD will be negotiated during the Demonstration and Validation (D&V) Phase prior to entry into FSD.

B. (U/NF) BRIEF DESCRIPTION OF ELEMENT: 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 provide torpedo defense for

The Joint US/UK Project will provide torpedo defense against all threat torpedoes for all surface ships.

FY 1990/1991 BIENNIAL 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

POPULAR NAME: Surface Ship Torpdeo Defense (SSTD)

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS II 2Q/89			
Engineering Milestones	10/88 Fuze Concept Test	9/89 Final At-Sea GT&C	Detection CDR 1Q/90		
T&E Milestones					SSTD DT II 1Q/92
Contract Milestones	Detection FSD Opt. 12/88				

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	1,500	13,200	12,800	5,700	38,800
Support Contract	1,400	2,130	2,595	2,720	10,500
In-House Support	20,863	18,352	24,348	26,646	99,006
GFE/ Other					
Total	23,763	33,682	39,743	35,066	148,306 16,052

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0603506N Budget Activity: 4
Program Element Title: Surfare Ship Torpedo Defense (SSTD)
Project Number: S0225 Project Title: US National SSTD Program

B. (S/NF) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The US National Surface Ship Torpedo Defense Program will provide torpedo defense for

SSTD Phase I will be expanded, starting in FY 90, to combatants, combat logistic force (CLF), and amphibious ships.

C. (C) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U)
b. (U) Began installations of SSTD Phase I production systems.
c. (U) Exercised detection system Full Scale Development (FSD) option.
d. (U) Continued Torpedo design modification efforts.
e. (U) Continued evaluations of alternative concepts.
f. (U) Tested the at sea to validate guidance/control package.
g. (U) Evaluated launch angles.
h. (U) Began support equipment modifications development.

2. (U) FY 1989 Program:
a. (U) Continue FSD of the detection subsystem.
b. (U) Conduct Performance Design Review (PDR) and begin software development for the detection subsystem.
c. (U) Select, fabricate and test
d. (U) Complete feasibility test of guidance/control concepts.
e. (U) Begin FSD of ORDALT Kits.
f. (U) Acquire two MK 32 Surface Vessel Torpedo Tube launchers.
g. (U) Continue development of support equipment.
h. (U) Begin system safety program for

3. (U) FY 1990 Plans:
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) Begin ORDALT Kit testing.
f. (U) Continue Development of support equipment.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603506N Budget Activity: 4
Program Element Title: Surfare Ship Torpedo Defense (SSTD)
Project Number: S0225 Project Title: US National SSTD Program

4. (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 Kits 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 system.
i. (U) Conduct preliminary Physical Configuration Audit (PCA).
j. (U) Begin TECHEVAL.
k. (U) Conduct the maintenance demonstration of the SSTD system.

5. (U) Program to Completion:
a. (U) Complete SSTD system TECHEVAL.
b. (U) Conduct SSTD OPEVAL.
c. (U) Complete PCA.
d. (U) Complete PRR.
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 Weapons Center, White Oak, MD; Naval Undersea Warfare Engineering Station, Keyport, WA; Applied Physics Laboratory, University of Washington, Seattle, WA. Contractors: General Electric, Syracuse, NY; Frequency Engineering Laboratories, Farmingdale, NJ.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	FSD Rescheduled	+17,388

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0603506N Budget Activity: 4
Program Element Title: Surfare Ship Torpedo Defense (SSTD)
Project Number: S0225 Project Title: US National SSTD Program

3. (U) COST CHANGES: The adjustment of +$17,388 reflects accommodation of significant funding reductions in FY 87/88/89 (totalling $36,500) which required completion of the SSTD Development Program to be rescheduled from FY 90 to FY 92.

F. (U) PROGRAM DOCUMENTATION:

OR-S0225	3/85	ASP	7/84	AP 6/88
NDCP	1/85	TEMP	1/86	

G. (U) RELATED ACTIVITIES: 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. A joint feasibility study will be conducted in FY 88/89 with the United States providing Nunn funding (PE 0603790N, "NATO Cooperative Research and Development") and the United Kingdom providing matching funds. Funding for this effort under Program Element 0603506N (Surface Ship Torpedo Defense) will commence in FY 90. The Memorandum of Understanding will specify cost sharing.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
AN/SLQ-25; AN/SLR-24 OPN #67	10,038	6,088	21,199	38,371	168,717	244,213

FY 88-91 will include 421 engineering change kits for AN/SLQ-25 (NIXIE) systems and associated production engineering. Production of a NIXIE towed body engineering change, a NIXIE power amplifier engineering change and advance procurement of the SSTD AN/SLR-24 will begin in FY 90.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MOU signed			I 4/91	II 5/94
Engineering Milestones			Final D&V Specification		
T&E Milestones				Issue TEMP	ADM Subsystem Dev/Test
Contract Milestones				D&V 7/91	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract					
Support Contract	600[1]	1,000[1]	1,000	1,910	TBD[2]
In-House Support	6,400[1]	6,000[1]	10,772	16,008	TBD[2]
GFE/Other					
Total	7,000[1]	7,000[1]	11,772	17,918	TBD[2] / TBD[2]

FY 1990/1991 BIENNIAL 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

Notes:
(1) (U) Nunn funding.
(2) (U) Jointly funded costs will be shared as follows: for Concept Evaluation, the cost of the Joint Project Office (JPO) and its direct support will be shared equally; for Demonstration and Validation, the jointly funded costs will be shared equally; for Full Scale Development, the cost of the JPO and its direct support will be shared equally. Cost shares for the contracts will be established by the Participants by July 1990.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Joint US/UK Surface Ship Torpedo Defense (SSTD) Project is designed to meet all torpedo threats.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) MOU negotiations completed.
   b. (U) Established Joint Project Office.
   c. (U) Began Joint Feasibility Study.
   d. (U) Established the Information Exchange Program.

2. (U) FY 1989 Program:
   a. (U) Sign MOU.
   b. (U) Prepare a POA&M for Concept Evaluation.
   c. (U) Begin preparation of industry Request for Proposal (RFP) and Source Selection Plan (SSP).
   d. (U) Draft Common Performance Requirement (CPR).
   e. (U) Develop Integrated Logistic Support strategies.
   f. (U) Revise program cost estimates and prepare Life Cycle Cost (LCC) estimates.
   g. (U) Issue Security Guidelines/Matrix.
   h. (U) Establish Joint Project Office procedures.
   i. (U) Establish Joint US/UK Funding polices.
   j. (U) Determine Test and Evaluation policies.
   k. (U) Draft Platform Interface Specifications.
   l. (U) Establish Technical Information Centers (TIC).
   m. (U) Develop Acquisition Strategy.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0603506N Budget Activity: 4
Program Element Title: Surface Ship Torpedo Defense
Project Number: S2045 Project Title: Joint US/UK SSTD Project

3. (U) FY 1990 Plans:
   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) Begain 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 Specification.
   h. (U) Initiate definition of National Variants.
   i. (U) Revise/update LCC estimate.
   j. (U) Issue ILSP.
   k. (U) Issue Draft NDCP.
4. (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.
   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) Milestone I NPDM (and UK equivalent).
   h. (U) Begin joint laboratory/sea evaluation of industry concepts proposed.
   i. (U) Issue TEMP.
   j. (U) Begin WSESRB Reviews.
5. (U) Program to Completion:
   a. (U) Revise MOU to define agreements for FSD.
   b. (U) Obtain national approvals of MOU revisions.
   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 a final 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, 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603506N Budget Activity: 4

Program Element Title: Surface Ship Torpedo Defense

Project Number: S2045 Project Title: Joint US/UK SSTD Project

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+$11,772

NARRATIVE DESCRIPTIVE OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The addition of +$11,772 reflects DON funding support of this joint project initiated with Nunn funds.

F. (U) PROGRAM DOCUMENTATION: The MOU is the only program documentation available at this time. Program documentation will be prepared during the Concept Evaluation Phase.

G. (U) RELATED ACTIVITIES: Program Element 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, Program Element 0603790D (NATO Cooperative Research and Development). Joint Potential Designator is not applicable.

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

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1723	Launch/Rec. Systems	5,339	4,058	8,545	10,428	Cont.	Cont.
W1722	CV Wpns Elev.	1,321	3,811	3,691	4,919	Cont.	Cont.
W1875	EAF Matting	0	0	600	0	0	600
TOTAL		6,660	7,869	12,836	15,347	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 all systems required to service, support, launch, provide approach and landing control, and recover aircraft operating onto or from ships; (2) Marine peculiar expeditionary operations; and (3) development of standardized, supportable weapons elevator components. Payoffs include increased safety, greater sortie generation rates, enhanced aircraft boarding rates, reduced manning, increased aircraft service life, and force modernization.

FY 1990/1991 BIENNIAL 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

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
LAUNCH AND RECOVERY SYS	5,339	4,058	8,545	10,428	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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) and advanced control systems for catapults and arresting gear to replace antiquated, manpower intensive systems of the 1950's. 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 the pilot can take early corrective action to prevent accidents and increase boarding rate. The Signature Managed Air Traffic Control, Approach and Landing System (SMATCALS) will allow all-weather operations from ships during radio frequency emission control conditions. A Landing Signal Officer (LSO) Head-Up Display (HUD) for AV-8B operations on LHA/LHD/LPH ships will enable the LSO to detect dangerous situations and take action to prevent landing accidents.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Contracts awarded for design and fabrication of Advanced Development Models (ADM) of Advanced Catapult Control System (ACCS), Advanced Arresting Gear Control System (AAGCS), Improved Carrier Optical Landing System (ICOLS), and Close-in Approach Indicator (CAI) MOD 2.
b. (U) SMATCALS ADM program plan completed and Broad Agency Announcement (BAA) issued.
c. (U) EMALS Development Options Paper (DOP) issued and ADM program plan completed.

2. (U) FY 1989 Program:
a. (U) Continue fabrication of ADM's of ACCS, AAGCS, and ICOLS.
b. (U) Deliver ADM of CAI MOD 2 and install at NAVAIRENGCEN test site.
c. (U) Award concept definition contracts for SMATCALS and AV-8 LSO HUD.
d. (U) Award preliminary design contracts for EMALS.

3. (U) FY 1990 Plans:
a. (U) Deliver ADM's of ACCS, AAGCS, and ICOLS and install at NAVAIRENGCEN test site.
b. (U) Conduct Navy Technical Evaluation (NTE) of CAI MOD 2.
c. (U) Award contracts for final design and fabrication of EMALS.

Program Element: 0603512N Budget Activity: 4
Program Element Title: SHIPBOARD AVIATION SYSTEMS
Project Number: W1723 Project Title: LAUNCH AND RECOVERY SYSTEMS

4. (U) FY 1991 Plans:
a. (U) Conduct NTE's of ACCS, AAGCS, and ICOLS.
b. (U) Continue fabrication of ADM's for EMAL, SMATCALS and AV-8 LSO HUD.
c. (U) Award contracts for final design and fabrication of SMATCALS and AV-8 LSO HUD ADM's.
d. (U) Complete program plans for Shipboard Optical Landing System (SOLS) and Autonomous Deck Equipment (ADE).

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Engineering Center, Lakehurst, NJ; Naval Ocean Systems Center, San Diego, CA. CONTRACTOR: TBD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	NONE	-13,560

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: -13,560 reduction reflects a refinement in resource requirements with no impact on schedule or technical capabilities.

F. (U) PROGRAM DOCUMENTATION: OR's 090-05-88
094-05-88
162-05-88
115-05-88
172-05-88
195-05-88.

G. (U) RELATED ACTIVITIES: P.E. 0602122N, Aircraft Technology, and P.E. 0602232N, C3 Technology.

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

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

J. (U) MILESTONE SCHEDULE:

Milestone II 3Q/FY90
Milestone III 4Q/FY92

FY 1990/1991 BIENNIAL 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 1988 Accomplishments:

a. (U) Specification definition contracts awarded for ballistic doors and hatches, hydraulic power units, quiet high-capability pumps, wire rope tester, and safety stanchions.

2. (U) FY 1989 Program:

a. (U) Award contracts for design and fabrication of weapons elevator components listed above.
b. (U) Award contracts for specification definition of high-pressure accumulator and composite air flask.

3. (U) FY 1990 Plans:

a. (U) Continue fabrication of weapons elevator components and deliver prototypes to Naval Ship Systems Engineering Station (NAVSSES) test site.

4. (U) FY 1991 Plans:

a. (U) Conduct weapons elevator component prototype tests and evaluation at NAVSSES.

5. (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.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603512N Budget Activity: 4
Program Element Title: SHIPBORD AVIATION SYSTEMS
Project Number: W1875 Project Title: EAF MATTING

C. (U) PROJECT DESCRIPTION: The Expeditionary Airfield (EAF) Matting presently available (AM-2) was developed for F-4 aircraft operations and is heavy and cumbersome. Lightweight (1/2 the weight of AM-2) and less voluminous (1/3 the volume of AM-2) matting will be develped for use with AV-8, V-22, and helicopters at V/STOL airfields ashore. Candidates under consideration include reinforced polyvinyl fiberglass used for runway bomb damage repair, and prefabricated surfacing aluminum used by the United Kingdom for Harrier operations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Plans: Not Applicable.

3. (U) FY 1990 Plans:

a. (U) Procure sufficient matting of both types to construct a V/STOL landing site and evaluate both types of matting under operational conditions.

4. (U) FY 1991 Planned Program: Not Applicable.

5. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Engineering Center, Lakehurst, NJ. 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603513N Budget Activity: 4
Program Element Title: SHIPBOARD SYSTEMS COMPONENT DEVELOPMENT

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0382	Shipboard Auxiliary Development	6,091	6,442	8,589	8,685	Cont.	Cont.
S1712	Hull, Mechanical and Electrical Improvement	4,095	4,388	4,477	4,496	Cont.	Cont.
TOTAL		10,186	10,830	13,066	13,181	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops machinery subsystems and component improvements for new ship construction and for backfit into the present fleet. The program includes shipboard auxiliary systems, shipboard corrosion control, fiber optic engineering standards and specifications development, hull mechanical and electrical equipment improvements and shipboard salvage techniques/equipment for ships, weapons and aircraft. Auxiliary machinery developments include air compressors, advanced concept pumps, advanced air conditioning systems, improved electric distribution components, and machinery control monitoring systems. Shipboard corrosion control developments are concerned with production processes to reduce life cycle costs of ship's components through improved corrosion and wear characteristics, and with improvements to reduce fleet maintenance in the area of shipboard preservation. This program also develops Navy Standard Underway Replenishment Equipment including: fueling at sea systems, dry cargo replenishment at sea systems, and intra-ship handling systems. The Hull, Mechanical and Electrical Improvement project is concerned with the development of improved equipments which are small but critical components of Hull, Mechanical and Electrical systems. The emphasis is on short-term developments for immediate fleet application.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603513N Budget Activity: 4
Program Element Title: SHIPBOARD SYSTEMS COMPONENT DEVELOPMENT
Project Number: S0382 Project Title: Shipboard Auxiliary System Dev.

C. (U) PROJECT DESCRIPTION: This project develops shipboard auxiliary components and systems which improve performance, reliability, and maintainability and will result in size, weight, and/or life cycle cost savings.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Completed 3000 psi rotary air compressor (RAC) design, development of Fiber Optic sensors, Fiber Optic engineering standards and specifications.
2. (U) FY 1989 Program:
a. (U) Complete development of powder coatings, and water jet paint removal specifications. Test foam generator system, non-cryogenic N_2 plant generator, 100KW variable speed constant frequency generator.
3. (U) FY 1990 Plans:
a. (U) Develop preliminary equipment design modification and test plan for arctic capability; upgrade salvage equipment operations manuals.
b. (U) Conduct SHIPEVAL of standard helicopter hangar door.
c. (U) Initiate tensioned hose and tensioned connect up rig development.
d. (U) Complete TECHEVAL of Foam Buoyancy Generation System.
e. (U) Complete development of prototype circuit breakers, 60Hz current limiting protector, solid state tank level indicators, ground fault locator and variable speed motor controller.
4. (U) FY 1991 Plans:
a. (U) Issue aluminum anode specification, preliminary design guidance on upgrade cathodic protection systems and process instruction on thermal spray coatings for valve systems.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; NAVSSES Philadelphia, PA; NAVCEL, Port Hueneme, CA; NORDL, St. Louis, MO; NRL, Washington, DC; CONTRACTORS: Worthington Div of Dresser Industries, Buffalo, NY; Hamilton Standard Div of UT, Windsor Locks, CT; Aqua Chem, Milwaukee, WI; York Engineering, Pittsburgh, PA; Westinghouse, Marine Technical Div. and R&D Center, Pittsburgh, PA; Battelle Memorial Institute, Columbus, OH.

F. (U) RELATED ACTIVITIES: Program Element 0602121N (Surface Ship Technology).

H. (U) OTHER APPROPRIATION FUNDS: Budget justification material does not provide this level of detail.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603513N Budget Activity: 4
Program Element Title: SHIPBOARD SYSTEMS COMPONENT DEVELOPMENT
Project Number: S1712 Project Title: Hull Mechanical & Electrical Improv.

C. (U) PROJECT DESCRIPTION: This project develops improved equipments which are small but critical components of hull, mechanical and electrical systems with the emphasis on short-term developments for immediate fleet applications.

D. U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed development of anti-flood 25 ton air conditioning plant and safety analysis of maintenance free battery.
2. (U) FY 1989 Program:
   a. (U) Complete development of standard dehydrator design, all weather windows, shock test of deck holddowns, boat davits, weapons flotation systems, specification for line voltage regulators; complete LABEVAL of maintenance free batteries, navigation light fixture and helicopter hangar doors.
3. (U) FY 1990 Planned Program:
   a. (U) Continue development of underway replenishment winch slip clutch, sliding block, and ram tensioner.
   b. (U) Complete SHIPEVAL of navigation lights and design/manufacture of line voltage regulator and specification for maintenance free batteries.
   c. (U) Continue development of 60/400 Hz electrical power system continuity/quality requirements.
   d. (U) Conduct OPEVAL of high pressure standard dehydrator.
   e. (U) Design and fabricate low pressure standard dehydrator.
4. (U) FY 1991 Planned Program:
   a. (U) Conduct shock and vibration tests of seawater cooling coils.
   b. (U) Conduct LABEVAL of prototype low pressure standard dehydrator.
   c. (U) Complete LABEVAL of line voltage regulator.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; NAVSSES, Philadelphia, PA; NWSC, Crane, IN; NAVCEL, Port Hueneme, CA; NWS Earl, NJ; CONTRACTORS: NOAA, Washington, DC; York Engineering, York, PA; Westinghouse, Marine Technical Division, Pittsburgh, PA; Battelle Memorial Institute, Columbus, OH; Tracor Marine, Ft. Lauderdale, FL.

F. (U) RELATED ACTIVITIES: Program Element 0602121N (Surface Ship Technology).

G. (U). OTHER APPROPRIATION FUNDS: Budget justification material does not contain this level of detail.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0384	Ship Survivability (Adv)	10,913	13,183	15,287	18,265	Cont.	Cont.
S1121	Personnel Protection	2,730	5,050	4,615	5,463	Cont.	Cont.
S1565	Ship Damage Control	5,437	4,927	6,494	7,828	Cont.	Cont.
S1607	EMPRESS II	8,100	4,918	6,529	0	0	40,425
S2053	CBR Defense	0	0	1,195	1,394	Cont.	Cont.
TOTAL		27,180	28,078	34,120	32,950	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The advanced development of equipment/systems/engineering data and full scale weapons effects simulation will provide protection of ships and their personnel from conventional, chemical, or 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Ship Survivability	10,913	13,183	15,287	18,265	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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, CBR personnel protection, and cold weather operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Conducted precursor ship EMP surveys and develop hardening methods.
b. (U) Evaluated CBR shipboard Collective Protection System (CPS) filter performance from shipboard inherent contamination.
c. (U) Developed comprehensive Cold Weather R&D program plan.
d. (U Conducted testing to determine Electromagnetic Pulse (EMP) coupling through apertures to electronic system cables; conduct ordnance EMP testing.
e. (U) Completed composite concept integration test and panel design.
f. (U)

g. (U)

h. (U) Drafted Type A Design Spec for Combat Systems Power Circuitry.
i. (U) Complete Computer Aided Design of Survivable Distributed Systems (CADSDIS) design specification.
j. (U) Initiated full scale testing of electrical/RF cable coatings, and initiate coatings specification.

2. (U) FY 1989 Program

a. (U) Develop system/equipment EMP hardening for precursor ship; complete the development and testing of EMP hardened cable trunk designs.
b. (U) Conduct investigations and testing for topside ice prevention and removal techniques for cold weather operations.
c. (U) Complete fabrication/evaluation of composite integrated technology structure (panel).
d. (U) Select potential advanced shipboard filtration concept for CBR transition to Engineering Development.
e. (U)

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S0384 Project Title: SHIP SURVIVABILITY ADVANCED

f. (b)
g. (U) Publish initial Type A Design Spec for Combat Power Circuitry.
h. (U) Develop requirements for improved "non-combustible" shipboard electrical cable; complete Navy acceptance tests on coatings and coatings spec; complete MIL-SPEC modifications for fire resistant replacement sealant and complete tests of packing materials for cables.
i. (U) Complete CADSDIS Code, Test, and Demonstration of at least two interacting system modules.
j. (U) Initiate lightweight, dynamic armor task.

3. (U) FY 1990 Plans:

a. (U) Conduct module development/evaluation of composite structures.
b. (U) Conduct and document Precursor Ship EMP Trial.
c. (U)

d. (U)

e. (U) Continue testing for topside ice prevention and removal and conduct hull/floating ice interaction model tests.
f. (U) Complete development of "non-combustible" cable designs.
g. (U) Develop AC power system hardening designed to MIL-SPECs.
h. (U) Continue EMP ordnance testing.
i. (U) Finalize HM&E/Combat System Power Interface Design Data Spec.
j. (U) Continue Dynamic Armor task and conduct small scale tests.
k. (U) Complete MIL-SPEC mods for fire resistant packing materials for cables.
l. (U) Complete test measurements and analyses, and prepare revisions to cable specifications to incorporate new test methods.
m. (U) Complete development of GENSPEC modification package to incorporate CADSDIS analysis requirement.

4. (U) FY 1991 Plans:

a. (U) Develop composite deckhouse design and fabricate for testing.
b. (U) Develop EMP Hardening methods for full threat ship.
c. (U)
d. (U) Complete development of limited life coatings for topside ice prevention.
e. (U) Continue EMP ordnance testing and initiate documentation.
f. (U) Conduct full scale testing of Dynamic Armor concepts.
g. (U) Develop MIL-SPEC for "non-combustible" cables.
h (U) Complete evaluation of AC power system hardening methods.
i. (U) Develop design rules for damage tolerant hull and bulkhead structure.
j. (U) Revise Type A Design Specification for Combat Systems Power Circuitry, incorporating new technology.

Program Element: 0603514N Budget Activity: 4
Program Element Title: SHIP COMBAT SURVIVABILITY
Project Number: S0384 Project Title: SHIP SURVIVABILITY ADVANCED

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; DTRC, Bethesda, MD; NSWC, Bethesda, 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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHD	None	None	None
COST	None	Installation delayed	-14,842

NARRATIVE DESCRIPTION OF CHANGES

1. (U)ENGINEERING CHANGES: None.
2. (U)SCHEDULE CHANGES: None.
3. (U)COST CHANGES: Decided not to install electromagnetic pulse protection in current fleet ships; deferred CVN underbottom protection design.

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 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. (U) Initiated development of laser eye protection and Special Applications Fire Fighter's Helmet.
   b. (U) Achieved Initial Operational Capability of fire fighting clothing, anti-flash clothing, and anti-exposure suit.
2. (U) FY 1989 Program:
   a. (U) Continue development of Fire Fighter's Breathing Apparatus, laser eye protection, and Special Applications Fire Fighter's Helmet.
   b. (U) Begin production and initial outfitting of Naval Flak Vest, Naval Battle Helmet, and Auto-Inflatable Utility Life Preserver.
3. (U) FY 1990 Plans:
   a. (U) Achieve Initial Operational Capability of Naval Battle Helmet, Naval Flak Vest, Auto-Inflatable Utility Life Preserver, and Ballistic Face Shield programs.
   b. (U) Complete development phase of Fire Fighter's Breathing Apparatus.
   c. (U) Continue development of laser eye protection, Special Applications Fire Fighter's Helmet, and improved cold weather clothing.
4. (U) FY 1991 Plans:
   a. (U) Commence outfitting of Fire Fighter's Breathing Apparatus.
   b. (U) Continue development of laser eye protection, Special Applications Fire Fighter's Helmet, and improved cold weather clothing.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Laboratory, Washington, DC; David W. Taylor Research Center, Bethesda and Annapolis, MD; Navy Clothing and Textile Research Facility , Natick, MA; Naval Sea Combat Systems Engineering Station, Norfolk, VA; CONTRACTORS: Sharp, Inc., Arlington, VA; AMSEC, Inc., Arlington, VA; Wedlinger Associates, New York, NY.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: None

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project provides advanced development of improved Damage Control and Firefighting equipment, devices, and systems for rapid control, suppression of damage, fire with retention of ship mission.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Completed concept tests for Portable Power & Pumping Systems, shipboard evaluation of commercial Damage Control Stability Simulation Model, threat assessment of foreign missile propellants, and HALON test gas simulant specification.
2. (U) FY 1989 Program:
a. (U) Complete Shipboard feasibility demonstration of an Ultrasonic Hull Communications System.
3. (U) FY 1990 Plans:
a. (U) Complete Portable Power & Pumping System and Hands-Free Thermal Imager Advanced Development, and transition to Engineering Development.
b. (U) Conduct shipboard tests of Ultrasonic Hull Communication System Advanced Development Model.
c. (U) Initiate weapons induced fire tests in Full Scale Fire Test Facility.
4. (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 for Initial Operational Capability in circa 1993.
d. (U) Develop advanced firefighting modules and initiate fabrication of test hardware/software for an interim demonstration test system.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; DTRC Bethesda, MD; NAVSSES, Philadelphia, PA; NWC, Inyokern, 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 (Ship Survivability).

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN	Procurement justification material does not contain this level of detail.					

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

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. (U) Completed vessel support system installation.
   b. (U) Completed and filed final Environmental Impact Statement.
   c. (U) Started Fabrication Data Acquisition and Processing System (DAAPS #1).
   d. (U) Installed command and control system.
   e. (U) Completed EMPRESS II transmitter developmental testing.
2. (U) FY 1989 Program:
   a. (U) Complete fabrication/integration of developmental test and evaluation of DAAPS #1.
   b. (U) Complete DAAPS #1 and transmitter acceptance testing (at-sea).
   c. (U) Fabricate and integrate DAAPS #2 & #3.
3. (U) FY 1990 Plans:
   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 Operational Capability (IOC) of EMPRESS II.
4. (U) FY 1991 Plans: Not applicable.
5. (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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Develop chemical, biological and radiological (CBR) mission essential defensive systems; individual and collective protection ashore and on ships; detectors and monitors to locate and identify CBR contamination; contamination control procedures, materials and equipment; CBR threat weapon effects.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable.

2. (U) FY 1989 Program: Not applicable.

3. (U) FY 1990 Plans: Continue work begun in Project S0384, Ship Survivability, on vulnerability assessment, design criteria, and CBR threat weapons effects. Continue development of microsensor detector and isoprotective material development will continue.

4. (U) FY 1991 Plans: Continue work on Microsensor detector. Continue development of the Surface Acoustic Wave (SAW) microsensor which will consist of tests for possible transitioning of device hardware and packaging. Initiate work on chemically selective coatings for the SAW. Continue development of chemiresistor miscrosensor.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA; DTRC, Bethesda, MD; NAEC, Lakehurst, NJ. CONTRACTORS: NRC, Philadelphia, PA; Battelle, Columbus, OH; IITRI, Chicago, IL.

F. (U) RELATED ACTIVITIES: PE 0604506N (CW Countermeasures), PE 0602233N (Mission Support Technology).

G. (U) OTHER APPROPRIATION FUNDS: None

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

FY 1990/1991 BIENNIAL 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 (ASSSP)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0770	ASSSP	2,008	3,347	2,902	2,813	Continue	Continue

B. (U) BRIEF DESCRIPTION OF ELEMENT: Develops new submarine Electronic Support Measures (ESM) technologies, techniques, and algorithms that allow submarines to operate effectively in an increasingly dense and sophisticated electromagnetic environment. Includes better threat warning, over-the-horizon targeting support for submarine-launched cruise missiles, and expanded tactical reconnaissance. Specific efforts include development of WLQ-() ESM block upgrades, radar cross section reduction techniques, improved targeting techniques, and advanced sensor development in the areas of non-imaging infrared, millimeter (mm) wave and laser threat warning.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Developed software/interface for modified airborne hardware able to recognize unique modulation anomolies.
   b. (U) Completed concept development for an integrated, multi-sensor ESM mast (IEM).
   c. (U) Completed the AN/WLQ-( ) A-Specification.
   d. (U) Developed prototype AN/BRD-7 integral RAM radome.
   e. (U) Developed software to improve AN/BRD-7 DF accuracy.
   f. (U) Developed communications threat profile scenario.
2. (U) FY 1989 Program:
   a. (U) Test system's ability to exploit unique modulation anomolies.
   b. (U) Develop block upgrade plan for the AN/WLQ-( ).
   c. (U) Test the AN/BRD-7 integral RAM radome and DF improvement.
   d. (U) Define techniques for processing complex, exotic signals.
3. (U) FY 1990 Plans:
   a. (U) Develop passive ranging algorithms and AN/BRD-7 radome EDM.
   b. (U) Test IEM critical functions risk reduction hardware.
   c. (U) Begin AN/WLQ-( ) block upgrade development
   d. (U) Develop a communciations tactical OTH-T correlator.
4. (U) FY 1991 Plans:
   a. (U) Begin IEM block upgrade including optical and mm wave sensors.
   b. (U) Continue to develop WLQ-( ) block upgrade and OTH-T correlator
   c. (U) Investigate innovative RCSR techniques (e.g., surface modulation).
5. (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) carries ASSSP projects through FSD.

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

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/91 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603528N Budget Activity: 4 - Tactical Programs
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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0976	Non-Acoustic ASW	10,518	15,601	15,994	17,055	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Continuing advances in Soviet submarine technology and [redacted] 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 [redacted]

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Conducted engineering test of first phase of [redacted] system ADM and continued further fabrication.
   b. (U) Continued analysis of FY 87 [redacted] field test of ASW remote sensing concepts
   c. (U) Provided support for two major ASW tests of the P-3 [redacted] ystem in conjunction with partner agency.
   d. (U) Continued design of improved [redacted] sensor system.
   e. (U) Conducted test of experimental development model [redacted] sensor.
   f. (U) Continued to monitor non-acoustic technology developments for potential ASW utility.

Program Element: 0603528N Budget Activity: 4-Tactical Program
Program Element Title: Non-Acoustic Anti-Submarine Warfare
Project Number: X0967 Project Title: Non-Acoustic Anti-Submarine Warfare

2. (U) FY 1989 Program:
   a. (U) Complete analysis of FY 87 [redacted] field test data.
   b. (U) Analyze results of two FY 88 ASW tests using P-3 [redacted] system.
   c. (U) Conduct final test of experimental development model [redacted] analyze data and initiate design for test phase.
   d. (U) Complete [redacted] system ADM and conduct Arctic test.
   e. (U) Complete design of [redacted] sensor.
   f. (U) Continue to monitor non-acoustic developments for potential ASW utility.
   g. (U) Initiate development of [redacted] System.

3. (U) FY 1990 Plans:
   a. (U) Provide support for major ASW test with P-3 [redacted] system in conjunction with partner agency.
   b. (U) Develop [redacted] sensor ADM.
   c. (U) Evaluate performance of [redacted] ADM in [redacted] initiate [redacted] test bed design for 688 Class SSN. Conduct tactical development and evaluation with [redacted] system.
   d. (U) Fabricate [redacted] sensor and conduct field tests.
   e. (U) Continue to monitor non-acoustic developments for potential ASW utility.
   f. (U) Complete design of [redacted] system.

4. (U) FY 1991 Plans:
   a. (U) Analyze results of FY 90 P-3 [redacted] system ASW test.
   b. (U) Complete [redacted] sensor ADM, commence test and evaluation.
   c. (U) Continue tactical development and evaluation of [redacted] system.
   d. (U) Fabricate [redacted] test bed system for 688 Class SSN and prepare for transition.
   e. (U) Continue to monitor non-acoustic developments for potential ASW utility.
   f. (U) Fabricate [redacted] system and conduct field tests.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Underwater Systems Center, Newport, RI (Lead Lab); Naval Air Development Center, Warminster, PA. CONTRACTORS: Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; TRW Space Systems, Redondo Beach, CA.

Program Element: 0603528N Budget Activity: 4-Tactical Program
Program Element Title: Non-Acoustic Anti-Submarine Warfare
Project Number: X0967 Project Title: Non-Acoustic Anti-Submarine Warfare

E. (U) COMPARISON WITH AMENDED FY 1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	Tests Cancelled Projects streched out	-14,155

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: As a result of FY 90 (-14,155) reduction, one major thrust area [redacted] technologies, has been delayed; another area, dealing with the performance of [redacted] has been reduced to only support function; a separate technology, [redacted] was curtailed. [redacted] design/fabrication was delayed. Two major [redacted] tests were cancelled. Tactical development and evaluation for the [redacted] advanced development model slipped from FY 90 to FY 91. System completion and transition to 6.4 were delayed from FY 91 to FY 92. Four P-3 [redacted] FY 90/91 tests were cancelled.

F. (U) PROGRAM DOCUMENTATION: NAPDD #033-095 10 March 1986
TOR Ser 098R/6S357617 22 December 1986

G. (U) RELATED ACTIVITIES: This program draws heavily on the non-acoustic work already accomplished and continuing [redacted] h

The committee provides top level review of all related non-acoustic anti-submarine warfare activities and all efforts in the field of non-acoustics to ensure that promising efforts are pursued and redundant efforts are avoided.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: N/A

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0968	Advanced Anti-Submarine Warfare Target	5,320	8,772	22,794	12,143	Cont.	Cont.
S1017	Expendable Mobile ASW Training Target	2,200	3,882	2,513	0	-0	16,186
S1955	Fast/Deep Prototype Target	3,948	2,348	0	0	0	11,990
Total		11,468	15,002	25,307	12,143	Cont	Cont

* Planned Transfer of $7,900 Project S1955 to S0986.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program develops underwater Anti-Submarine Warfare (ASW) mobile targets for weapon and sensor evaluation and fleet training that simulate the maximum depth and speed of the projected submarine threats in order to support developmental and operational testing of the Navy's advanced ASW weapons. Project S1955 (Fast Deep Prototype Target) is the first step. It develops a single prototype target capable of simulating the threat submarine's full dynamic capabilities, specifically for testing the submarine launched MK 48 Advanced Capability (ADCAP) Torpedo and the air and surface launched MK 50 Torpedo. This project will help answer weapon operational issues and will demonstrate the feasibility of adapting the state-of-the-art Advanced Capability Stored Chemical Energy Propulsion System (ADSCEPS) to a 21 inch diameter vehicle. Project S0968 (Advanced ASW Target) is a companion effort to the prototype project. It develops and builds six productionized (MK 30 MOD 3) Fast Deep Targets based on the technology demonstrated in the prototype. This project also includes a planned restart of the MK 30 MOD 2 Fleet Training Target in FY 1991. Project S1017 develops the MK 39 Expendable Mobile ASW Training Target (EMATT) for open ocean training of surface and air platforms. EMATT provides increased dynamic capability, programmed run capability, acoustic compatibility with all Fleet surface ship and air platform sonars and sonobuoys, and Magnetic Anomaly Detection (MAD) simulation. EMATT provides an air launch capability that does not exist in the current MK 38 Mini Mobile Target (MMT).

FY 1990/1991 BIENNIAL 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

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

Project Number		FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	To Complete
S0968	MK 30 Mod 3 Fast Deep Target	5,320	8,772	22,794	12,143	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

The MK 30 Mod 3 Fast Deep Target is being developed to support evaluations of the Navy's newest torpedoes. An initial deployment of six targets is planned. This project will use the acoustic signal processor, power amplifier and towed array previously under development in this project for the MK 30 Mod 2 Advanced ASW Target, the guidance and control hardware from the current inventory MK 30 Mod 1 Target, and the MK 48 ADCAP CCAPS propulsion system. Development of the MK 30 Mod 2 development target has been deferred to FY 1991.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable.

   a. (U) Transitioned from MK 30 MOD 2 to MOD 3.
   b. (U) Initiated MK 30 MOD 3 system and sub-system trade-off studies and specification development.
   c. (U) Selected MK 48 ADCAP CCAPS engine as propulsion plant.

2. (U) FY 1989 Program:

   a. (U) Complete system design and planning.
   b. (U) Initiate design modification of electro-acoustic subsystems.

3. (U) FY 1990 Plans:

   a. (U) Exercise contract option on the MK 48 ADCAP CCAPs FSED contract for the design and fabrication of propulsion system components.
   b. (U) Initiate fabrication of electro-acoustic subsystems.
   c. (U) Conduct electro-acoustic subsystem testing.

FY 1990/1991 BIENNIAL RET&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603529N Budget Activity: 4
Program Element Title: Advanced Anti-Submarine Warfare Target

4. (U) FY 1991 Plans:
   a. (U) Deliver electro-acoustic subsystems to Navy for system level testing.
   b. (U) Complete fabrication of propulsion system components and start component level testing.
   c. (U) Re-start of MK 30 MOD 2 development.

5. (U) Program to Completion:
   a. (U) Deliver propulsion systems to Navy for in-house system level testing and integration with electro-acoustic subsystem.
   b. (U) Conduct in-water demonstration testing with advanced weapons.
   c. (U) Complete site activation efforts MK 30 Mod 3.
   d. (U) Fabricate MK 30 Mod 2 subsystems.
   e. (U) Complete fabrication and initiate MK 30 Mod 2 in-water testing.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Washington, D.C. (Program Office), Naval Underwater Systems Center, Newport, Rhode Island (Lead Laboratory and Systems Integrator); Contractors: Loral Systems Group, Akron, OH; Raytheon Corp., Portsmouth, RI. (Acoustic Contractor)

E. (U) COMPARISON WITH AMENDED FY 1989 DESCRIPTIVE SUMMARY: Program has been restructured. FY 1989 RDDS described development of MK 30 MOD 2, which has been deferred until FY 1991 after development of MK 30 MOD 3.

F. (U) PROGRAM DOCUMENTATION: NAPDD 9/88 - estimate

G. (U) RELATED ACTIVITIES:
   a. " Piggy Back " on MK 48 ADCAP Design effort. Program Element: 0604675N P.E. Title: MK 48 Advanced Capability Engineering, Project Number S0366.
   b. MK 30 Mod 3 CCAPS SDR/CDR FY90.

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

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

J. (U) MILESTONE SCHEDULE: (MK 30 MOD 3)
   a. Propulsion System Development Contract Award - 1/90.
   b. Acoustic payload fabrication FY 90
   c. Propulsion System Testing - 7/91 through 1/92.
   d. Integration and land based testing FY 92.
   e. Initial operational capability 7/93.

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

FY 1990/1991 BIENNIAL 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 MK-39 (EMATT)

C. (U) PROJECT 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 1988 Accomplishments:
   a. (U) Complete 42 prime units for use in FSED Testing.
   b. (U) Complete DT-IIB Testing.
2. (U) FY 1989 Programs:
   a. (U) Initiate Test Analyze and Fix (TAAF) for reliability growth.
3. (U) FY 1990 Plans:
   a. (U) Complete OT-IIA. Receive approval for Low Rate Production.
   b. (U) Conduct DT-IIC and OT-IIB Testing.
4. (U) FY 1991 Plans: Receive approval for Full Rate Production based on OT-IIB.
5. (U) Program to completion: Not applicable.

E. (U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC (Program Office); Naval Underwater Systems Center, Newport, RI (Lead Laboratory); Prime Contractor: Sippican Ocean Systems, Inc.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (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 #47 EMATTS ASW TARGET (WPN)	0	0	10,512	10,923	Cont.	Cont.
Quantities	0	0	1,105	1,460	Cont.	Cont.

Budget Activity 03, Torpedoes and Related Equipment.

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project develops an in-water capability of simulating maximum projected threat speed, depth and acoustic characteristics to support testing of the MK 48 Advanced Capability (ADCAP) and MK 50 Advanced Lightweight Torpedoes.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Electro-acoustic mock-up testing completed.
   b. (U) Towed array delivered for integration.

2. (U) FY 1989 Program:
   a. (U) Conduct in-water testing and operations with weapons.
   b. (U) This program completes in FY 1989.

3. (U) FY 1990 Plans: Not Applicable.

4. (U) FY 1991 Plans: Not Applicable.

5. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: In-House: Naval Sea Command, Washington, DC (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-acquistion program.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603542N Budget Activity: 4 - Tactical Program
Program Element Title: Radiological Controls

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1825	Radiological Controls	176	172	189	198	Continue	Continue
S1830	RADIAC Development	2,648	3,044	3,710	3,761	Continue	Continue
Total for PE		2,824	3,216	3,899	3,959	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project develops highly efficient methods for the calculation, measurement, and shielding of gamma and neutron radiation emitted by nuclear weapons or industrially used radiosotopes.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments:
   a. (U) Developed improvements in the methods for calculating radiation levels and incorporated them into the Navy's dose mapping computer program.
   b. (U) The mathematical description for the distribution of the radiation output of depleted uranium ammunition was developed.
   c. (U) Investigated the use of tissure equivalent proportional counters and super-heated liquid drop dosimeters for environmental monitoring of neutrons.
2. (U) FY 1989 Program:
   a. (U) Incorporate improvements in the Navy's computer program which maps radiation levels in shps to allow installaion in a micro-computer.
   b. (U) Determine over-response of the DT 648 dosimeter in neutron environments.
3. (U) FY 1990 Plans:
   a. (U) Determine methods to assess radon levels in weapons storage and maintenance spaces.
   b. (U) Develop more efficient methods of radiation shielding to reduce the weight of shielding on Navy ships.
4. (U) FY 1991 Plans:
   a. (U) Develop more efficient methods of radiation shielding to reduce the weight of shielding on Navy ships.
5. (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 (Code 06GN)

F. (U) RELATED ACTIVITIES: None

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: 0603542N Budget Activity: 4 Tactical Program
Program Element Title: Radiological Controls
Project Number: S1830 Project Title: RADIAC Development

C. (U) PROJECT 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. New instrumentation is being developed to meet 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 1988 Accomplishments: Contract was awarded for the Demonstration/Validation phase of the Laser-Heated Thermoluminescent Dosimetry System in February 1988. Conceptual Development continued on the Underwater RADIAC, the Tritium Monitor, and Neutron Dosimetry System.

2. (U) FY 1989 Program: Begin Full Scale Engineering Development (FSED) for Laser-Heated Thermoluminescent Dosimetry System. Begin Demonstration/Validation (D/V) Phase for Multifunction RADIAC and ARCADE System, EOD Personal Dosimeter, Neutron Dosimetry System, and Underwater RADIAC. Continue Conceptual Development of Tritium Monitor.

3. (U) FY 1990 Plans: Continue FSED for Laser-Heated Thermoluminescent Dosimetry System; begin FSED for Multifunction RADIAC, and ARCADE System. Continue FSED for EOD Personal Dosimeter; begin FSED Neutron Dosimetry System, and Underwater RADIAC. Begin Demonstration/Validation Phase for Tritium Monitor.

4. (U) FY 1991 Plans: Begin production phase for Laser-Heated Thermoluminescent Dosimetry System, Multifunction RADIAC, and ARCADE System. Continue FSED for EOD Personnel Dosimetry; begin FSED Neutron Dosimetry System, and Underwater RADIAC. Begin Demonstration/Validation Phase for Tritium Monitor.

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

E. (U) WORK PERFORMED BY: Naval Surface Weapons Center, White Oak, Silver Spring, MD; Oak Ridge National Labs, Oak Ridge, TN; and Naval Sea Systems Command, Washington, DC.

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 APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
OPN #120 (29200)	0	0	376	741	39,500	40,690

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0229	Surface Ship Silencing	4,802	2,714	8,111	13,006	Cont.	Cont.
S1704	ASW Advanced Development Technology	33,929	64,225	47,744	40,986	Cont.	Cont.
S2032	Coast Guard Sonar	0	4,978	0	0	0	4,978
TOTAL		38,731	71,917	55,855	53,992	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops surface ship anti-submarine 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. Development, test and evaluation of a lightweight, portable, low frequency sonar for use by the U.S. Coast Guard will be conducted in FY89.

DECLASSIFY ON: OADR

FY 1990/1991 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

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0229	Surface Ship Silencing	4,802	2,714	8,111	13,006	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: With continued quieting of Soviet submarines and the utilization of improved sonar by both friends and foes, the ability to conduct successful ASW from any fixed or mobile platform is directly dependent upon reducing the acoustic noise of surface ships in the area. ASW 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. The success of the AN/SQQ-89 and other surface ship ASW programs relies on developing and maintaining quiet surface ships. Non-ASW surface ship acoustic quieting provides for the development, and at-sea demonstration, of quieting techniques to reduce radiated noise and shipboard machine-generated airborne noise. These projects are directed toward: (1) increasing the survivability of these ships by making threat sensor determination of surface ship presence, position, classification, predicted intercept, and [illegible] more difficult and (2) reducing the interference impact of surface ship noise on our force ASW ship sonars, [illegible] nd sonobuoys.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed acoustic evaluations and recommendations for the next generation amphibious ship TOR and TLR.

b. (U) Completed prototype [illegible] installation specifications and scheduled ship and facilities availabilities.

c. (U) Completed cascade orificial restrictive device (CORD) RDT&E and DD 963/DDG 993 SHIPALT.

d. (U) Completed development of DD 963/DDG 993 SHIPALT incorporating advanced submarine pump silencing technology.

e. (U) Completed CG 16 hub vortex dissipator (HVD) water tunnel evaluations.

f. (U) Completed ASW operational predictions and analysis of full scale [illegible] prototype evaluation data.

2. (U) FY 1989 Program: Pursue to maximum extent possible and transition, as necessary, propulsor and machinery quieting, AN/SQS-53C baffle development, and airborne noise reduction work related to FF 1052, DD 963 and FFG 7 Classes for continuation in FY90. Continue [illegible] installation in [illegible]

FY 1990/1991 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

3. (U) FY 1990 Plans: Complete diagnostic evaluation of CG 47 Class. Initiate detailed design of combatant (e.g., CGN) prototype. Continue propulsor quieting, AN/SQS-53C baffle development and airborne noise reduction fleet evaluations and acoustic design support RDT&E.

4. (U) FY 1991 Plans: Complete diagnostic evaluation of DDG 51 Class. Continue detailed design of prototype system. Continue propulsor quieting, baffle development, airborne noise reduction, fleet evaluations and acoustic design support RDT&E. Initiate detailed design of prototype.

5. (U) Program to Completion: This is a continuing program. The current program is structured to apply to ASW ships (FF 1052 Class, DD 963 Class, DDG 993 Class, FFG 7 Class, CG 47 Class, CGN Classes, DDG 51 Class, and subsequent new construction); Battle Group High Value Units (CV/CVN Classes, CG 16 Class, CG 26 Class, BBs and AOR/AFS/AOE.AE/AO Classes); Amphibious Ships (LCC/LHA.LKA/LPD/LPH/LSD/LST Classes); Mine Warfare Ships (MCM/MSH/MSO Classes); and

D. (U) WORK PERFORMED BY: In-house: David Taylor Research Center, Carderock, MD; Naval Underwater Systems Center, New London, CT; Naval Ocean Systems Center, San Diego, CA; Naval Oceanographic Research and Development Activity, Bay St. Louis, MS; Naval Research Laboratory, Washington DC. Contractors: Penn State University, State College, PA; Applied Physics Laboratory, John Hopkins University, Laurel, MD; Applied Research Laboratory, University of Texas, Austin, TX; Epoch Engineering, Gaithersburg, MD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: None.

FY 1990/1991 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

F. (U) PROGRAM DOCUMENTATION: NAPDD (176-03) 11/87
NDCP (0229-AS) 10/78 (amended 10/80)

G. (U) RELATED ACTIVITIES: Program Element 0602121N and 0602323N (Ship and Submarine Technology); development of acoustic silencing technology. Program Element 0604561N (SSN 21); development of noise reduction technology for submarines.

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

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

J. (U) MILESTONE SCHEDULE:

(1)	(U) FF 1052, DD 963/DDG 993, and FFG 7 Class Quieting Products At-Sea Demonstrations.	FY90
(2)	(U) CG 47 Class Quieting Products At-Sea Validation	FY92
(3)	(U) System Initial At-Sea Demonstration on Combatant	FY94
(4)	(U) Initial At-Sea Demonstration on Combatant	FY95

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603553N Budget Activity: 4
Project Element Title: Surface Anti-Submarine Warfare
Project Number: S1704 Project Title: ASW Advanced Development

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1704	ASW Advanced Development	33,929	64,225	47,744	40,986	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 upgrades to provide

Efforts beyond Block 3 of the AN/SQQ-89 Improved Program will be the development and evaluation of technologies for test of multistatic sonar systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Conducted cavitation, hull absorption and element interaction tests for AN/SQQ-89(I) array configurations and critical item and acceptance tests for reconfigurable multi-line evaluation systems (RMES) towed array.

b. (U)

c. (U) Performed [ ] tests at Lake Seneca on the array which will be installed in USS GLOVER and completed installation of in USS GLOVER bow dome. Performed Phase II tests in USS GLOVER using bow mounted] and

e. (U) Started detailed analysis of ship impact associated with proposed AN/SQQ-89(I) system design approaches.

2. (U) FY 1989 Program:

a. (U) Complete AN/SQQ-89(I) design support tests in GLOVER

b. (U) Design and evaluate concepts of [systems.

c. (U) Perform preliminary engineering for low cost [ ] classification algorithms and systolic adaptive processing/beamforming techniques.

d. (U) Instal test tool aboard USS GLOVER and perform Phase III tests using bow mounted to

e. (U) Demonstrate the ability to meet the performance specified in OR 062-03-86.

f. (U) Complete competitive Design Acquisition Board (DAB) review during second quarter of FY90.

g. (U) Perform evaluations of prime contractor's FFG technical proposals and complete contract documentation for Milestone II approval.

h. (U) Start procurement of long lead Navy standard equipment required to support the FY90 start of Full Scale Engineering Development.

3. (C) FY 1990 Plans:

a. (U)

b. (U) Fabricate advanced development model (ADM) low cost towed arrays.

c. (U) Develop an advanced model of sonar optical signal processor, and conduct real time laboratory evaluations of advanced active/passive detection and classification algorithms.

4. (U) FY 1991 Plans:

a. (U) Complete testing and analysis of tactical towed source sea trial data. b. (U) Complete fabrication of ADM low cost towed array subsystem.

c. (U) Conduct additional real time at-sea tests of contact management algorithm.

d. (U) Conduct at-sea real time evaluations of advanced active/passive detection and classification algorithms for low frequency sensor systems.

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

D. (U) WORK PERFORMED BY: In-house: Naval Underwater Systems Center, New London, CT; Naval Ocean Systems Center , San Diego, CA; Naval Reseach Laboratory, Washington, DC and Orlando, FL. Contractors: Johns Hopkins University, Laur , 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603553N Budget Activity: 4
Project Element Title: Surface Anti-Submarine Warfare
Project Number: S1704 Project Title: ASW Advanced Development

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHD	N/A	N/A	N/A
COST	None	None	+$15,493

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: The Department/Navy adjustment of + $15,493 reflects realignment of 6.4 to 6.3 funding to support the AN/SQQ-89(I) Development Program.

F. (U) PROGRAM DOCUMENTATION: NAPDD (154-03) 3/87

G. (U) RELATED ACTIVITIES: PE0604713N/S1916 (Surface ASW System 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: This is a non-acquisition program.

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S2033	Adv Sub Systems Dev	*	*	28,213	39,979	Continue	Continue
S2034	R&D Submarine	0	0	8,990	16,081	Continue	Continue
Total		(112,889)	(13,543)	37,203	56,060	Continue	Continue

* Funded under 0603569N, Project S1974 in FY 1988 and FY 1989.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: The principal challenge to the U.S. Navy is the intensive and continually improving Soviet submarine and surface force. This program supports revolutionary 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 by rapid prototyping and to expedite delivery of improvements to the fleet and thereby provide a hedge against technology surprises. HM&E and non-nuclear technologies will receive the initial emphasis. Where appropriate, the program will include combat system, electronic sensors, countermeasures and weapons technologies. Planned new starts include the transition of technologies developed under the Congressionally-mandated DARPA Advanced Submarine Technology Program, and the R&D submarine. Project S2034 will provide time and space for demonstrating advanced technologies and concepts on board an at-sea 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.

Program Element: 0603561N Budget Activity: 4
Program Element Title: Advanced Submarine Systems Development
Project Number: S2033 Project Title: Adv Sub Systems Dev

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S2033	Adv Sub Sys Dev	*	*	28,213	39,979	Continue	Continue

* Funded under PE 0603569N Project S1974 in FY1988 and FY1989.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The principal challenge to the U.S. Navy is the extensive and continually improving Soviet submarine and surface force. This project will provide the advanced submarine technology required to counter this increasing threat. Efforts initially emphasize HM&E and non-nuclear propulsion technologies and will include, when appropriate, sensors, weapons, electronics, and countermeasures. The overall intent is to increase the submarine technology base to provide design options not currently feasible, rapid prototyping and delivery of improvements to fleet, and provide a hedge against technology surprises. These developments will directly support the attack submarine mission to aggressively seek out and destory 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 ACCOMPLISHEMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable

2. (U) FY 1989 Program: Not Applicable

3. (U) FY 1990 Plans: Continue tasks initiated under Program Element 0603569N in FY 1988 and 1989.
   a. (U) Begin fabrication of steel hull section in USS DOLPHIN.
   b. (U) Continue development of advanced propulsion machinery technology.
   c. (U) Continue development of advanced, quiet machinery and silencing technology.
   d. (U) Continue development of components.
   e. (U) Initiate development of advanced damage prevention technologies.
   f. (U) Initiate development of

4. (U) FY 1991 Plans:
   a. (U) Complete fabrication and installation of steel hull section in USS DOLPHIN.
   b. (U) Continue development of advanced propulsion machinery technology.
   c. (U) Installation and sea trial of
   d. (U) Continue development of advanced, technology.
   e. (U) Continue development of components.
   f. (U) Continue development of advanced damage prevention technologies.
   g. (U) Continue development of techniques.
   h. (U) Initiate development of advanced submarine control program (ASCOP).

Program Element: 0603561N Budget Activity: 4
Program Element Title: Advanced Submarine Systems Development
Project Number: S2033 Project Title: Adv Sub Systems Dev

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

D. (U) WORK PERFORMED BY: In-house: David Taylor Research Center, Bethesda, MD; NUSC, Newport, RI; NRL, Washington, DC; Naval Ship Systems Engineering Station; Phildelphia, PA; Mare Island NAVSHIPYD, Vallejo, CA; NOSC, San Diego, CA; NCSC, Panama City, FL; and COMSPAWARSYSCOM, Washington, DC; Contractors: General Dynamics, Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Penn State University, Applied Physics Laboratory, University Park, PA; Southwest Research Institute, San Antonio, TX; Charles Stark Draper Laboratory, Cambridge, MA; and other laboratories and industry as appropriate.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-6,886

NARRATIVE DESCRIPTION OF CHANGES

1. TECHNOLOGY: None
2. SCHEDULE: None
3. COST: Program restructured to accomodate higher priority efforts. This program funds efforts previously contained in PE 0603569N.

F. (U) PROGRAM DOCUMENTATION: Not Applicable

G. (U) RELATED ACTIVITIES: This Program Element continues some projects previously funded under Program Element 0603569 Projects S2025 and S1974. Submarine related RDT&E programs will provide inputs into Program Element 0603561 in the form of new technologies, systems, and components that can be used in 688 Class, SSN-21 Class, and future Attack Submarine Classes by block upgrades. The most important of the related Program Elements is 0604561N (SSN 21 Development). Program Elements 0604524N, (Submarine Combat System Development); 0604502N, (Submarine Communications); 0603570N, (Advanced Nuclear Reactor Components and Systems); 0604567N, (Ship Subsystem Development/LBTS); 0603569E, (Advanced Submarine Technology) are also related to this Program Element.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: Not Applicable.

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S2034	R&D Sub	0	0	8,990	16,081	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEM CAPABILITIES: The funds requested for the R&D Submarine will be used to design and implement modifications to a deployable attack submarine which will facilitate testing and evaluation of advanced submarine technology and concepts. These modifications may include: additional hull penetrations, structural modifications, new sensors and masts. Developments from industry, in-house Navy programs, and the DARPA sponsored submarine R&D thrust will be accommodated.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: Not applicable
2. (U) FY 1989 Program: Not applicable
3. (U) FY 1990 Plans: Investigate transition of possible candidate technologies and begin design of submarine modifications necessary to support R&D objectives and initial long lead procurement.
4. (U) FY 1991 Plans: Continue design of submarine modifications necessary to support R&D objectives. Continue to transition technologies from in-house Navy programs and the DARPA Advanced Submarine Technology program.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: Naval laboratories involved with the development of technologies and products selected for installation; Mare Island NAVSHIP YD, Vallejo, CA; Contractors: General Dynamics, Electric Boat Divison, Groton, CT; Newport News Shipbuilding, Newport News, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIES	IMPACT ON SCHEDULE	IMPACT ON FY 1990 COST
TECH	None	None	None
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY: This is a new start.
2. (U) SCHEDULE: None
3. (U) COST: None

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

Program Element: 0603561N Budget Activity: 4
Program Element Title: Advanced Submarine Systems Development
Project Number: S2034 Project Title: R&D Submarine

G. (U) RELATED ACTIVITIES: This project will support the development and demonstration of technologies and hardware developed under Project S2033, all other submarine related RDT&E programs, and the DARPA submarine R&D initiative. Principal Program Elements, in addition to Project S2033, contributing will be 0604561N (SSN 21 Development), 0604524N (Submarine Combat System Development), 0604502N (Submarine Communications), 0603570 (Advanced Nuclear Reactor Components and Systems), and 0604567N (Ship Subsystem Development/LBTS).

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: Not Applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603562N Budget Activity: 4-Tactical Programs

Program Element Title: Submarine Tactical Warfare System (Advanced)

Project Number: S1739 Project Title: Submarine Arctic Warfare Development

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1739	Submarine Arctic W/F	5,766	6,131	7,483	7,186	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT:

It develops advanced capabilities for Efforts include an ice pool to simulate the Arctic environment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Conducted ICEX 1-88 and planned ICEX 1-89 and 2-89.
   b. (U) Conducted full-scale load test of
   c. (U) Conducted lake test of devices.
   d. (U) Readied ice pool for tests on
2. (U) FY 1989 Program:
   a. (U) Conduct ICEX 1-89 and ICEX 2-89.
   b. (U) Quantify performance of
   c. (U) Continue full-scale load tests of
   d. (U) Conduct tests in ice pool and at sea of
   e. (U) Conduct ice pool tests of
   f. (U) Conduct ice pool tests of
3. (U) FY 1990 Plans:
   a. (U) Conduct ice pool tests and issue guidance on
   b. (U) Analyze and report results of ICEX 1-89 and 2-89.
   c. (U) Develop Arctic unique improvements to
   d. (U) Analyze and report results of tests.
4. (U) FY 1991 Plans:
   a. (U) Analyze results of ICEX 1-90 and plan ICEX 2-92.
   b. (U) Develop and test Arctic unique system improvements; conduct ice pool tests.
   c. (U) Develop
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC, San Diego, CA; NUSC, Newport, RI; DTRC, Carderock, MD; NORDA, Bay St. Louis, MO. CONTRACTORS: Applied Physics Laboratory, University of Washington, Seattle, WA; Integrated Systems Analysts, Inc., Arlington, VA; Analysis and Technology Inc., North Stonington, CT; Applied Research Laboratory, University of Texas, Austin, TX.

E. (U) RELATED ACTIVITIES: (a) 0602314N (ASW Technology); 0602323N (Submarine Technology); and 0602435N (Ocean and Atmosphere Support Technology) provide technologies and concepts for advanced development efforts; (b) 0604561N (SSN 21 Development); and 0604524N (Submarine Combat System) will incorporate Arctic specific improvements.

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

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603564N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (ADVANCE)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0408	Ship Dev. (Adv)	4,668	5,018	8,246	11,373	Cont.	Cont.
S1896	EM Engineering	1,000	0	0	0	Cont.	Cont.
S2043	Sub Tender Dev	0	0	1,967	4,790	15,000	21,757
TOTAL		5,668	5,018	10,213	16,163	Cont.	Cont.

B. (U) BRIEF 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 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 Option 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603564N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (Advance)
Project Number: S0408 Project Title: Ship Development (Advance)

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Ship Design (Adv.)	4,668	5,018	8,246	11,373	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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, P.E. 0604567N. This program also develops and evaluates unconventional hull form concepts suitable for future acquisition . The Navy has benefited from the Research, Development, Design and Deployment of the hydrofoil (PHM class) and 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 required by government for the design of surface ships in the Shipbuilding Programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Performed advanced concept studies for the Battle Force Capable Combatant, the Mission Essential Unit, a Low Observable Ship, and the ASW SWATH.
   b. (U) Conducted LX feasibility studies.
   c. (U) Evaluated rudder roll stabilization technology on ship performance.
   d. (U) Performed comparative analysis of Soviet and Free World CVs.
   e. (U) Analyzed ASW and Electronic Systems technology impacts on HM&E concepts.
   f. (U) Performed HM&E technology impacts on Arctic ship concepts.
   g. (U) Evaluated structural high strength, low alloy (HSLA) technology concepts for future ships.
2. (U) FY 1989 Program:
   a. (U) Perform destroyer (DDG 51 Flight III), repair ship (AR(X)), towing and rescue vessel (ATR(X)), and surveying ship (T-AGS(X)) feasibility studies.
   b. (U) Develop baseline designs of the Battle Force Capable (BFC) Combatant, Mission Essential Unit (MEU), and Large Capacity Missile Carrier (LCMC).
   c. (U) Continue LX studies.
   d. (U) Assess warfare, hull, machinery and electrical subsystems for advanced ships.

Program Element: 0603564N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (Advance)
Project Number: S0408 Project Title: Ship Development (Advance)

e. (U) Evaluate ship stabilization and seaway performance technology for hull form and subsystem impacts.

3. (U) FY 1990 Plans:

a. (U) Transition from feasibility studies to preliminary design of AR(X), ATR(X), and TAGS(X) candidates.

b. (U) Perform LX feasibility studies.

c. (U) Continue DDG-51 Flight III feasibility design.

d. (U) Perform HM&E system assessments of BFC, MEU and LCMC.

e. (U) Perform comparative analysis of Soviet replenishment ships.

f. (U) Start advanced concept design of Arctic ACV.

g. (U) Define and plan HM&E subsystem technology improvements for advanced ships.

4. (U) FY 1991 Plans:

a. (U) Continue preliminary design of AR(X), ATR(X), and TAGS(X) candidates.

b. (U) Transition DDG-51 Flight III from feasibility to preliminary design.

c. (U) Continue LX preliminary design.

d. (U) Perform HM&E and combat system assessments of BFC, MEU, and LCMC.

e. (U) Perform comparative analysis of Soviet and Free World battle groups.

f. (U) Continue feasibility design of Arctic ACV.

g. (U) Assess warfare and HM&E subsystem for advanced ships.

5. (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: Naval Coastal Systems Center, Panama City, FL; David Taylor Research Center, Bethesda, MD; Naval Surface Weapons Center, White Oak, MD; Naval Ocean Systems Center, San Diego, CA. CONTRACTOR: John J. McMullen Associates Inc., Arlington, VA; Gibbs and Cox, Arlington, VA; JAYCOR, Middletown, RI; EMCON, San Diego, CA; Sperry Marine Inc., Charlottesville, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	Ship program selection changed	-6,374

Program Element: 0603564N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (Advance)
Project Number: S0408 Project Title: Ship Development (Advance)

NARRATIVE DESCRIPTION OF CHANGES

1.(U) TECHNICAL CHANGES: None.

2.(U) SCHEDULE CHANGES: None.

3.(U) COST CHANGES: Deferred advanced planning and advanced technology analyses, surface ship continuing concept formulation studies, reverse technology transfer studies, ship impact studies.

F. (U) PROGRAM DOCUMENTATION:
a. (U) Extended Planning Annex (EPA).
b. (U) Shipbuilding Program.
c. (U) All Ship TORs and DOPs.

G. (U) RELATED ACTIVITIES: P.E. 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.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NATO cooperative development on Interface Control from Modular Installations.

J. (U) MILESTONE SCHEDULE:
a. (U) LX DOP 12/89 to 4/91.
b. (U) ASW-SWATH Baseline Study 9/88.
c. (U) Preliminary Design AR(X) (92).
d. (U) Preliminary Design ATR(X) (92).

FY 1990/1991 BIENNIAL RDT&E, NAVY 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 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Plans: Not Applicable.

3. (U) FY 1990 Plans:
   a. (U) Issue Tentative Operational Requirement (TOR).
   b. (U) Start Decision Option Papers.
   c. (U) Initiate concept development studies.

4. (U) FY 1991 Plans:
   a. (U) Start cost and feasibility study.

5. (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.

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1258	Nuclear Technology Development	35,680	40,783	51,476	58,272	Continue	Continue
S1914	S6W Nuclear Propulsion Plant	45,000	43,609	28,700	28,717	Continue	Continue
TOTAL		80,680	84,392	80,176	86,989	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 increase plant efficiency by improving heat transfer capability. New instrumentation and control equipment is needed. Much of the instrumentation equipment in the fleet is over 20 years old, difficult to support, requires a growing amount of maintenance and does not have the accuracy and reliability available with modern technology. In addition, better component and system designs are being developed to reduce and improve performance.

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)

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Nuclear Development	35,680	40,783	51,476	58,272	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
   a. (U) Fabricated and began tests on small scale heat transfer test units and initiated design of large scale test unit.
   b. (U) Continued to design and develop remote robotic steam generator inspection equipment.
   c. (U) Developed and fabricated advanced instrumentation equipment such as monitoring, detection, diagnostic and control units which will improve plant performance and operator interface.
   d. (U) Developed and tested new fluid transfer components including valves and pumps and other advanced components.
   e. (U) Tested reactor plant systems and components to prove new designs and improve existing components.

2. (U) FY 1989 Program:
   a. (U) Continue to design and develop new concept steam generator components
   b. (U) Continue development of remote robotic steam generator inspection equipment.
   c. (U) Qualify advanced design instrumentation and control equipment such as monitoring and detection equipment.
   d. (U) Continue to design, develop and test fluid transfer and control equipment. Advanced designed components will provide for quieter pumps and valves.
   e. (U) Continue to test reactor plant systems and components to prove new design and improve existing designs.

3. (U) FY 1990 Plans:
   a. (U) Develop advanced heat transfer technology. Conduct various tests.
   b. (U) Design better instrumentation and control equipment including qualification of monitoring and indication equipment. Development of advanced reactor plant detectors and design of advanced diagnostic equipment.

c. (U) Develop and evaluate new sensors and data transmission systems incorporating state-of-the-art fiber optic and microprocessor technology.

d. (U) Develop state-of-the-art power supply equipment.

e. (U) Develop improved fluid transfer and control equipment.

f. (U) Evaluate advanced nuclear plant components.

g. (U) Develop physics models and computational methods for better control of reactivity in advanced plants.

h. (U) Develop plant components and systems to ensure individual equipment compatibility with overall design.

4. (U) FY 1991 Plans:

a. (U) Continue heat transfer technology efforts; testing to qualify steam generator concepts. Scale steam generator chemistries and materials.

b. (U) Continue development of alternative power supplies.

c. (U) Conduct design effort to develop advanced, more reliable electrical power conversion equipment.

d. (U) Design and develop new instrumentation and control equipment for large plants such as CVN's and CGN's; continue development of advanced reactor plant detectors, diagnostic equipment, sensors, and data transmission means.

e. (U) Continue to develop fluid transfer and control equipment.

f. (U) Continue to develop plant component and system designs that will offer improved overall plant efficiency.

g. (U) Continue development of physics models and computational methods for reactor plant designs to allow higher operation parameters.

h. (U) Continue to evaluate advanced nuclear plant components.

Program Element: 0603570N Budget Activity: 4
Program Element Title: Advanced Nuclear Power Systems
Project Number: S1258 Project Title: Nuclear Technology Development

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

D. 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, N.Y.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	-4,036

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: The Nuclear Technology Development Project was decreased -4,036 in FY 1990. Efforts previously budgeted here have been transferred to project (S1914).

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: This project is related to Program Element 0602324N, Nuclear Propulsion Technology and Program Element 0205675N, Operational Reactor Development. There is no unnecessary 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 1990/1991 BIENNIAL 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)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S6W Nuclear Propulsion Plant	45,000	43,609	28,700	28,717	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This effort is developing aspects of the nuclear propulsion plant for the new attack submarine (SEAWOLF). Work is directed toward design, development and testing 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 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 1988 Accomplishments:
   a. (U) Developed and tested heat transfer components, principally a more steam generator and moisture separator.
   b. (U) Completed fabrication of to support testing and to establish and qualify operating characteristics; performed test to qualify new main coolant pump.
   c. (U) Developed valves for the plant.
   d. (U) Fabricated instrumentation equipment test units.
   e. (U) Continued plant design to determine optimum component system arrangement requirements.

2. (U) FY 1989 Program:
   a. (U) Continue to develop and qualify improved heat exchanger components, including steam generator and moisture separator.
   b. (U) Continue to develop and qualify pumps and valves; continue test.
   c. (U) Conduct tests of plant indication, protection, monitoring and control equipment.
   d. (U) Design and qualify plant systems and arrangements. Work will include:
      - Continuing the detailed design of the reactor plant layout to confirm component designs.
      - testing to ensure goals are met.
      - Developing plant operating procedures.
      - Confirming design acceptability.

FY 1990/1991 BIENNIAL 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

3. (U) FY 1990 Plans:
   a. (U) Conduct detailed design of improved heat exchanger components.
   b. (U) Complete [redacted] test.
   c. (U) Qualification testing of reactor plant indication, control and monitoring equipment.
   d. (U) Complete the detailed design of the S6W reactor plant and prepare drawings and plans. Continue to develop procedures and conduct analyses to confirm the plant design and to provide operating and maintenance guidelines.

4. (U) FY 1991 Plans:
   a. (U) Continue detailed design of heat exchanger components.
   b. (U) Continue to develop procedures and conduct analyses to confirm the plant design; continue to develop operating and maintenance guidelines.
   c. (U) Complete the reactor plant drawings and detailed plans to support lead ship construction.

5. (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, N.Y.

E. (U) COMPARISON WITH FY 1988/FY 1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+3,984

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable
2. (U) SCHEDULE CHANGES: Not Applicable
3. (U) COST CHANGES: The S6W project was increased +3,984 in FY 1990, This action was taken to accomodate work shifts caused by budget reductions in FY 1988.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Other Naval Nuclear Program Elements include, 0205675N, Operational Reactor Development. There is no unnecessary 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603582N Budget Activity: 4
Program Element Title: Combat System Integration

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0164	Combat System Integration	9,520	10,244	8,989	8,993	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides shore based test and integration facilities to test the integration of combat direction, weapon, sensor and computing systems. Systems are assembled and tested to assure configuration control and interoperability prior to installation or release to the Fleet.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Continued integration in all warfare areas and across all applicable ship classes.

b. (U) Continued integration testing of ACDS Blk 0, New Threat Upgrade (NTU), and AN/SLQ-32.

2. (U) FY 1989 Program:

a. (U) Complete integration testing of: ASW Module, Carrier Air Traffic Control Center, Direction Altitude Identification Radar and NATO Sea Sparrow in CV/CVNs; Tomahawk, ASWCS upgrade, VLS, SGS/AC and LAMPS upgrade on DD 963s.

b. (U) Continue Overall Combat System Operability Test (OCSOT) development and surface ship combat system master plan update.

3. (U) FY 1990 Plans:

a. (U) Complete integration testing of: AN/SYS-2 and TAS, SGS/AC on CG 16/26 classes.

b. (U) Continue development of new OCSOT for upgraded BB 61, DD 963 and FFG 7 classes, and update the Surface Ship Combat System Master Plan.

4. (U) FY 1991 Plans:

a. (U) Complete integration testing of AN/SYS-2 and AN/SPS-48E Radar in CV/CVNs, NTU in CGNs, C2P and ACDS Block 0 in CV/CVNs and CG 16/29s.

b. (U) Commence integration testing of ACDS Block 1 in CV/CVN and NTU in CGN 9.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: INTCOMBATSYSTESTFAC, San Diego, CA; NAVSHIPWPNSYSENGSTA, Port Hueneme, CA; NAVSWC, Dahlgren, VA; FLTCOMBAT-DIRSSACT, Dam Neck, VA and San Diego, CA; NAVOCEANSYSCEN, San Diego, CA. CONTRACTORS: UNISYS, St. Paul, MN; Advanced Technology, Inc., Reston, VA; Automation Industries, Vitro Lab, Silver Spring, MD; Science Applications International Corp., San Diego, CA; Integrated Systems Analysts, Inc., Arlington, VA.

E. (U) RELATED ACTIVITIES: Computer programs developed under the following are tested under this program: PE 0205620N, ASW Combat System Integration; PE 0603228N, CV ASW Module; PE 0604355N, Vertical Launch ASROC; PE 0604361N, NATO Sea Sparrow; PE 0604372, New Threat Upgrade; PE 0604518N, CIC Conversion; PE 0604602, Naval Gunnery Improvement.

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

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603601N
Program Element Title: Mine Development (Advanced)

Budged Activity: 4

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1556	Advanced Sea Mine	11,416	0	0	0	0	320,100
S2024	Improved CAPTOR	4,476	0	3,134	3,633	Cont.	Cont.
S1917	RECO	2,511	1,493	1,211	1,331	Cont.	Cont.
Total		18,403	1,493	4,345	4,964	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 for mine warfare against evolving targets into the 21st century.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: The Mine MK 60 Mod 1 will be ORDALTED to maintain effectiveness of the weapon against the [redacted]

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Program plan submitted to and approved by sponsor.
   b. (U) Candidate sensor arrays modeled.
   c. (U) Technical library established to encourage industry involvement.
   d. (U) NICRAD agreements established with several contractors.
   e. (U) Initial LCC modeling completed.
   f. (U) Design of hardware to adapt MK 46 NEARTIP was completed.

2. (U) FY 1989 Program:
   a. (U) Efforts begun with FY88 funds will be continued in FY89.

3. (U) FY 1990 Plans:
   a. (U) Analyze and test subsystems
   b. (U) Iterate designs based on test results
   c. (U) Optimize system/subsystems

4. (U) FY 1991 Plans:
   a. (U) Develop system performance specification
   b. (U) Develop FSD contract data package

5. (U) Program to Completion: This is continuing Program

E. (U) WORK PERFORMED BY: In-house: NSWC, White Oak Laboratory, Silver Spring, MD; Naval Mine Warfare Engineering Activity, Yorktown, VA. Contractor: To be selected competitively.
F. (U) RELATED ACTIVITIES: None.
G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquistion program.
H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603601N Budget Activity: 4
Program Element Title: Mine Development (Advanced)
Project Number: S1917 Project Title: RECO

C. (U) PROJECT DESCRIPTION: Develop 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 [redacted] mines.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Prepare program documentation, participate in ICEX 88-1-to [redacted]
   b. (U) Begin long-term in-water ambient and self-generated noise study for mines of interest.
   c. (U) Conduct tests of small charges of insensitive explosives as candidate RECO transmitter signals.
   d. (U) Continue coding/decoding algorithm analysis and propagation model development.
2. (U) FY 1989 Program:
   a. (U) Evaluate explosive performance and propagation data.
   b. (U) Continue long-term in-water noise study.
   c. (U) Develop coding/decoding algorithms for mines of interest.
   d. (U) Continue propagation model development.
3. (U) FY 1990 Plans:
   a. (U) Complete long-term in-water noise study.
   b. (U) Continue development of coding/decoding algorithms, propagation models.
   c. (U) Begin development of applications handbook.
4. (U) FY 1991 Plans:
   a. (U) Complete coding/decoding algorithm development.
   b. (U) Continue applications handbook.
   c. (U) Continue propagation model development.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NSWC, White Oak Laboratory, Silver Spring, Md; Naval Mine Warfare Engineering Activity, Yroktown, Va. Contractors: Applied Research Laboratory, Penn State University.

F. (U) RELATED ACTIVITIES: RECO involves coordination with CAPTOR, Mine Development (Advanced), and with QUICKSTRIKE and SLMM Mines Program Eelement 0604601N, Mine Development (Engineering) to assure compatibility among mines having RECO capability.

G. (U) OTHER APPROPRIATION FUNDS: None

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: MOU signed with the U.K. Sept 1986.

FY 1990/1991 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0363	Insensitive Munitions Advanced Development	14,045	13,700	22,416	20,851	Cont.	Cont.
S1821	Conventional Fuze/Warhead Package	8,750	11,419	31,989	31,042	Cont.	Cont.
TOTAL		22,795	25,119	54,405	51,893	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 in combat performance and meet the CNO goal of transitioning to insensitive munitions by 1995.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S0363 Project Title: Insensitive Munitions Advanced Dev.

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Insensitive Munitions Advanced Development	14,045	13,700	22,416	20,851	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 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 cookoff 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/ 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 1988 Accomplishments
   a. (U) Continued validation and shortfall analysis of weapon Plan of Action and Milestones (POA&Ms).
   b. (U) Completed large scale testing of baseline propellants.
   c. (U) Initiated large-scale testing of advanced warhead case concepts (reactive case, composite, dual-explosive).
   d. (U) Initiated evaluation of alternate propulsion concepts.
   e. (U) Transitioned sympathetic detonation resistant explosive from laboratory to pilot plant.
   f. (U) Initiated design of insensitive fuze booster designs.
   g. (U) Continued transition of IM technology to weapon developers.

2. (U) FY 1989 Program:
   a. (U) Continue validation and shortfall analysis of POA&M's.
   b. (U) Initiate large-scale testing of sympathetic detonation resistant explosive.

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITION
Project Number: S0363 Project Title: Insensitive Munitions Advanced Dev.

c. (U) Demonstrate advanced initiation systems for warheads.
d. (U) Perform vulnerability tests on advanced propulsion concepts.
e. (U) Complete continuous processing studies of explosives.
f. (U) Complete demonstration of initial reactive case, composite and dual explosive warhead design concepts.
g. (U) Complete design of generic container for IM protection.
h. (U) Initiate large scale testing of advanced propellants and explosives.

3. (U) FY 1990 Plans:
a. (U) Continue validation and shortfall analysis of weapon POA&M's.
b. (U) Complete large-scale testing of sympathetic detonation resistant explosive.
c. (U) Initiate development of insensitive high performance explosive.
d. (U) Continue large-scale testing of advanced propellants, rocket motor cases and warhead designs.
e. (U) Continue advanced propellant development.

4. (U) FY 1991 Plans:
a. (U) Continue validation and shortfall analysis of POA&M's.
b. (U) Initiate advanced development of insensitive underwater explosive.
c. (U) Continue large-scale testing of insensitive high performance explosives, advanced propellants, rocket motor case designs and warhead case designs.
d. (U) Continue evaluation of alternate propulsion concepts.

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

D. (U) WORK PERFORMED BY: Naval Surface Warfare Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	N/A
COST	Program Deferral	None	-11,762

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITION
Project Number: S0363 Project Title: Insensitive Munitions Advanced Dev.

3. (U) COST CHANGES: The -$11,762 will result in the deferral of programs.

F. (U) PROGRAM DOCUMENTATION: Non-acquisition Program Decision Document - 13 March 1986.

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NATO AC/310 Subgroup I - Group on the Safety and Suitability of Munitions for Use (Explosives).

I. (U) MILESTONE SCHEDULE:

	Transition to Eng. Development	DATE
1.	Composite and armored warheads	FY 1991 (fourth quarter)
2.	High output insensitive radial boosters for missile warheads	FY 1991 (fourth quarter)
3.	Insensitive rocket motor concept	FY 1991 (fourth quarter)
4.	Sympathetic detonation resistant explosive for large missile warheads and GP-bombs	FY 1991 (fourth quarter)
5.	High performance explosive for shaped charge warheads	FY 1992 (fourth quarter)
6.	Non-aluminized PBX for missile warheads	FY 1992 (first quarter)
7.	Reactive case warhead	FY 1992 (second quarter)
8.	New fuzing/detonator concept	FY 1992 (fourth quarter)
9.	Insensitive low signature propellant	FY 1993 (fourth quarter)
10.	Improved air blast explosive	FY 1993 (fourth quarter)
11.	Insensitive motor case design	FY 1993 (fourth quarter)
12.	Alternate propulsion design concepts	FY 1993 (fourth quarter)
13.	Insensitive underwater explosive	FY 1994 (fourth quarter)
14.	Rugged nondetonatable propellant	FY 1995 (fourth quarter)

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
CONVENTIONAL FUZE/WARHEAD PACKAGE	8,750	11,419	31,989	31,042	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 combining Dual Mode RF/IR Fuze and low observable fuze. 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 1988 Accomplishments:

a. (U) SPARROW LOW ALTITUDE FUZE PIP SUBPROJECT: Raytheon Corp. has continued design refinements, packaging design and ordered long lead time hardware. The Preliminary Design Review (PDR), was successfully completed in January 1988. The CDR was successfully completed in July 1988.

b. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: The low Observable Target Missile Fuze subproject and very closely related Dual Mode subproject have been restructured and combined into a single project. Breadboards of both were fabricated and bench tested.

c. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECTS: Two brassboards of the RF section were sucessfully laboratory evaluated. An outdoor pole test facility has been completed.

d. (U) REACTIVE CASE WARHEAD SUBPROJECT: All efforts were and to transitioned promising technology to appropriate 6.4 RDT&E programs.

2. (U) FY 1989 Program:

a. (U) SPARROW LOW ALTITUDE FUZE PIP SUBPROJECT: Complete development and deliver first development test (DT) missiles in October 1988. Conduct and complete all of the DT and OT series.

b. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Competitively award brassboard development contract.

c. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECT: Fabricate ten advanced development models.

d. (U) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM: Conduct SEEKER SURVEY.

[redacted]

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S1821 Project Title: Conventional Fuze/Warhead Package

3. (U) FY 1990 Plans:
a. (U) SPARROW LOW ALTITUDE PIP SUBPROJECT:
b. (U) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Fabricate three brassboards and conduct tests and analysis of performance.
c. (U) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECTS: Evaluate ten advanced development test units.
d. (U) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM: Design Integrated guidance package.

4. (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 SUBPROJECTS: Fabricate sixty advanced development test units.
c. (U) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM SUBPROJECT:

d. (U) LETHALITY ENHANCEMENT BY DETONATION OF UNEXPENDED FUEL SUBPROJECT: Assign lead activity and initiate design process.

5. (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 SUBPROJECT: Design, fabricate and evaluate advanced development models.

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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Improved Missile Guidance	None	+22,303
SCHD	None	None	None
COST	None	None	None

[redacted]

Dan Wes McNair
NAVY Budget OFFICE
695-6833

Program Element: 0603609N Budget Activity: 4
Program Element Title: CONVENTIONAL MUNITIONS
Project Number: S1821 Project Title: Conventional Fuze/Warhead Package

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: This change extends the scope of the existing program to incorporate missile homing improvements

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 modifications, RIM 7M WPN (P.E. 0204229N).

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	
(U) PROCUREMENT WPN SPARROW MODS PE 24229N (42EA) LI 230400 BA-2 #8	0	44,300	44,100	44,000	Cont.	Cont.

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

J. (U) MILESTONE SCHEDULE:

FY 1990/1991 BIENNIAL 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

POPULAR NAME: MK-50 TORPEDO P³I

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones*		*Specific Milestones TBD			
Engineering Milestones			Start Hdwr Development 1Q/89		
T&E Milestones*		*Specific Milestones TBD			
Contract Milestones*		*Specific Milestones TBD			

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	0	0	0	0	TBD
Support Contract	0	0	0	0	TBD
In-House Support	0	0	4,720	4,959	Continuing
GFE/Other	0	0	0	0	TBD
Total	0	(500)**	4,720	4,959	Continuing Continuing

**From PE 0604610N/S0199 (MK-50 Torpedo)

Program Element: 0603610N Budget Activity: 4
Program Element Title: Advanced Warhead Development
Project Number: S1873 Project Title: Advanced Warhead Development

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program is designed to improve the Torpedo MK-50 to ensure that it retains an advantage over the rapidly evolving submarine threat. Two warhead concepts are under consideration; the
The near term program is structured to implement the trumpet warhead and to determine the feasibility of weaponizing the
which is higher risk and may require reducing the size of other torpedo systems. The other near term elements of the program -- investigation of Very High Speed Integrated Circuitry (VHSIC) and Advanced Stored Chemical Energy Propulsion System (ADSCEPS) technologies -- are structured to reduce the physical size of the torpedo electronics and propulsion system to allow for the larger warhead while upgrading guidance and control (G&C) and propulsion performance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable.

2. (U) FY 1989 Program:
a. (U) A trade-off study (effort funded in PE 0604610N/S0199 (MK-50 Torpedo)) will be conducted to optimize the size and performance relationships among the G&C electronics, the and the propulsion system.
b. (U) Determine characteristics.

3. (U) FY 1990 Plans:

a. (U) Begin development of hardware.
b. (U) Begin layout of "weaponizable" G&C, and propulsion system designs.
c. (U) Continue development of analytic capability in the areas of warhead-target coupling and lethality analysis.

4. (U) FY 1991 Plans:

a. (U) Continue development of the
b. (U) Continue layouts of "weaponizable" torpedo system designs/modifications.
c. (U) Continue development of analytic capability in the areas of warhead-target coupling and lethality analysis.

5. (U) Program to Completion:

a. (U) Complete development.
b. (U) Begin production.
c. (U) Define requirements of G&C, and propulsion system and begin development.
d. (U) Complete development of G&C and propulsion upgrades and begin production.
e. (U) Complete development of and begin production.

D. (U) WORK PERFORMED BY: In-house: NSWC, White Oak, Silver Spring, MD.

Program Element: 0603610N Budget Activity: 4
Program Element Title: Advanced Warhead Development
Project Number: S1873 Project Title: Advanced Warhead Development

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHD	N/A	N/A	N/A
COST	N/A	N/A	-$5,172

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Department/Navy adjustment of - $5,172 reflects deferral of the upgrade effort beyond FY91.

F. (U) PROGRAM DOCUMENTATION: SDDM 3/84

G. (U) RELATED ACTIVITIES: Program Element 0604610N (MK-50 Torpedo) provides for full-scale development of the Torpedo MK-50. Program Element 0602633N (Technology Development) provides for investigation, using diagnostic and analytical methods and equipments, of new underwater warhead concepts. Balanced Technology Initiative and Advanced Technology Demonstration programs provide for assessment of G&C, warhead and propulsion technologies.

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

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

J. (U) TEST AND EVALUATION DATA: Contained in MK-50 Congressional Data Sheet.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0020	Advanced Assault Amphibious	0	0	2,739	25,995	Continue	Continue
C1293	Stratified Charge Rotary Engine	11,112	13,271	13,428	15,984	Continue	Continue
PROGRAM ELEMENT TOTAL		11,112	13,271	16,167	41,979	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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) initiated by the Congress will provide high-horsepower, low-weight, multi-fuel engine capabilities to the AAA as well as other power/size requirements of developing tactical systems with similar requirements.

FY 1990/1991 BIENNIAL 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

POPULAR NAME: AAA

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS-0 Jul FY88			MS-1 1st Qtr	MS-II 1st Qtr FY94 MS-III 1st Qtr FY98
Engineering Milestones			Conceptual Mockups		PDR 1st Qtr FY95 CDR 1st Qtr FY97
T&E Milestones					DT/OT I 2nd/3rd Qtr FY93 DT/OT II 3rd Qtr FY95 1st Qtr FY98
Contract Milestones			Concept Exploration Award 1st Qtr FY90	Demo/ Validation Award 1st Qtr FY91	FSD Contract Award 1st Qtr FY94 Production Award 1st Qtr FY98

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract			2,250	22,780	Continuing
Support Contract			215	600	Continuing
In-House Support			274	2,615	Continuing
GFE/ Other			0	0	Continuing
Total			2,739	25,995	Continuing Continuing

Program Element: 0603611M Budget Activity: 4
Program Element Title: Marine Corps Assault Vehicles (Advanced)
Project Number: C0020 Project Title: Advanced Amphibious Assault

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 firepower, 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 Advanced Amphibious Assault (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

1. (U) FY 1988 Accomplishments: None.

2. (U) FY 1989 Program: None.

3. (U) FY 1990 Plans: The Concept Exploration (C/E) phase will begin with the Competitive Award of three conceptual design contracts that will address through requirements and trade-off analyses, such characteristics as performance, supportability, cost schedule and risk. Each C/E contract will contain an option for the execution of Demonstration and Validation (D&V) Phase development activity. Principle C/E products will consist of conceptual design studies and full scale mockups of each proposed design.

4. (U) FY 1991 Plans: Following the successful transit of MS-I award of the D&V phase option will be exercised for two of the three C/E contractors. Award of the D&V option will initiate the design and fabrication of one prototype system per contractor based on their respective designs submitted in C/E. The design of additional mission role variants will also begin.

5. (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

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A -
COST	N/A	N/A	+2,739

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy/Department adjustment of $2,739 provided funds required for cost estimate.

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1293	SCRE	11,112	13,271	13,428	15,984	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: To operate and survive in future threat environments, amphibious and combat vehicles must feature greater mobility, requiring higher output engines. Due to 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Designed and procured hardware for Demonstration and Validation (D&V) engines.

b. (U) Accumulated over 1000 hours of development test hours.

c. (U) Demonstrated rated power and speed (750 HP @ 3600 rpm).

d. (U) Identified and implemented corrective measures to improve engine cooling, starting, idling and durability.

e. (U) Received approval of Acquisition Plan for expanded D&V to develop the family-of-engines (FOE) concept.

Program Element: 0603611M Budget Activity: 4
Program Element Title: Marine Corps Assault Vehicles (Advanced)
Project Number: C1293 Project Title: Stratified Charge Rotary Engine (SCRE)

2. (U) FY 1989 Program:

a. (U) Complete contractor's initial D&V test program and deliver two-rotor engines to the Government.

b. (U) Conduct Government operational testing of two-rotor engines in both current and prototype amphibious vehicles.

c. (U) Modify current D&V contract to incorporate development of the FOE concept.

d. (U) Design/procure/fabricate two-rotor and three-rotor engines, reflecting the FOE concept.

3. (U) FY 1990 Plans:

a. (U) Complete contractor testing of two-rotor and three-rotor engines and deliver to Government for vehicular testing.

b. (U) Award Full Scale Development (FSD) contract.

c. (U) Design/procure/fabricate FSD engines.

4. (U) FY 1991 Plans:

a. (U) Complete assembly of FSD engines.

b. (U) Initiate contractor and Government testing of engines.

c. (U) Initiate field tests of engines.

5. (U) Program to Completion:

a. (U) Continue contractor testing of the rotary engine.

b. (U) Deliver FSD engines for application testing.

c. (U) Deliver Level III Production Data Package (PDP) for use in competitive production.

D. (U) WORK PERFORMED BY: In-house: NSSC (NAVSEA, PMS310), Washington, DC. Contractors: John Deere Technologies International, Inc., Wood-Ridge, NJ.

Program Element: 0603611M Budget Activity: 4
Program Element Title: Marine Corps Assault Vehicles (Advanced)
Project Number: C1293 Project Title: Stratified Charge Rotary Engine (SCRE)

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	6 month delay	-5,010

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy/Department adjustment of -$5,010 will delay the design of FSD engines.

F. (U) PROGRAM DOCUMENTATION: Required Operational Capability (ROC) No. MDB 0211.4.1 for the Rotary Engine, 4 April 1986.

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.

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 1990
c. (U) Milestone III	FY 1992
d. (U) Initial Operational Capability	Dependent upon application vehicle

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0077	Mine Warfare (Advanced)[a]	(1,149)	(1,845)	1,897	3,403	Continue	Continue
C1968	Mine Detection System (Advanced)[b]	(2,055)	(2,693)	4,314	10,023	Continue	Continue
C2029	Directed Energy Countermeasures[c]	(224)	(1,265)	3,381	6,099	Continue	Continue
PROGRAM ELEMENT TOTAL		0	0	9,592	19,525	Continue	Continue

a Transferred from Program Element 0603729M, Marine Corps Combat Service Support (Advanced).

b Funded in Program Element 0604717M in FY 1988 and in Program Element 0603729M in FY 1989.

c Funded in C1598 Nuclear/Biological/Chemical Equipment under Program Element 0603635M, Marine Corps Ground Combat/Supporting Arms Systems (Advanced) in FY 1988. Funded in Program Element 0603729M in FY 1989.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Covers a wide variety of present and emerging technologies which will contribute to USMC Mine/Countermine system capability. Largely focused on countermine efforts, this element will specifically develop systems which will detect or neutralize mines. While effectiveness against all types of mines is desirable, the achievement of such a feat has proven itself to be an elusive goal. The dynamic nature and complexity of the countermine problem and its relative urgency necessitates consideration of advanced development of a variety of systems which will each contribute to achieving overall countermine effectiveness. A major hazard to movement ashore, on the beach, and inshore is the presence of mines. This project brings a new approach to the problem of detection/neutralization of mines by using high power microwave (HPM)/laser energy. These technologies also have capabilities to damage optics and electronics as additional warfighting benefits.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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) PROJECT DESCRIPTION: This project provides the Marine Corps Advanced Development efforts on the capability to breach, proof and mark minefields.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Feasibility of Advanced Assault Vehicle (AAV) mine plow proven, testing of Portable Mine Neutralization System (POMINS) begun, Shaped Charge Anti-Mine Munition (SCAMM) and Wide Area Mines (WAM) to transition from exploratory development to 6.3, advanced development.

1. (U) FY 1988 Accomplishments: (Funded under 0603729M)

   a. (U) Completed DT/OT I on AAV mine plow.
   b. (U) Initiate DT/OT II POMINS.

2. (U) FY 1989 Program: (Funded under 0603729M)

   a. (U) Transition AAV Mine Plow to engineering development, to C1969.
   b. (U) Initiate development on SCAMM.
   c. (U) Complete DT/OT II for POMINS, attain production approval.
   d. (U) Joint development with USA on WAM.

3. (U) FY 1990 Plans:

   a. (U) Initiate development on Enhanced (Safer) Fuel Air Explosive (FAE) munitions.
   b. (U) Continue development of SCAMM.
   c. (U) Continue/complete joint development of WAM.

4. (U) FY 1991 Plans:

   a. (U) Continue development of Enhanced (Safer) FAE.
   b. (U) Initiate development of Surf Zone Marker.
   c. (U) Initiate DT/OT I for SCAMM.
   d. (U) Transition development of WAM to engineering.

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

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA. Contractors: NCSC, Panama City, FL; NWSC, Crane, IN; NWC, China Lake, CA; BRDEC, FT Belvoir, VA.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1968	Mine Detection System (Advanced)*	(2,055)	(2,693)	4,314	10,023	Continue	Continue

* Funded in Program Element 0604717M, Marine Corps Combat Services Support (Engineering) in FY 1988. Funded in Program Element 0603729M, Marine Corps Combat Services Support (Advanced) in FY 1989.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops Marine Corps 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 very dirty water and on land. The forward detection land-based system, currently in exploratory development, will detect mine fields on the move, and at long stand-off.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: (Funded in Program Element 0604717M)

a. (U) AMDAS has demonstrated feasibility in the laboratory to accomplish the requirement in the areas of imaging resolution, and laser power levels. The forward detection concept is under study jointly with DARPA through an SBIR technology base effort in exploratory development.

b. (U) Continued candidate identification in non-developmental item individual mine detection program.

2. (U) FY 1989 Program: (Funded in Program Element 0603729M) Complete non-developmental item individual mine detection program testing.

3. (U) FY 1990 Plans: Complete AMDAS trade-off analysis begun in exploratory development resulting from preliminary flight testing, acquire fast, sensitive receiver, build and integrate Feasibility Demonstration Model (FDM), and flight test FDM.

4. (U) FY 1991 Plans: Transition AMDAS to advanced development, begin system design and fabrication, and commence test and evaluation.

Program Element: 0603612M Budget Activity: 4
Program Element Title: Marine Corps Mine/Countermeasures Systems (Advanced)
Project Number: C1968 Project Title: Mine Detection System (Advanced)

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

D. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; NCSC, Panama City, FL. Contractors: TBD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES			
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	N/A	-9,272

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy/Department adjustment of -9,272 resulted from a cost savings. This was achieved by using a non-developmental item instead of a developmental approach for an individual non-metallic mine detector.

F. (U) PROGRAM DOCUMENTATION: JSNS FY 1986; ROC in staffing.

G. (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.

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

Program Element: 0603612M Budget Activity: 4
Program Element Title: Marine Corps Mine/Countermeasures Systems (Advanced)
Project Number: C1968 Project Title: Mine Detection System (Advanced)

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Milestone I	FY 1991
b. (U) DT I/OT I	FY 1994
c. (U) Milestone II	FY 1995
d. (U) DT II	FY 1996
e. (U) OT II	FY 1997
f. (U) Milestone III	FY 1998
g. (U) IOC	FY 2000
h. (U) FOC	FY 2001

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603612M Budget Activity: 4
Program Element Title: Marine Corps Mine/Countermeasures Systems (Advanced)
Project Number: C2029 Project Title: Directed Energy Countermeasures

C. (U) PROJECT DESCRIPTION: Develop mine detection/neutralization systems to counter directed energy weapons and sensor, fire control, command, and communications systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Identified optical/electro-optic items susceptible to lasers. Determined weight/space for Army countermeasures (CM) systems on USMC vehicles. Test items for microwave susceptibility. Development of laser and microwave CM.

1. (U) FY 1988 Accomplishments: Funding contained in C1598, under PE 0603635M. Tested items for effects of microwave. Demonstrated counter sensor/mine location devices. Developed universal laser filter. Comparative test of laser warning systems.

2. (U) FY 1989 Program: Funding contained in PE 0603729M. Demonstrate laser warning, laser simulator and countersensor devices. Develop multi-wavelength laser eye protection. Test items for susceptibility to microwave/laser energy.

3. (U) FY 1990 Plans: Develop laser warning, laser simulator, counter sensor devices, and multi-wavelength laser eye protection for image intensifier/infrared sensor hardening. Microwave hardening for USMC Mine CM systems. Develop microwave devices. Integrate microwave on USMC vehicle for mine neutralization/detection.

4. (U) FY 1991 Plans: Develop mine location/neutralization, laser warning/simulator systems, counter sensor devices and multi-wavelength laser eye protection. Image intensifier/infrared sensor hardening. Verify microwave hardening techniques and scale system to USMC airborne platforms.

5. (U) Program to Completion: Microwave hardening of selected USMC systems. Demonstrate airborne microwave damage device. Develop explosively driven High Powered Micorowave (HPM) weapon. This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: LANL, Los Alamos, NM; MICOM, Huntsville, AL. Contractors: Allied Corporation, Westlake Village, CA.

F. (U) RELATED ACTIVITIES: None.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
49	Directed Energy Countermeasures						
	Laser Filters	0	0	259	356	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
TACNUC Development	2,021	10,325	15,026	14,232	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
   - Continued USMC W82 projectile engineering.
   - Continued B61 Improvement engineering.
   - Completed alternative warhead effectiveness, intrinsic radiation, and inventory objective studies for nuclear SEA LANCE.

2. (U) FY 1989 Program:
   - Continue engineering development of USMC W82 projectile.
   - Continue B61 Improvement engineering.
   - Complete submarine underwater shock vulnerability and safe standoff studies for SEA LANCE.
   - Update SEA LANCE feasibility, design, and cost studies.
   - Resume B90 Nuclear Depth Strike Bomb (NDSB) engineering development.
   - Resume ship EMP vulnerability assessments and test planning.
   - Test the effects of nuclear radiation exposure on fire control computers and microprocessors.
   - Resume specifications and standards development for EMP hardened equipment.
   - Conduct BLAST/THERMAL stress testing of shipboard gas turbine engine ducting in conjunction with Defense Nuclear Agency.

TED DATA

FY 1990/1991 BIENNIAL 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

3. (U) FY 1990 Plans:
   - Certify USMC W82 for fleet introduction.
   - Continue B61 Improvement engineering.
   - Continue SEA LANCE feasibility, design and cost studies.
   - Continue B90 engineering development.
   - Continue ship EMP vulnerability assessments and test planning.
   - Continue specifications and standards development for EMP hardened equipment for DD-963.
   - Continue BLAST/THERMAL vulnerability test of DDG-51 radar and radio antennas.
   - Test EMP hardened prototype area surveillance radar.
   - Initiate radiation vulnerability assessments, test planning and testing of selected DDG-51 equipment.

4. (U) FY 1991 Plans:
   - Continue USMC W82 certification for remaining recipients.
   - Complete B61 Improvement engineering.
   - Continue B90 engineering development.
   - Complete SEA LANCE feasibility, design and cost studies.
   - Continue specifications and standards development for EMP hardened equipment.
   - Continue BLAST/THERMAL and radiation exposure testing.
   - Continue EMP assessments on shipboard equipment.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, NUSC, NWC, NOSC, NWEF, DNA. CONTRACTORS: To be determined.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	-0-
SCHD	NONE	NONE	-0-
COST	NONE	Hardness testing delay	-11,130

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: The -$11M will delay the DD-963 precursor hardening effort from '89 to '90, and delay the CG-47 prototype EMP hardening from '90 to '92.

Program Element: 0603634N Budget Activity: 4
Program Element Title: Tactical Nuclear Development
Project Number: S0342 Project Title: Tactical Nuclear Development

F. (U) PROGRAM DOCUMENTATION: TACNUC NAPDD #062-098 of 03/24/86.

G. (U) RELATED ACTIVITIES: PE 0603367N, SEA LANCE; 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 separately under PE 0603514N, Project S1607.

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

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

J. (U) MILESTONE SCHEDULE:

Major Milestones	Date
1. Complete USMC W82 engineering development	03/90
3. B61-6 IOC	03/91
4. Complete SEA LANCE Decision Cost Study	08/91
5. Commence SEA LANCE engineering development	01/92

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1598	NBC Equipment	1,639	1,404	2,497	4,021	Continue	Continue
C1963	HVM*	1,612	2,516	*	*	Continue	Continue
C1964	Anti-Armor (Fire and Forget)	1,467	1,442	4,065	9,915	Continue	Continue
C1981	GATERS**	802	1,266	N/A	N/A	N/A	N/A
PROGRAM ELEMENT TOTAL		5,520	6,628	6,562	13,936	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) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This joint program develops NBC equipment with the Army and other services. Marine Corps efforts concentrate on amphibious characteristics which include surf-zone detection, decontamination, and individual/collective protection.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The Marine Corps continues to strengthen its NBC Defensive posture by the development and acquisition of equipment to enhance the individual Marines ability to survive and operate in an NBC environment.

1. (U) FY 1988 Accomplishments: Completed evaluation of lightweight decontamination system, radiac devices, and M40/M42 Series masks. Continued development of a Portable Collective Protective System (PCPS). Monitored and participated in seventeen Army NBC projects.

2. (U) FY 1989 Program: Continue joint Army automated chemical agent warning and reconnaissance systems development. Complete development of PCPS, the Non-Aqueous Equipment Decontamination System (NAEDS). Continue development of the Personnel Casualty Decontamination System (PCDS-XM291).

3. (U) FY 1990 Plans: Contribute to development of M40/M42 Series Protective Mask (P3I) and detection and warning devices and other Army developments.

4. (U) FY 1991 Plans: Contribute to development of sensing chemical agent alarm XM-21 and other development efforts with the Army.

5. (U) Program to Completion: Contribute to US Army development of NBC reconnaissance system and remote sensing chemical agent alarm XM-21.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; US Army NRDEC, Natick, MA; US Army CRDEC, Aberdeen, MD. Contractors: TBD.

F. (U) RELATED ACTIVITIES: All US Army NBC developments are evaluated.

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

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
140	NBC Equipment						
	PCPS	0	0	821	865		21,707
	(qty) (RCN 068943)	0	0	(120)	(120)		(3,049)

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603635M Budget Activity: 4
Program Element Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Project Number: C1963 Project Title: Hypervelocity Missile (HVM)

C. (U) PROJECT DESCRIPTION: This joint Army, Air Force and Marine Corps program will provide a vehicle mounted guided missile system capable of defeating frontally, and at extended ranges, all threat main battle tanks into the 21st century. The HVM will replace the TOW Weapon System on the Light Armored Vehicle-Anti Tank (LAV-AT) Vehicle.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Conducted HVM ground launch demonstration.

2. (U) FY 1989 Program:

a. (U) Evaluation of HVM demonstration.

b. (U) Planning for next phase of HVM development and integration of LAV-AT Vehicle.

3. (U) FY 1990 Plans: Consolidated in C1964, Anti-Armor (Fire and Forget) in FY 1990 and beyond.

4. (U) FY 1991 Plans: Not applicable.

5. (U) Program to Completion: Not applicable.

E. (U) WORK PERFORMED BY: In-house: None. Contractors: LTV, Dallas, TX (For Demonstration Phase).

F. (U) RELATED ACTIVITIES: Joint Anti-Armor Weapons Systems.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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: Anti-Armor (Fire and Forget)

C. (U) PROJECT DESCRIPTION: This project provides for Marine Corps participation in Joint Anti-Armor programs. These programs include Advanced Anti-Tank Weapons System - Medium (AAWS-M), Hypervelocity Missile (HVM) and related efforts developed by the Defense Advance Research Projects Agency (DARPA). Funds support unique Marine Corps developmental requirements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Proof of principle (concept validation) with the three technologies participating. Source selection and FSD to start in FY 1989.

1. (U) FY 1988 Accomplishments: Participated in AAWS-M development.

2. (U) FY 1989 Program: Continue participation in the joint development of AAWS-M and the joint DARPA/USA/USMC Armor/Anti-Armor efforts.

3. (U) FY 1990 Plans: Continue to participate in joint DARPA/USA/USMC Armor/Anti-Armor program. Monitor armor team upgrades and anti-armor team countermeasures. Monitor AAWS-M progress.

4. (U) FY 1991 Plans: Continue to monitor and participate in joint Armor/Anti-Armor programs. Monitor AAWS-M cost schedule and performance progress, and participate in testing.

5. (U) Program to Completion: Continue to participate in the DARPA/USA/USMC Joint Armor/Anti-Armor program. Evaluate AAWS-M for amphibious operational requirements and procurement.

E. (U) WORK PERFORMED BY: In-house: US Army MICOM, Redstone Arsenal, AL; Los Alamos National Laboratory, NM; NSWC, Dahlgren, VA. Contractors: Various contractors (prime TBD in FY 1989).

F. (U) RELATED ACTIVITIES: Army Armor/Anti-Armor programs for heavy and light systems.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603635M Budget Activity: 4
Program Element Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Project Number: C1981 Project Title: Ground Air Telerobotics Systems (GATERS)

C. (U) PROJECT DESCRIPTION: This project developed prototype Teleoperated Vehicle (TOV) Systems to demonstrate principle and concept during FY 1989.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Commenced concept demonstration for TOV at a limited level due to Congressional reduction.

b. (U) Commenced design and construction of Marine Corps Ground Launched HELLFIRE module for TOV.

c. (U) Control of Airborne Remotely Operated Device program was assimilated into the OSD Joint Unmanned Air Vehicle Program Office.

2. (U) FY 1989 Program:

a. (U) Complete concept demonstration of TOV with HELLFIRE module.

b. (U) Formulate Required Operational Capability (ROC) and begin preparations for Milestone I, demonstration validation decision.

3. (U) FY 1990 Plans: None.

4. (U) FY 1991 Plans: None.

5. (U) Program to Completion: None.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; NOSC, Honolulu, HI. Contractors: Martin-Marietta, Baltimore, MD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY

Program Element: 063654N Budget Activity: 4
Program Element Title: Joint Service Explosive Ordnance Disposal Development (Advanced)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0377	Explosive Ordnance Disposal Procedures	7,923	9,165	6,301	6,576	Cont.	Cont.
S1317	Explosive Ordnance Disposal Diving Systems	3,174	2,377	3,623	4,078	Cont.	Cont.
Total		11,097	11,542	9,924	10,654	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT:
Provides for the development of Explosive Ordnance Disposal tools and equipment for use by all military services. The responsibility is assigned to the Navy as single service manager, by Department of Defense Directive 5160.62 of 24 November 1971, 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603654N Budget Activity: 4
Program Element Title: Joint Service Explosive Ordnance Disposal Development (Advanced)
Project Number: S0377 Project Title: Explosive Ordnance Disposal Procedures

C. (U) PROJECT 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 1988 Accomplishments:
   a. (U) Approval for Production for the Shaft Liner and Fuze Neutralization Kit.
   b. (U) Initiate Remote Explosive Detector.
2. (U) FY 1989 Program:
   a. (U) Start TECHEVAL on Diver Acoustic Positioning System.
   b. (U) Complete TECHEVAL on Magnetometer Search System.
   c. (U) Complete TECHEVAL and OPEVAL on ROVER and Jet Perforator.
   d. (U) Approval for Production for Rover and Jet Perforator.
   e. (U) Initiate Electro-Chemical Trepanner.
3. (U) FY 1990 Plans:
   a. (U) Approval for Production for Magnetometer Search System.
   b. (U) Complete TECHEVAL on Remote Controlled Reconnaissance Monitor (RECORM).
   c. (U) Initiate the Computerized Procedural Data Base System and the Robotics Ordnance Neutralizing Device (ROND).
4. (U) FY 1991 Plans:
   a. (U) Complete OPEVAL on RECORM.
   b. (U) Approval for Production for RECORM and Diver Acoustic Positioning System.
   c. (U) Initiate Directed Energy Neutralizing System.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Explosive Ordnance Disposal Technology Center (lead laboratory), Indian Head, MD. CONTRACTORS: Foster-Miller Associated, Inc., Waltham, MA; Datasonic, Inc., Cataumet, MA.

F. (U) RELATED ACTIVITIES: Program Element 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 88 Actual	FY 89 Estimate	FY 90 Estimate	FY91 Estimate	TOTAL Program
Procurement (OPN) #240	0	0	0	2,250	2,250

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603654N Budget Activity: 4
Program Element Title: Joint Service Explosive Ordnance Disposal Development (Adv)
Project Number: S1317 Project Title: Explosive Ordnance Disposal Diving System

C. (U) PROJECT 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 1988 Accomplishments:

a. (U) Milestone II decision for the Chemical Warfare Protective Dive Suit.

2. (U) FY 1989 Program:

a. (U) Complete TECHEVAL and OPEVAL for the MK-98 Neutralization Charge, and Chemical Warfare Protective Dive Suit.

3. (U) FY 1990 Plans:

a. (U) Approval for Full Production (AFP) MK 98 Neutralization Charge.
b. (U) Start TECHEVAL for the EX 2 Remotely Operated Vehicle.
c. (U) Milestone II decision for the EX 19 Underwater Breathing Apparatus (UBA) and the Divers Timer/Depth Gauge.
d. (U) Complete TECHEVAL and OPEVAL for the 65' EOD Support Craft.

4. (U) FY 1991 Plans:

a. (U) AFP for the Chemical Warfare Protective Dive Suit and the EX2 remotely operated vehicle.
b. (U) Complete TECHEVAL and OPEVAL for the Divers Timer Depth Gauge and OPEVAL for the EX 2 Remotely Operated Vehicle.
c. (U) Start TECHEVAL for the EX 19 Breathing Apparatus.
d. (U) Initiate the EOD Teleoperator System.

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

E. (U) WORK PERFORMED BY: NCSC, Panama City, FL; NSWC, White Oak, MD; NUSC, San Diego, CA; Naval EODTC, Indian Head, MD, NEDU, Panama City, FL.
CONTRACTOR: Micronics International, Inc., Brea, CA: Texas Research Institute, Inc., Austin, TX; Raloid Inc., Reisterstown, MD.

F. (U) RELATED ACTIVITIES: Not Applicable.

G. (U) OTHER APPROPRIATION FUNDS: OPN #43 Procurement justification material does not contain this level of detail.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603691N Budget Activity: 4
Program Element Title: MK-48 Advanced Capability (ADV)
Project Number: S0366 Project Title: MK 48 Advanced Capability (ADV)

POPULAR NAME: MK 48 ADCAP

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	1/89 AFP 8/88 IOC			CCAPS M/S II 2/90	CCAPS M/S III 1Q/94
Engineering Milestones					
T&E Milestones	5/88 OPEVAL Completed				
Contract Milestones	CCAPS D&V 8/88			CCAPS FSD 2/90	

BUDGET ($K)	FY 1988*	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	3,403	5,965	24,621	38,519	751,758
Support Contract	103	106	109	112	8,586
In-House Support	16,689	21,392	20,172	20,519	387,921
GFE/Other					
Total	20,195	27,463	44,902	59,150	1,148,265 84,513

* FY 88 funded in PE 0604675N

Program Element: 0603691N Budget Activity: 4
Program Element Title: MK 48 Advanced Capability (ADV)
Project Number: S0366 Project Title: MK-48 ADCAP

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

] Lost performance is regained with the ADCAP

] ADCAP follow-on improvements[

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed Operational Evaluation (OPEVAL).
   b. (U) Finalized documentation for Milestone III Review.
   c. (U) Updated technical data package with data resulting from TECHEVAL/OPEVAL.
   d. (U) Completed the CCAPS technology assessment phase.
   e. (U) Awarded CCAPS demonstration and validation contract.
2. (U) FY 1989 Program:
   a. (U) Continue CCAPS demonstration and validation.
   b. (U) Commence the Guidance and Control software block improvement program.
3. (U) FY 1990 Program:
   a. (U) Start CCAPS full scale development.
      1. (U) Initiate procurement of hardware; 6-10 EDM units
      2. (U) Continue in-water test program (Developmental Testing)
      3. (U) Systems engineering for integration of final design
      4. (U) Logistics Support Analysis
      5. (U) Safety analysis/testing
   b. (U) Continue Guidance and Control software block improvement program.
4. (U) FY 1991 Plans:
   a. (U) Continue CCAPS full scale development.
      1. (U) Continue development of technical data package/Level III drawings
      2. (U) Developmental Testing in-water runs
      3. (U) Safety Testing
      4. (U) Development of test equipment/support equipment
      5. (U) Procedural documentation/preliminary technical manual preparation
      6. (U) Reliability/quality plan development
   b. (U) Continue Guidance and Control software block improvment program.
5. (U) Program to Completion:
   a. (U) Complete CCAPS full scale development.
   b. (U) Continue Guidance and Control software block improvement 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; NSWC, White Oak, MD; CONTRACTORS: Hughes Aircraft Company, Fullerton, CA; Westinghouse, Cleveland, OH; Applied Research Laboratory/Penn State University, State College, PA; KPMG Peat Marwick, Washington, DC; Sundstrand, Rockford, IL.

Program Element: 0603691N Budget Activity: 4
Program Element Title: MK 48 Advanced Capability (ADV)
Project Number: S0366 Project Title: MK-48 ADCAP

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Continue CCAPS and Guidance and Control software block improvement Programs at fully funded levels.	None	+37,415
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Navy and department adjustment of +37,415 in FY 1990 was provided to fully fund the CCAPs and G&C upgrades.
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:
   1. NDCP Rev. 2, dated 6 Sep 88, subject "Navy Decision coordinating Paper (NDCP) for Torpedo MK 48 ADCAP Program."
   2. OPNAV TEMP 371 Rev. 2, dated 3 Nov 87, subject "Test and Evaluation Master Plan No. 371 for Torpedo MK 48 ADCAP."
   3. OPNAV TEMP 371-1 "Test and Evalaution 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). There is no duplication of effort within the Navy or DoD connected with this program.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APPN/P-1	Not applicable					
(O) PROCUREMENT						

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL 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 Eq

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0394	Shallow Depth Diving Eq.	1,417	1,832	2,185	2,212	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1988 Accomplishments:
   a. (U) Completed Navy provisional certification of the Lightweight Dive System (LWDS) prototype.
   b. (U) Completed prototype dive helmet for the Conventional Dive System (CDS).
   c. (U) Completed LWDS Milestone II approval for full scale development.
2. (U) FY 1989 Program:
   a. (U) Complete full scale development of the Lightweight Dive System.
   b. (U) Conduct operational evaluation of the Lightweight Dive System.
   c. (U) Complete developmental testing of the Conventional Dive System.
   d. (U) Conduct milestone II for the Conventional Dive System.
3. (U) FY 1990 Plans:
   a. (U) Achieve Milestone III approval for the full scale production of the Lightweight Dive System.
   b. (U) Complete Test and Evaluation Conventional Dive System units.
4. (U) FY 1991 Plans:
   a. (U) Complete TECHEVAL and OPEVAL of CDS.
   b. (U) Complete support documentation for CDS.
   c. (U) Conduct diver testing of underwater diver tools and diver's communications.
5. (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;

E. (U) RELATED ACTIVITIES: PE 0603713N, Ocean Engineering Technology Dev.

F. (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 #42(113000)	0	0	1,912	1,965	8,950	12,827

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: US/UK MOU for diving R&D Cooperative Agreement; US-France Cooperation in diving 1969.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0118	Ocean Measurement Sensors	1,768	2,485	3,648	3,570	Cont.	Cont.
R1299	Ocean Measurement Techniques	1,377	1,564	0*	0*		
X1596	Satellite Applications and Technology	2,715	3,414	4,197	4,541	Cont.	Cont.
R1987	Mapping, Charting and Geod. Techniques	2,617	1,740	1,563	1,346	Cont.	Cont.
	TOTAL	8,477	9,203	9,408	9,457	Cont.	Cont.

* Project R1299 combined with project R0118 FY 1990 and out.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program develops highly specialized, ultra-high resolution oceanographic instrumentation and techniques to measure 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 [illegible] and for transitioning oceanographic data from forward operating areas into Navy operational oceanographic support products. The Mapping, Charting and Geodesy project will address 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.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project supports the advanced development of

Additionally, this project develops instrumentation in response to fleet environmental requirements and Naval Oceanographic Office survey requirements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. Initiated development of air expendable optical "K" meter (AXKT) and expendable conductivity sensor (XCTD).
   b. Continued NAASW system development including vorticity sensor.
   c. Completed tests of expendable air/sea surface 3 month buoy.
2. (U) FY 1989 Program:
   a. Initiate 3 month satellite communication drifter with tail.
   b. Initiate towed bioluminescence sensor.
   c. Continue NAASW sensor system suite including vorticity sensor.
   d. Complete XCTD.
3. (U) FY 1990 Plans:
   a. Continue towed bioluminescence sensor and Strategic Area Long Term Environmental Assessment.
   b. Complete AXKT.
   c. Complete vorticity sensor.
4. (U) FY 1991 Plans:
   a. Initiate internal wave sensor.
   b. Initiate expendable fiber optic bioluminescence sensor.
   c. Complete towed bioluminescence system.
   d. Complete NA-16/towed system evaluation.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Ocean Research and Development Activity, Bay St. Louis, MS; CONTRACTORS: John Hopkins University, Applied Physics Laboratory; University of Washington, Seattle, WA; Sippican Corp., Marion, MA.

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: No planned procurement (prototype only).

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. (U) Completed small scale turbulence studies.
   b. (U) Initiated the global optical "K" atlas.
   c. (U)
   d. (U) Completed lead and polynya study for Naval Polar Ocean Center.

2. (U) FY 1989 Program:
   a. (U) Initiate Strategic Area Long Term Environmental Assessment.
   b. (U) Complete global optical "K" atlas.
   c. (U) Complete empirical ice model work.
   d. (U) Complete analysis of towed sensor data for non-acoustic analysis work.

3. (U) FY 1990 Plans: Program work/funds consolidated with project R0118.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Ocean Research and Development Activity, Bay St. Louis, MS; Naval Ocean Systems Center, San Diego, CA; Naval Postgraduate School, Monterey, CA. CONTRACTORS: Applied Physics Laboratory,John Hopkins University, Laurel, MD; Applied Physics Laboratory, University of Washington, Seattle, WA; Scripps Institute of Oceanography, University of California, La Jolla, CA; Arete Associates, Washington, DC; Science Applications International Corp., 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: Not applicable.

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

FY 1990/1991 BIENNIAL 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.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. Developed techniques and software modules to derive operational ocean products for fleet support from Geophysical/Geodetic Satellite (GEOSAT) and Satellite Sounder Microwave Imager (SSM/I) data.
   b. Tested automated artificial intelligence (AI) techniques for dynamic ocean feature detection.
   c. Began atmospheric Light Detection And Ranging (LIDAR) application studies.
2. (U) FY 1989 Program:
   a. Develop tactical ocean wave products using satellite altimeter and SSM/I data.
   b. Test atmospheric 3-D data merge techniques for single station analysis.
   c. Complete definition of synthetic aperture radar (SAR) sensor for Navy application.
3. (U) FY 1990 Plans:
   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.
4. (U) FY 1991 Plans:
   a. Test technique to conduct 3-D data merge for atmospheric applications.
   b. Define multi-mode oceanographic radar system for Navy environmental applications.
5. (U) PROGRAM TO COMPLETION: This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE: Naval Environmental Prediction Research Facility, Monterey, CA; Naval Ocean Research and Development Activity, Bay St.Louis,MS; Naval Research Laboratory, Washington, DC.

F. (U) RELATED ACTIVITIES: PE 0305111N, Weather Service; PE 0603207N, Air/Ocean Tactical Application; PE 0305160N, Defense Meteorological Satellite Program.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603704N Budget Activity: 4
Program Element Title: ASW Oceangraphy
Project Number: R1987 Project Title: Mapping, Charting and Geodesy (MC&G)

C. (U) PROJECT DESCRIPTION: Develop new airborne and space systems and algorithms to acquire, process and display digital MC&G information in support of ASW, Mission Planning, Strike, Amphibious and Special Warfare. In addition, the project supports analyses and assessments to define new or modified MC&G data bases for future weapon systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. Completed space shuttle magnetometer design study and a DoD-wide magnetics requirements study.
   b. Performed requirement analysis for the Tactical Environmental Support System (TESS), a DMA digital Bathymetric Data Base , as well as a product evaluation of the World Vector Shoreline project.
2. (U) FY 1989 Programs:
   a. Evaluate existing and prototype digital MC&G data bases/products.
   b. Test tidal prediction system.
   c. Conduct analysis to determine system configuration for deploying an ice measurement system on fixed wing aircraft.
   d. Develop models, decision aids, and data bases to support passive and active optical survey system performance.
   e. Develop electronic chart.
3. (U) FY 1990 Plans:
   a. Evaluate prototype digital MC&G data bases and products.
   b. Develop airborne shallow water survey system.
   c. Continue development of electronic chart.
   d. Investigate advanced space system for acquisitions of MC&G data.
4. (U) FY 1991 Plans:
   a. Continuing MC&G evaluation to support future weapon systems.
   b. Develop automated analysis technique.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN HOUSE:Naval Ocean Research and Development Activ., Stennis Space Center, MS. CONTRACTORS: Planning Systems Inc, Slidell, LA.

F. (U) RELATED ACTIVITIES: PE 0601153N, Defense Research Sciences; PE 0602435N, Ocean and Atmospheric Support Technology; PE 0301327N, Technology, Reconnaissance, and Surveillance; PE 0305160N, Defense Meteorological Satellite Program; PE 0603785N, ASW Environmental Acoustic Support. PE 0603704, Satellite Applications and Technology.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603708N Budget Activity: 4
Program Element Title: Anti-Submarine Warfare Signal Processor

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0490	BEARTRAP	10,705	7,857	11,866	15,406	Cont.	Cont.
S0823	Acoustic Performance Prediction	5,737	6,029	7,333	7,648	Cont.	Cont.
X0821	Advanced Acoustic Processor	1,336	1,539	1,884	2,764	Cont.	Cont.
TOTAL		17,778	15,425	21,083	25,818	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Anti-Submarine Warfare (ASW) Signal Processing program provides for the

The program is responsive to requirements to improve air ASW systems to counter the existing and projected submarine threat.

(U) The BEARTRAP project is providing

To accomplish this BEARTRAP incorporates

(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 geographic areas, especially the Arctic.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Project BEARTRAP	10,705	7,857	11,866	15,406	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: In the mission of [redacted] and developing special equipment to accomplish this [redacted] Project BEARTRAP has had a major and significant impact upon anti-submarine warfare. This is a result of both the [redacted] into the ASW community. BEARTRAP consists of a combination of developmental and [redacted] installed in [redacted] P-3C aircraft, along with special ASW sensors, post mission processing, calibration equipment, and specially trained research personnel. Incorporating a rapid deployment capability, BEARTRAP develops [redacted] neither currently utilized by operational units or planned for future systems. BEARTRAP is in a unique position [redacted] for Navy development and technology demonstration programs where sensor technology permits.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

° On-going [redacted] including continuing demonstration efforts, [redacted] acquisition and evaluation of a new Automated Quick Look (AQL) [redacted] and analysis system for concept demonstration of advanced technology at key ASW Operational Centers (ASWOC).
° Developmental software and hardware improvements, prototype [redacted] for the AQL systems, were tested [redacted] and other special BEARTRAP research equipment.
° Development of software for the integrated P-3C UPDATE III capability required by [redacted] U.S. BEARTRAP aircraft is progressing.

2. (U) FY 1989 Program:

° [redacted] software and hardware developmental improvements to support [redacted] P-3C BEARTRAP aircraft.

Program Element: 0603708N Budget Activity: 4
Program Element Title: Anti-Submarine Warfare Signal Processing
Project Number: W0490 Project Title: BEARTRAP

° Continue development efforts on the integrated P-3C UPDATE III capability. Efforts will continue to improve performance of sonobuoys currently under evaluation and development. Investigation of methods of by BEARTRAP Aircraft.
° Continue development efforts for improvements to Automatic Quick Look (AQL) for processing capabilities.
° Support concept planning efforts for replacing existing.

3. (U) FY 1990 Plans:
° Continue acquisition of for test and evaluation, initiate development effort to provide to the AQL system.
° Continue developmental software and hardware evaluation and support and acquire prototype equipment for test and evaluation.
° Complete the integrated UPDATE III capability and subsequent installation in U.S. aircraft for demonstration and evaluation.
° Provide data directly to Navy Laboratories.
° Initiate design effort to replace the present with smaller for UPDATE III deployment.
° Acquire an additional AQL system at an ASWOC site for analysis of research data.

4. (U) FY 1991 Plans:
° Continue SPL reseach, acquire developmental with for evaluation, install prototype software and hardware to test to the AQL system.
° Continue development of software, hardware and equipment.
° Provide for ongoing evaluation by Navy Laboratories.
° Continue design effort to replace the present with smaller for UPDATE III deployment.
° Acquire an additional AQL systems for ASWOC siting.
° Initiate design of a replacement for the present system installed in P-3C BEARTRAP aircraft, improving capability.
° Initiate effort to provide BEARTRAP capability in P-3C UPDATE IVs.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NATC, Patuxent River, MD; NSWC, White Oak, MD; NWSC, Crane, IN; and NAC, Indianapolis, IN. CONTRACTORS: TRACOR, Austin, TX; G.P. TAURIO, Columbia, MD; METRON, Inc., Warminster, PA; Norden Systems, Melville, NY; and Sparton Electronics Div., Jackson, MI.

Program Element: 0603708N Budget Activity: 4
Program Element Title: Anti-Submarine Warfare Signal Processing
Project Number: W0490 Project Title: BEARTRAP

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES			
TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITY	IMPACT ON SCHEDULE	IMPACT ON FY90 COST
TECH	None	None	None
SCHED	None	None	None
COST	Delayed development	6 mo delay	-$1,171K

NARRITIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The -$1.171K reduction in FY 1990 delays efforts in P-3 Update IV BEARTRAP capability, and

F. (U) PROGRAM DOCUMENTATION:
NDCP WO-49-AS 6/20/80
NAPDD 076-095 4/15/86

G. (U) RELATED ACTIVITIES: Program Elements 0603529N (Advanced ASW Target); 0603553 (Surface ASW); 0604713N (Surface ASW Systems Improvement); 0603619N (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 SCHEDULE: This is a continuing program.

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) PROJECT DESCRIPTION: APP develops on-board software capabilities that provide acoustic sensor performance predictions and tactical decision aids for all tactical ASW platforms based on in-situ measurements and new/updated environmental data bases. APP enables the fleet to obtain the full performance potential of complex at-sea ASW systems by increasing their detection and tracking performance.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Updated acoustic models, data bases and at-sea systems (e.g., SIMAS, ICAPS, and SFMPL); Completed implementation of Navy Standard Range Dependent Model; Completed development of initial aircraft laptop APP products; Initiated development of an [redacted] Updated the SQS-53C APP system and provided support for at-sea testing.

2. (U) FY 1989 Program: Improve/update data bases and acoustic models; Update APP system; Evaluate aircraft laptop APP products at-sea; Continue development and evaluation of APP prototype addressing new ASW systems; Develop APP products to support PROBE ALERT, Acoustic Intercept System (AIS) and acoustic weapons; Develop SIMAS modifications to support the DDG-51 class combat system.

3. (U) FY 1990 Plans: Update models, data bases and at-sea systems; Develop products to support [redacted] phases of the ASW problem; Conduct at-sea evaluation of next generation APP prototype including [redacted] Conduct at-sea evaluation of [redacted] into APP.

4. (U) FY 1991 Plans: Update models, data bases and at-sea systems; Conduct at-sea evaluation of [redacted] /Update next generation APP system based on at-sea results; Update [redacted] system based on at-sea test results; Conduct at-sea evaluation of APP systems using [redacted]

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NUSC Newport, RI (Lead Laboratory); 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: 0604575N, AN/SQS-53C; 0604524N, Submarine Combat Systems Development; 0604713N, ASW Surface Systems 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

Program Element: 0603708N Budget Activity: 4
Program Element Title: Anti-Submarine Warfare Signal Processing
Project Number: X8021 Project Title: Advanced Acoustic Processing (AAP)

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 1988 Accomplishments: Conducted Phase I testing of submarine signal processing BQQ-5C towed array; Conducted Phase II testing of SQR-19 systems; Conducted testing of AD/CAC algorithms in ACAP for UYS-1; Initiated SSTD AD/CAC system; Evaluated training in air ASW signal processing systems; Continued testing of [ ] sonobuoy systems.

2. (U) FY 1989 Program: Continue testing of submarine and surface ship passive ASW systems; Complete Phase I testing of SSTD AD/CAC; Initiate testing of P-3C UPDATE IV post processing algorithms; Continue evaluation of training in air ASW signal processing systems; Initiate evaluation of training in other tactical platforms; Complete testing of [ ] sonobuoy systems.

3. (U) FY 1990 Plans: Continuation of testing of P-3C Update IV post processing algorithms; Continuation of testing of SSTD algorithms; Continuation of testing of submarine and surface ship passive ASW systems; Continuation of testing of training; Initiate testing of active sonars in surface ships.

4. (U) FY 1991 Plans: Continuation of tesing of P-3C Update IV; Completion of testing of submarine and surface ship passive ASW systems; Continuation of testing of training; Completion of testing of SSTD; Continuation of testing of active sonars in surface ships.

5. (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: This project provides for development of advanced acoustic processing capabilities for various air, surface, and submarine platform applications for Program Elements: 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603709N Budget Activity: 4

Program Element Title: Advanced Biological Systems

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0214	Advanced Marine Biological Systems	5,393	6,219	5,715	5,579	Cont.	Cont.

B. (U/NF) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Train marine mammals to determine military worth and optium utility.

C. (U/NF) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U/NF) FY 1988 Accomplishments:
   a. (U/NF) Linear Chek
   b. (U) MK-7 Mod 1 successfully completed TECHEVAL and OPEVAL. Approval for full production has been granted.
   c. (U/NF) The EX-3 Mod 0 completed TECHEVAL of [redacted] Conducted OPEVAL.
   d. (U/NF) Targets of Opportunity (TOO) program: [redacted]
   e. (U/NF) Arctic Ops Project: [redacted]
2. (U/NF) FY 1989 Program:
   a. (U/NF) Continue training of [redacted]
   b. (U) Continue with Targets Of Opportunity (TOO) and arctic ops programs.
3. (U) FY 1990 Plans:
   a. (U/NF) Continue [redacted] training at greater depth for EX-4 program.
   b. (U/NF) Enhance and test new transport equipment for [redacted]
   c. (U) Continue the Arctic Ops, TOO and Linear Chek Programs.
   d. (U/NF) [redacted]
4. (U/NF) FY 1991 Plans:
   a. (U/NF) Complete OPEVAL on [redacted]
   b. (U) Milestone II for Enhance, Targets of Opportunity, Arctic Ops.
5. (U) Program to Completion: This is a Continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA. CONTRACTORS: B-K Dynamiocs; SEACO, San Diego, CA.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS:

	FY 88 Actual	FY 89 Estimate	FY 90 Estimate	FY 91 Estimate	To Complete
OPN #240	Procurement justification material does not contain this level of detail.				

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0099	Deep Subm Bio Med Div	5,889	5,785	6,256	6,515	Continue	Continue
S0396	Deep Depth Diving	1,074	2,108	1,603	1,360	1,915	11,105
S0397	Deep Ocean Tech	5,928	6,061	6,872	7,167	Continue	Continue
TOTAL		12,891	13,954	14,729	15,042	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 tools and the vehicles to permit manned and unmanned underwater operations to depths of 20,000 feet.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Develop biomedical technology to increase diver safety and effectiveness for current operations, and support deeper dives.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. Delivered Procedure Manual for Deep Submergence Rescue Vehicle.
   b. Wrote new no-decompression limits and decompression tables.
   c. Developed training programs for improved underwater performance.
2. (U) FY 1989 Program:
   a. Develop new safety limit for high concentration oxygen exposure.
   b. Recommend active supplemental heating requirements for divers.
   c. Report results of high carbohydrate diets upon diver work capacity.
3. (U) FY 1990 Plans:
   a. Report nitrogen/oxygen/helium utility for Deep Submergence Rescue.
   b. Recommend optimal acclimation regimens for very cold water diving.
   c. Issue manual of chamber atmosphere control, monitoring and decontamination, and new diver's air purity/temperature standard.
   d. Develop comprehensive human oxygen toxicity risk model.
   e. Develop decomp. sickness model for any nitrogen/oxygen mixture.
   f. Develop hearing conservation standard for most diving operations.
4. (U) FY 1991 Plans:
   a. Deliver comprehensive med. recommendations for submarine rescue.
   b. Issue definitive thermal/diet/fluid guidance for cold water dives.
   c. Develop comprehensive physiologic design criteria for breathing gear.
   d. Develop model of helium/oxygen saturation decompression.
   e. Human trials of protocols limiting brain injury from gas embolism.
5. (U) Program to Completion:
   a. Complete Technical Evaluation (TECHEVAL) and Operational Evaluation (OPEVAL). Approval for production (AFP) planned for 1993.

E. (U) WORK PERFORMED BY: IN HOUSE: NAVMEDRSCHINSTITUTE, Beth., MD: NAVSUBMEDRSCHLAB, New London, CT: Contractors: University of PA, Philadelphia, PA: Duke University, Durham, NC; State University of N.Y., Buffalo, NY.

F. (U) RELATED ACTIVITIES: Program Element 0603722N, (Naval Special Warfare), scenario analysis of physiologic requirements and enhancement.

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: (U) US/UK M.O.U. For A Cooperative Agreement on Diving R & D, 1970; (U) US-France Cooperation in Oceanography, 1969; (U) MDDEA-N-76-A-5816 US/Australia: Underwater Physiology, 1976; no US corporate or DOD or foreign financial commitments.

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. Conducted material/structure testing of the Navy One Man, One Atmosphere Diving System (NOMOADS) graphite composite pressure hull.
   b. Issued draft Acquisition Plan, Training Plan and Integrated Logistics Support Plan for the NOMOADS.
   c. Completed Test and Evaluation Master Plan for the NOMOADS.
2. (U) FY 1989 Program:
   a. Complete unmanned reliability testing of the NOMOADS.
   b. Initiate certification planning for the NOMOADS.
3. (U) FY 1990 Plans:
   a. Initiate reliability hydrostatic pressure testing of NOMOADS torso. Requires destructive testing for certification.
   b. Conduct testing of NOMOADS joints.
4. (U) FY 1991 Plans:
   a. Complete certification testing of pressure housing.
   b. Complete testing of NOMOADS joints.
   c. Initiate manned, laboratory controlled testing (shallow).
5. (U) Program to Completion:
   a. Complete Technical Evaluation (TECHEVAL) and Operational Evaluation (OPEVAL). Approval for production (AFP) planned for FY 1993.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Laboratory, 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 0603722N, 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 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. Completed development and testing of the unmanned Advanced Tethered Vehicle (ATV) 20,000 foot fiber-optic tether.
   b. Completed shallow depth (2500 feet) at-sea testing of the untethered Advanced Unmanned Search System (AUSS).
   c. Conducted initial at-sea tests of the ATV using the 20,000 foot fiber-optic tether.
   d. Completed the sonar suite, acoustic data link and graphite composite/titanium pressure hull for the 20,000 foot depth operation of the AUSS.
2. (U) FY 1989 Program:
   a. Conduct ATV open ocean dives to 20,000 foot depth.
   b. Complete ATV long duration (greater than 24 hours) 20,000 foot on-bottom working scenario.
   c. Initiate training of fleet operators and prepare support documentation for fleet ATV operation.
   d. Initiate at-sea testing of the AUSS.
3. (U) FY 1990 Plans:
   a. Complete fleet support documentation for ATV.
   b. Comp. ATV handling system shipbd. install. for deep ocean tests.
   c. Conduct at-sea operational testing of ATV to depths of 20,000 feet.
   d. Complete upgrade of AUSS search sensors.
   e. Conduct AUSS acoustic data link testing to 20,000 foot depth.
4. (U) FY 1991 Plans:
   a. Comp. ATV dp. ocean bottom work task test. to depths of 20,000 ft.
   b. Complete formal ATV fleet turnover.
   c. Conduct bottom (20,000 foot depth) search testing with AUSS.
   d. Comp. data suppression prog. to allow near real time acoustic TV trans. from AUSS vehicle at 20,000 ft. depth to surf. sup. ship.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Coastal Systems Laboratory, Panama City, FL; David Taylor Research Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA. CONTRACTORS: Rochester, Inc., Culpepper, VA; Tension Member Technology, Los Angeles, CA.

F. (U) RELATED ACTIVITIES: PE 0603702N, Ocean Engineering Systems Development; PE 0603722N, Naval Special Warfare.

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

H. (U) INTERNATIONAL COOPERATION AGREEMENT: Not applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1743	C^2 Processor	(14,401)*	19,360	9,879	6,755	8,912	83,842
X1753	Link 11	(9,023)*	17,734	19,497	19,645	Cont.	Cont.
	Total	(23,424)	37,094	29,376	26,400	Cont	Cont.

* Funded under PE 0604232N in FY88

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) This program element provides for development of the Command and Control Processor (C2P) and Link 11 Improvements (LEI). The Command and Control Processor program is developing software programs which will serve as the interface between current and developing tactical digital communication systems; TADILS A, C and J with future growth to include intelligence information exchange networks. The C^2P will function as a communications processor thereby removing this task from tactical data system computing equipment. This will provide a flexible capability for rapidly exchanging tactical information essential for effective battle force management. The Link 11 Improvement Program is designed to improve existing Link 11 high speed, computer-to-computer, digital radio communications and is currently being structured to incorporate options developed under the recently completed HFAJ design effort. Cooperative efforts are ongoing with NATO through the Program Management Office located in Washington, DC for project definition. The US portion of this effort will be conducted in two phases with the Phase I objective providing near term improvements to the existing Link-11 equipment and software and Phase II providing longer range architectural and communications protocol changes intended to take full advantage of the Radio Frequency (RF) 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.

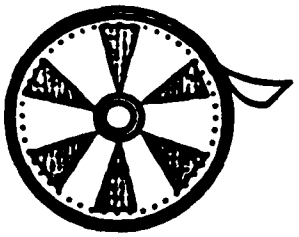
FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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)

C^2P COMPUTER PROGRAM



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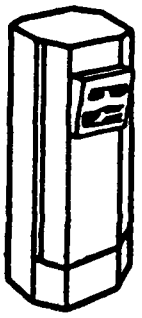

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POPULAR NAME: COMMAND AND CONTROL PROCESSOR (C2P)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					IIIA & IIIB Version 0
Engineering Milestones	CDR				FQR Version 1
T&E Milestones		TRR	TRR	OT IIA Version 0	OT IIB/C Version 1
Contract Milestones		REFORMAT CPIF			

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(2,261)*	5,821	4,672	2,836	30,483
Support Contract	(551)*	594	637	672	4,749
In-House Support	(405)*	423	464	491	3,679
GFE/ Other	(11,184)*	12,522	4,106	2,756	44,931
Total	(14,401)*	19,360	9,879	6,755	83,824 8,912

*Funded under PE 0604232N

FY 1990/1991 BIENNIAL RDT&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)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
1. (U) An operational environment analysis established the requirement for the Combat Direction System (CDS) to quadruple track capacity and surveillance range, and increase target insertion rate. The C2P will be a newly developed computer program 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 C2P will isolate all tactical data link equipment, message standards and protocols from tactical information processors. The C2P provides the interface between Links 4A, Link 11, and Link 16 and the Advanced Combat Direction System (ACDS), and AEGIS Command and Decision (C&D). The C2P 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Acquired two AN/UYK-43 computers for OPEVAL Version 0 ships.
b. (U) Acquired two AN/UYK-43 computers for the Life Cycle Support Activity.
c. (U) Completed computer program design specifications.
d. (U) Completed Critical Design Review.
e. (U) Commenced software coding.
f. (U) Continued development of interface test drivers.

2. (U) FY 1989 Program:

a. (U) Acquire one AN/UYK-43 computer for the AEGIS Combat System Engineering Development Site (CSEDS).
b. (U) Acquire hardware (VAX) for Software Development Facility.
c. (U) Complete software coding.
d. (U) Conduct initial Test Requirements Review (TRR).
e. (U) Acquire three AN/UYK-43 computers for OPEVAL version 0 and OPEVAL version 1 test ships.

3. (U) FY 1990 Plans:

a. (U) Conduct second TRR.
b. (U) Conduct initial Government Acceptance Test of version 0.

FY 1990/1991 BIENNIAL RDT&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) FY 1991 Plans:

a. (U) Conduct Combat System Integration Test for AEGIS and ACDS Block 0 ships.
b. (U) Conduct Technical Evaluation Version 0.
c. (U) Conduct Operational Evaluation Version 0.

5. (U) Program to Completion:

a. (U) Conduct Technical Evaluation Version 1.
b. (U) Conduct Operational Evaluation Version 1.

D. (U) WORK PERFORMED BY:

(U) IN-HOUSE: Fleet Combat Direction System Support Activity, San Diego, CA; Naval Ocean Systems Center, San Diego, CA. CONTRACTORS: Hughes Aircraft Company, Fullerton, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	ACDS Block 0 AEGIS OS-516 Model 4 JTIDS AIC	None	None
SCHED	None	None	None
COST	None	Add 17 Months Reschedule OT	-1,201

NARRATIVE DESCRIPTION OF CHANGES

Impact of Changes:

1. (U) TECHNOLOGY: Added ACDS Block 0 platforms/AEGIS baseline 516 interface and JTIDS air control for Model 4 CDS ships, as a result of restructured ACDS Block 0 and 1 programs.
2. (U) SCHEDULE: None
3. (U) COST: The -$1,201 funding reduction added 17 months to the C^2P schedule and resulted in rescheduling OT-IIA from FY90 to FY91 and subsequent rescheduling of OT-IIB and OT-IIC to FY92.

FY 1990/1991 BIENNIAL RDT&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)

F. (U) PROGRAM DOCUMENTATION:
OR March 1982 Revised December 1985
NDCP Feb 1988

G. (U) RELATED ACTIVITIES: Link 16 (Joint Tactical Information Distribution System (JTIDS)), PE 0205604N; Warfare Support System, PE 0604230N; Tactical Command System, PE 0604231N; Advanced Combat Direction System (ACDS) Block 1, PE 0604518N.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands,Units/Cost)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
OPN (BA2) #95	0	0	0	9/8,373	39/ 36,828	45,201
OPN (BA8) #302		0	0	1,910	2,145	4,055

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

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

FY 1990/1991 BIENNIAL RDT&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:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	Comp Design phase	SDR			Cont.
Engineering Milestones	COMP MULTOTS S/W REHOST		LEIS critical test demo		Cont.
T&E Milestones	COMP ROL-11 NCT TEST	WRITE ADDL S/W MULTOTS			Cont.
Contract Milestones		Complete JVT Continue SDR		Award FSD contract	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(4,833)*	8,491	15,795	16,089	Cont.
Support Contract	(892)*	1,106	2,141	2,204	Cont.
In-House Support	(2,947)*	3,232	1,260	1,144	Cont.
GFE/ Other	(351)*	4,905	301	208	Cont.
Total	(9,023)*	17,734	19,497	19,645	Cont. Cont.

* Funded under PE 0604232N in FY 1988

FY 1990/1991 BIENNIAL RDT&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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) The Link 11 Improvement Program (LEIP), by using design options derived from the recently terminated HFAJ program, will improve existing Link 11 high-speed, computer-to-computer, digital radio communications across the Radio Frequency (RF) spectrum among Combat Direction System (CDS) equipped ships, submarines, aircraft and shore sites. It will include the replacement and/or upgrading of existing Link 11 equipment, and the addition of operational improvements, while retaining interoperability with present and future Navy, Joint, and Allied Link 11 systems. LEIP will allow more effective employment of fleet units by increasing the timeliness and data capacity of tactical information transfer and transmission of high priority warning and force orders. Phase I, the Link Eleven Improvement System (LEIS) portion of this effort, will provide near term improvements, including Link Eleven Model Five (LEMF) and is currently in design under a Joint Venture Team (JVT) contract. Phase II will provide long term improvements through the incorporation of system architectural and communications protocol changes intended to take full advantage of the RF spectrum and provide both increased data handling capacity and improved network access time. The MULTOTS upgrade sub-project will allow Navy Tactical Interoperability Support Activity to certify all required messages for Link-11 interoperability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Awarded FSED Contract to Joint Venture Team (JVT) for Phase I (HFAJ/LEIP).

b. (U) Completed ROL-11 system specification based upon NATO Comparative Test (NCT) program results.

c. (U) Contract was awarded to rehost and update MULTOTS software on new computers with higher capacity than existing computers.

2. (U) FY 1989 Program:

a. (U) Restructure the LEIP to reflect the termination of the HFAJ program.

b. (U) Through the JVT contract, proceed with LEIS through a System Design Review (SDR) in Jun 89.

c. (U) Commence development effort on OPSPEC 511 which will be the message standard for Improved Link 11.

d (U) Commence Critical Technology Demonstration of LEIS single tone modems and protocols.

e. (U) Commence LEIS aircraft integration definition studies.

f. (U) Initiate near term improvements to current Link 11.

g. (U) Complete writing additional MULTOTS software and conduct MULTOTS software tests.

FY 1990/1991 BIENNIAL RDT&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

3. (U) FY 1990 Plans:
   a. (U) Complete Critical Technology Demonstration of single tone modem and LEIS protocols.
   b. (U) Release first draft of OPSPEC 511.
   c. (U) Continue LEIS aircraft integration definition studies for additional aircraft.
   d. (U) Release RFP for restructured LEIS FSED program.

4. (U) FY 1991 Plans:
   a. (U) Award LEIS FSED contract.
   b. (U) Continue development of OPSPEC 511.
   c. (U) Complete aircraft integration definition studies.
   d. (U) Commence aircraft integration design.

5. (U) Program to Completion:
   a. (U) TECHEVAL of LEIS
   b. (U) OPEVAL of LEIS.
   c. (U) Certify OPSPEC 511.

D.(U) WORK PERFORMED BY: IN-HOUSE: Naval Avionics Center, Indianapolis, IN; Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD; Naval Air Systems Command, Washington, DC; Naval Electronic Support Engineering Center, Portsmouth, VA; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC; Navy Tactical Interoperability Support Agency, San Diego, CA; Naval Underwater Systems Center, New London, CT; Naval Electronic Systems Engineering Activity, St. Inigoes, MD; Fleet Combat Direction Systems Support Activity, Dam Neck, VA. CONTRACTORS: Joint Venture Team (Rockwell/Marconi) Dallas, TX; MITRE Corporation, Bedford, MA; Logicon Incorporated, San Diego, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Add Multi-media delete HFAJ	Slip OPEVAL beyond 1995	None
SCHED	None	None	None
COST	Provide FSED Capability	None	+$9,280

FY 1990/1991 BIENNIAL RDT&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

NARRATIVE DESCRIPTION OF CHANGES

Impact of Changes:

1. (U) TECHNOLOGY: Due to cancellation of the HFAJ program, the LEIP program is being restructured and will provide a new, improved Link-11, independent of HFAJ.

2. (U) SCHEDULE: None

3. (U) COST: Departmental and Navy actions resulted in a net increase of $9,280. The program was rescoped to reflect the cancellation of HFAJ and restructured as necessary to execute LEIP as a stand alone program.

F. (U) PROGRAM DOCUMENTATION:

DCP - 1/87 (HFAJ/LEI)
TEMP - 1/86 (HFAJ/LEI)
Acquisition Plan 85-43 - 1/86
ROL-11 OR - 6/86
ROL-11 TEMP 357-03 - 1/88

G. (U) RELATED ACTIVITIES: None.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NATO Improved Link Eleven (NILE) in Project Definition, executing under a current Memorandum of Understanding (MOU) with a program office established in Washington, DC.

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0829	Energy Conserv. (Adv)	3,305	3,987	3,001	3,525	Cont.	Cont.
R0838	Mobility Fuels (Adv)	4,251	4,502	4,006	4,223	Cont.	Cont.
TOTAL		7,556	8,489	7,007	7,748	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 $136M per year by 1995 and $200M per year by 2000 are projected compared to 1985 using today's fuel prices.

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. (U) Completed testing of AV-8B engine to determine effects of fuel quality on performance and reliability.
   b. (U) Recommended changes to ship diesel fuel procurement specs to improve storage stability.
2. (U) FY 1989 Program:
   a. (U) Complete testing of T700 (LAMPS) and F404 (F/A-18) engines and continue testing of ship gas turbine and high speed diesel engines to determine effects of fuel quality on performance and reliability.
3. (U) FY 1990 Planned Program:
   a. (U) Determine appropriate freeze and pour point requirements for Navy fuels.
   b. (U) Complete ship engine testing with broadened specification fuels.
4. (U) FY 1991 Planned Program:
   a. (U) Complete all test work to redefine Navy fuel specifications for ships and aircraft.
5. (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 Inst., San Antonio, TX; National Inst. for Petroleum Research, Bartlesville, OK.

F. (U) RELATED ACTIVITIES: Program Element 0602233N, Mission Support Technology. This project is a part of joint service program and is coordinated with DOE, NASA and industry. There is no unnecessary duplication of effort within the Navy, DOD or other federal agencies.

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

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

FY 1990/1991 BIENNIAL 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 1988 Accomplishments:
   a. (U) Developed alternatives to organotin anti-fouling paints.
   b. (U) Developed turbine efficiency improvements for F404 engine.
   c. (U) Completed development of hybrid photovoltaic/wind systems.
   d. (U) Initiated F404 compressor and T406 brush seal engine efficiency improvement projects.
2. (U) FY 1989 Program:
   a. (U) Continue development of advanced anti-fouling paints.
   b. (U) Develop efficient auxiliary equipment for gas turbine ships.
   c. (U) Continue F404 and T406 aircraft engine improvement projects.
   d. (U) Assess geothermal resources at naval facilities.
3. (U) FY 1990 Planned Program:
   a. (U) Continue development of auxiliary equipment for gas turbine ships.
   b. (U) Transition F404 and T406 efficiency improvements to NAVAIR.
   c. (U) Initiate F110 efficiency improvement project.
   d. (U) Adapt closed loop ECS technology to fighter/attack aircraft.
   e. (U) Continue assessment of geothermal reservoirs.
4. (U) FY 1991 Planned Program:
   a. (U) Continue F110 improvement and closed loop ECS efforts.
   b. (U) Continue assessment of geothermal reservoirs.
   c. (U) Provide energy conservation input to Advanced Integrated Warship Program.

5. (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). There is no unnecessary duplication of effort within the Navy, DOD or other federal agencies.

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

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0077	Mine Warfare (Advanced)[a]	1,149	1,845	(1,897)	(3,403)	Continue	Continue
C0078	Combat Service Support (Advanced)	687	1,776	849	1,187	Continue	Continue
C0082	Aviation Support Material/Equipment	1,585	704	145	101	101	3,509
C1966	Surf Zone Container Handler[b]	521	1,257	868	(1,155)	2,398	7,712
C1967	Mine Clearing (Advanced)	b(765)	1,445	c(0)	d(2,920)	Continue	Continue
C1968	Mine Detection System (Advanced)	b(2,055)	2,693	a(4,314)	a(10,023)	Continue	Continue
C1969	Mine Neutralization Equipment[e]	2,365	3,464	(2,559)	(3,011)	Continue	Continue
C1983	Tactical Fuel Systems[b]	481	968	176	(678)	Continue	Continue
C2029	Directed Energy Countermeasures[f]	(224)	1,265	a(3,381)	a(6,099)	Continue	Continue
PROGRAM ELEMENT TOTAL		6,788	15,417	2,038	1,288	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).
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 Corps Mine/Countermeasures (Engineering).
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) BRIEF DESCRIPTION OF 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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project develops automated aids for site selection, design and estimation of construction and provides state of the art earthmoving and excavating construction equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Contracted for lease of prototype Engineer Support Tractor (EST).

2. (U) FY 1989 Program:

a. (U) Initiate Amphibious Objective Area Land Management System (AOALMS).

b. (U) Conduct DT for EST.

c. (U) Initiate start-up of Rapid Excavator program.

3. (U) FY 1990 Plans:

a. (U) Complete advance development of AOALMS.

b. (U) Contract for EST engineering development prototype.

c. (U) Conduct DT and finalize procurement specification for Rapid Excavator.

d. (U) Initiate start-up of Field Fortification program.

4. (U) FY 1991 Plans: Continue development of Field Fortifications.

5. (U) Program to Completion: Complete Field Fortifications.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; NCEL, Port Hueneme, CA. Contractors: TBD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project supports Marine Corps improvements in aviation operational capabilities.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Completed DT/OT II of Radar Beacon, Forward Air Controller-Target Data Communicator (RABFAC-TDC).

2. (U) FY 1989 Program:

a. (U) Develop interoperability of RABFAC-TDC with aviation and assault support applications to provide data link communications in all amphibious assault environments.

b. (U) Complete OT of the TPS-73 MATCALS.

3. (U) FY 1990 Plans: Continue RABFAC-TDC development for aviation and assault support (Naval Gunfire) for mission accomplishment without reliance on voice communication in an amphibious assault environment.

4. (U) FY 1991 Plans: Conduct RABFAC-TDC operational testing of aviation and assault support platforms.

5. (U) Program to Completion: Research and develop aviation associated equipment for emerging fleet requirements. This is a continuing program.

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 APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603729M Budget Activity: 4
Program Element Title: Marine Corps Combat Services Support (Advanced)
Project Number: C1966 Project Title: Surf Zone Container Handler

C. (U) PROJECT DESCRIPTION: This project will improve handling of containerized supplies and material with emphasis on development of new strategically and operationally mobile equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Initiated DT I of two prototype container handlers.

2. (U) FY 1989 Program: Finalize statement of work for full scale engineering development prototype container handlers and award contract. Develop DT-II T&E master plan.

3. (U) FY 1990 Plans: Conduct DT II. Publish test report.

4. (U) FY 1991 Plans: Conduct OT II. Publish test report.

5. (U) Program to Completion: Program complete in FY 1991.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; NCEL, Port Hueneme. Contractors: TBD

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603729M Budget Activity: 4
Program Element Title: Marine Corps Combat Services Support (Advanced)
Project Number: C1983 Project Title: Tactical Fuel Systems (TFS)

C. (U) PROJECT DESCRIPTION: Conduct Engineering Development on TFS.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Conducted DT of Fuel Additive and Aircraft Dropped Fuel Subsystems. Developed the ILSP for the CH-53 Subsystem.

2. (U) FY 1989 Program:

a. (U) Continue development of the TFS.

b. (U) Initiate the development of communication/manifold system.

c. (U) Initiate the design of CH-53 Subsystem.

d. (U) Complete the Fuel Additive Subsystem.

3. (U) FY 1990 Plans: Continue development of the TFS, the communication/manifold system, and the CH-53 Subsystem.

4. (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.

c. (U) Initiate the development of the Air Dropped Fuel Subsystem.

5. (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 APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603763N Budget Activity: 4
Program Element Title: W/F Systems Architecture and Engineering
Project Number: X1991 Project Title: Warfare Systems Architecture and Engineering (WSA&E)

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
WSA&E	(9,781)*	9,987	11,783	12,429	Cont.	Cont.

*Funded in FY 1988 in PE 0604232N

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(U) Warfare Systems Architecture and Engineering (WSA&E) provides a methodology to assess the warfighting value to the Navy battle forces of new and existing programs. It provides a consistent framework within which to perform system engineering. A current architecture reflecting existing systems plus those that IOC in the FYDP and an architectural assessment utilizing the Top Level Warfare Requirements (TLWRs) approved by the Warfare Requirements Board (WRB) are developed. The architectural assessment identifies overlaps and shortfalls in the current force. Architectural options for the future force include technology, cost, schedule, performance, and risk of proposed and existing warfare programs. Architectural options are presented to the WRB and become the basis for revising master plans and investment strategies, for pursuing new technological developments and for evaluating requirements documentation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: (Funded under 0604232N)
a. (U) Developed warfare system performance baseline.
b. (U) Developed current architecture descriptions for Carrier Battle Force (CVBF) Warfare Task Areas (WTA): Anti-Submarine Warfare (ASW), Strike Warfare (STW), Anti-Surface Warfare (ASUW), Navy Special Warfare (NSW) and Electronic Warfare (EW).
c. (U) Identified shortfalls and overlaps in CVBF ASW WTA.
d. (U) Began identification of CVBF force level shortfalls and overlaps.
e. (U) Developed and evaluated technology options for CVBF WTAs.
f. (U) Prepared force level architecture options for CVBF.
g. (U) Conducted battle force systems engineering which included: Coordinated the application of Navy engineering standards and discipline during the development of architectural options. Developed the process for inserting architectural performance requirements into specific acquisition programs. Developed Battle Force System Engineering Plan (BFSEP) for C3I. Conducted force level requirements traceability during acquisition design, design review and issue resolution. Coordinated the application of Navy engineering standards and discipline during the development of architectural options and Development Option Papers.
h. (U) Conducted short term studies and experiments to verify the performance of proposed changes to force level architecture.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603763N Budget Activity: 4
Program Element Title: W/F Systems Architecture and Engineering
Project Number: X1991 Project Title: Warfare Systems Architecture and Engineering (WSA&E)

2. (U) FY 1989 Program:

a. (U) Continue development of warfare system performance baseline.

b. (U) Develop current architecture descriptions for CVBF as a force; for CVBF WTA; AAW, AMW and C^3; and, for Area ASW WTA ASW and MIW.

c. (U) Identify shortfalls and overlaps in CVBF WTA: AMW, NSW, EW, AAW, ASUW/STK and C^3 and in Area ASW WTA: ASW and MIW.

d. (U) Prepare architecture options for CVBF as a force, CVBF WTA AAW, AMW, NSW, C^3, EW, ASW, ASUW/STK; and for Area ASW WTA ASW and MIW.

e. (U) Conduct technological assessments and develop C^3I requirements for advanced system concepts responding to priority deficiencies in 2010-2030.

f. (U) Develop acquisition program force level performance and interface specifications and testing requirements.

g. (U) Continue items 1.g and 1.h from 1988.

3. (U) FY 1990 Plans:

a. (U) Continue development of warfare system performance baseline.

b. (U) Develop current architecture description for: Amphibious Force as a force; for Area ASW as a force; and, for Area ASW WTA EW and C^3.

c. (U) Identify shortfalls and overlaps within Area ASW WTA: ASUW/STK, AAW, C^3, EW and AMW.

d. (U) Prepare architecture options for: Area ASW as a force; and for Area ASW WTA ASUW/STK, AAW, C^3, EW and AMW.

e. (U) Continue items 2.e through 2.g from 1989.

4. (U) FY 1991 Plans:

a. (U) Continue development of warfare system performance baseline.

b. (U) Develop current architecture description for Protection of Shipping as a force.

c. (U) Identify shortfalls and overlaps in Amphibious Force.

d. (U) Prepare architecture options for Amphibious Force.

e. (U) Update architecture options for CVBF as a force.

f. (U) Continue items 3.e from 1990.

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

D. (U) WORK PERFORMED BY: In-house: NAVOCEANSYSCEN, San Diego, CA; NAVSWC, Dahlgren, VA; NAVAIRDEVCEN, Warminster, PA; NUSC, New London, CT; NAVWPNCEN, China Lake, CA; NAVCOASTSYSCEN, Panama City, FL. Contractors: VITRO, Silver Springs, MD; APL, Laurel, MD; TRIDENT, Fairfax, VA; MITRE Corporation, Reston, VA; SAIC, LaJolla, CA.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603763N Budget Activity: 4
Program Element Title: W/F Systems Architecture and Engineering
Project Number: X1991 Project Title: Warfare Systems Architecture and Engineering (WSA&E)

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	12 month delay	-14,456

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: NONE.
2. (U) SCHEDULE CHANGES: NONE.
3. (U) COST CHANGES: The $-14,456 change resulted from the combined effects of breaking up Program Element 0604232N; the combining of projects 0604230N/X2001, 0604231N/X2010 and 0604232N/X1991 into 0603763N/X1991 and restructuring of the project. Reduction in funding revises planning for one TLWR and one set of architectural descriptions, shortfalls/overlaps and options annually vice two.

F. (U) PROGRAM DOCUMENTATION: Non-Acquisition Program Definition Document (NAPDD) of 10 June 1988.

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: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0120	AEAS Ocean Measurement and Modeling Program	12,798	13,610	13,817	14,576	Cont.	Cont.
R2017	Advanced Underwater Acoustic Modeling Project	2,936	2,979	2,999	2,409	Cont.	Cont.
Total		15,734	16,589	16,816	16,985	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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.

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 Program

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0120	AEAS Measurements and Modeling Program	12,798	13,610	13,817	14,576	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The quieting of new-generation threat submarines has

To counter this threat, 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 undersea acoustic surveillance and tactical ASW systems, thus extending threat detection ranges, increasing time to enemy counter-detection and enhancing ASW platform survivability. It conducts undersea environmental/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 1988 Accomplishments:
° Completed upgrades to and transitioned the System for the Prediction of the Acoustic Response of Sound Surveillance System and Surveillance Towed Array Sonar System (SPARS);
° Began implementation of performance prediction models capable of operating in complex, range-dependent environments;
° Conducted measurement program in shallow water area of the Arctic;
° Initiated measurement and modeling program focused on

° Expanded and improved mine warfare data bases and models;
° Developed digital ocean acoustic measurement and recording system required to support next-generation sensor systems.

2. (U) FY 1989 Program:
° Begin planning for the first in a series of experiments on environmental acoustics;
° Launch new experimental and modeling programs in support of shallow water ASW and
° Complete delivery of range-dependent prediction models and data bases;
° Complete processing, analysis and reporting of Arctic environmental-acoustic measurements made during FY 85-87;
° Develop Arctic tactical guidance pubs;

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 Program

° Expand level of support to
° Test prototype digital acoustic measurement and recording system;
° Conduct modest

3. (U) FY 1990 Plans:

° Conduct expanded ocean experimental programs to resolve uncertainties (ambient noise directionality and temporal variability, bottom, surface and volume reverberation, signal spreading) critical for the development and deployment of

° Deliver a passive shallow water range-dependent model for fleet use;
° Complete publication of AEAS exercise products (descriptions of array and other system performance, tactical decision aids, etc.);
° Deliver improved ambient noise directionality data base for surveillance towed array sonar system deployments;
° Deliver VLF ambient noise data base for patrol aircraft deployments;
° Develop improved data bases and models for inclusion in SPARS, and complete interface between SPARS and advanced ASW surveillance work station;
° Publish results from FY 1988-89 shallow water exercises;
° Complete development and deploy second unit of advanced digital ocean acoustic measurement and recording system.

4. (U) FY 1991 Plans:

° Analyze results from FY 1990 open ocean experiments to influence

° Conduct ocean experiment in high-interest area

° Deliver a VLF passive range-dependent performance prediction model, ambient noise model and acoustic bottom loss data base for use on patrol aircraft;
° Install performance prediction capability in SPARS;
° Complete publication of FY 1988 shallow water products and tactical decision aids;
° Conduct joint marginal ice zone experiment with Norway in Barents Sea;
° Develop and deploy performance prediction system for torpedoes.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NORDA, 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.

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 Program

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	Delay model development	-$5,722

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable
2. (U) SCHEDULE CHANGES: Not applicable
3. (U) COST CHANGES: Funding reduction will stretch out a program which investigates the effects of the ocean environment on Low Frequency Active acoustic sonars.

F. (U) PROGRAM DOCUMENTATION:
NAPDD #018-006, 17 January 1986.

G. (U) RELATED ACTIVITIES: AEAS provides environmental acoustic support to, and is involved in, joint activities with a number of other Navy programs. Relationships are both compatible and synergistic, with no unnecessary duplication of effort. The most important of these programs are:

- PE 0204311N, Undersea Surveillance Systems
- PE 0603784N, Fixed Distributed System

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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) PROJECT DESCRIPTION: Project R2017 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 1988 Accomplishments: Development of modeling capability; evaluation of models by Critical Sea Test (CST) Program; development, test and evaluation of reverberation algorithms; installation of oceanographic and acoustic models on VAX test bed system.

2. (U) FY 1989 Plans: Continue development of modeling capability; continue evaluation of models based on collected Critical Sea Test data; evaluate/validate range dependent 3-D models.

3. (U) FY 1990 Plans: Finalize development of modeling capability (MOD 1); test acoustic model with Critical Sea Test data; test simulation of effects of ocean fronts on acoustic performance prediction in bi-static environment; test 3-D transport model vs data; deliver range-dependent system design model to System Commands.

4. (U) FY 1991 Plans: Deliver range-dependent model, based on archival oceanography, for fleet operational use; test model on Critical Sea Test, Fixed-Fixed, and SQQ-89I programs; begin integration of oceanography on reverberation model into the 3-D transport model (MOD 2).

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NORDA, Bay St. Louis, MS; NRL, Washington, DC; NOSC, 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: This work is coordinated with, and supportive of, the following other Navy programs:

- PE 0603747N, Advanced Anti-Submarine Warfare Technology
- PE 0603704N, Anti-Submarine Warfare Technology
- 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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0572	JT SRV/NAV STD AVIONICS	2,923	7,059	12,448	9,886	Cont.	Cont.
W1630	Carrier A/C Inertial Nav System II	2,030	949	3,393	6,941	Cont.	Cont.
W0845	AN/AYK-14*	4,402	4,535	*	*		
	TOTAL	9,355	12,543	15,841	16,827	Cont.	Cont.

* AN/AYK-14 was transferred to P.E. 0604574N.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 P.E. attempts to solve this problem by developing 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. 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 it replaces.

FY 1990/1991 BIENNIAL 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

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Standard Avionics Development	2,923	7,059	12,448	9,886	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Service/Navy Standard Avionics Components and Systems (AVCS) project provides for the design, development, test, evaluation and qualification of standard avionics for Navy use and wherever practicable use across all services. The primary goal of the Standard Attitude Heading and Reference System (SAHRS) project, which enters limited production in FY90, is to reduce obsolete attitude heading references and proliferation of new development efforts to meet requirements of V-22, T-45, F-14D and Army's DV-1. 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 (GWPS), Standard Compass System (SCS), Standard Automatic Flight Control System (SAFCS) and Downed Aircrewman Locator System (DALS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued delivery of SAHRS FSED hardware.
   b. (U) Initiated SAHRS Design Approval Testing (DAT).
   c. (U) Began SAHRS System integration tests and TECHEVAL/OPEVAL.
   d. (U) Obtained Approval for Limited Production of SAHRS.

2. (U) FY 1989 Program:
   a. (U) Complete delivery of SAHRS FSED hardware.
   b. (U) Complete Design Approval Testing of SAHRS.
   c. (U) Complete SAHRS TECHEVEL/OPEVAL.
   d. (U) Obtain Milestone IIIA approval of SARHS.
   e. (U) Specification formulation and acquisition planning for for GPWS (TACAIR)and SCS.
   f. (U) Perform engineering studies and begin specification formulation for SAFCS and DALS.

3. (U) FY 1990 Plans:
   a. (U) Obtain SAHRS Approval for Full Production.
   b. (U) Award Full Scale Development contracts for GPWS (TACAIR), SAFCS, and DALS and SCS.

FY 1990/1991 BIENNIAL 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

4. (U) FY 1991 Plans:

a. (U) Perform qualification/integration testing for GPWS (TACAIR), SAFCS, DALS and SCS.

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

a. (U) Complete GPWS (TACAIR) TECHEVAL and begin OPEVAL.
b. (U) Obtain GPWS (TACAIR) AFP.
c. (U) Award GPWS (HELO) FSD contract.
d. (U) Complete TECHEVAL/OPEVAL for SAFCS, DALS and SCS.
e. (U) Begin specification formulation/acquisition planning for Laser Altimeter, Laser Doppler, and Integrated Inertial Sensor System.
f. (U) Perform qualification/integration testing for GPWS (HELO).
g. (U) Obtain AFP decision on SCS, SAFCS and DALS.
h. (U) Award FSD contracts for Laser Altimeter, Laser Doppler, and Integrated Inertial Sensor System.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD: Naval Avionics Center, Indianapolis, IN. CONTRACTORS: Singer Kerfott Division, Little Falls, NJ; Northrop Precision Products Division, Boston, MA.; and others to be determined.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Descope Programs	None	-7,208
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Two tasks (SAFCS & GPWS) have been descoped in the number of anticipated users and the platforms that will be tested. This project will complete the hardware for both, but the software will only be done for one platform. Specific platforms will fund the integration and software.
2. (U) SCHEDULE CHANGES: N.A.
3. (U) COST CHANGES: N.A.

FY 1990/1991 BIENNIAL 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

F. (U) PROGRAM DOCUMENTATION

PROGRAM	TOR	OR	TEMP	AP
GPWS		1/87		
SAHRS			3/85	4/84
SAFCS		4/86		
SCS		1/86		
DALS		3/87		

G. (U) RELATED ACTIVITIES: A tri-service Memorandum of Agreement exists to promote joint development of standard avionics components and subsystems. Currently the Joint USAF/USN SCADC has received Approval for Production.

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APN/#4,#9,#5, #20,#26	Procurement justification material does not contain this level of detail.				Cont.

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

J. (U) MILESTONE SCHEDULE:

	M/S I	M/S II	M/S IIIA	M/S IIIB
SAHRS	N/A	85/2Q	89/2Q	90/2Q
GROUND PROX. WARNING SYS	N/A	N/A	N/A	N/A
GPWS/CATEGORY I	N/A	N/A	N/A	90/2Q
GPWS/CATEGORY II	N/A	90/1Q	N/A	92/4Q
GPWS/CATEGORY III	N/A	92/2Q	N/A	95/3Q
SAFCS	N/A	90/1Q	N/A	93/4Q
STANDARD COMPASS SYS (SCS)	N/A	90/1Q	N/A	93/4Q
DOWNED AIRMAN LOCATING SYS	N/A	90/1Q	N/A	93/1Q

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. (U) Commenced and completed Navy TECHEVAL of CAINS II.
   b. (U) Commenced Navy OPEVAL of CAINS II.
   c. (U) Began CCDL specification formulation and acquisition planning.
   d. (U) Obtained Approval for Limited Production of CAINS II.
2. (U) FY 1989 Program:
   a. (U) Complete Navy OPEVAL of CAINS II.
   b. (U) Obtain Approval for Full Production of CAINS II.
3. (U) FY 1990 Plans: Full Scale Development contract award for CCDL.
4. (U) FY 1991 Plans:
   a. (U) Commence qualification testing of CCDL.
   b. (U) Begin TECHEVAL/OPEVAL of CCDL.
5. (U) Program to Completion: This is a continuing program.

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: Litton Aerospace, Woodland Hills, CA; The Singer Company, Kearfott Division, Little Falls, NJ.

F. (U) RELATED ACTIVITIES: The CAINS II project transitions Laser Gyro technology previously developed under another program element.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APN/#4,7,9,11	Procurement justification material does not contain this level of detail.				Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0676	Improved ID DEV	6,492	5,029	6,474	6,473	Cont.	Cont.
W1253	Combat ID Sys	7,493	15,623	19,863	50,015	Cont.	Cont.
TOTAL		13,985	20,652	26,337	56,488	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: 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 Identification Friend or Foe (IFF) systems for battle group air defense management and air traffic control. These IFF systems must be both tri-service and NATO interoperable to prevent fratricide in joint and allied operations. An upgraded, improved cooperative system is required. 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 a new cooperative identification system (MK XV) that is both Tri-Service and NATO interoperable. Through FY 1987, funding in this project included the Navy share of the Tri-Service "core" program (basic hardware) as well as Navy unique requirements (system cost and effectiveness analyses, system integration in Navy ships and aircraft, and Navy test and evaluation). FY 1988 and later funding is only for Navy unique requirements. The Improved Identification Development project (W0676) develops new Non-Cooperative Target Recognition (NCTR) techniques as well as improvements to the existing MK XII IFF System. This project has been restructured to allow rapid fielding of the Shipboard Advanced Radar Target ID System (SARTIS), an NCTR system, on selected 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

C. (U) PROJECT DESCRIPTION: This project provides for the development and integration of Non-Cooperative Target Recognition (NCTR) techniques, as well as improvements to existing MK XII IFF equipment. Major efforts include development of the Shipboard Advanced Radar Target ID system (SARTIS), an NCTR device; development of the Centralized IFF (CIFF) System, which correlates ID inputs from multiple sensors; integration of CIFF with the AUTO-ID system developed under PE 0603382N; and support of tri-service NCTR programs.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Finished fabrication of Advanced Radar Target Identification System (ARTIS) brassboards for Tri-Service Target ID Program (TRITIP).
   b. (U) Contracted for CIFF EDMs for T&E at NESEA and APL.
2. (U) FY 1989 Program:
   a. (U)
   b. (U) Development of SARTIS ADM hardware; improve algorithms on existing weapons systems and investigate other demonstrations.
   c. (U) Support tri-service NCTR (TRITIP).
3. (U) FY 1990 Plans:
   a. (U) Initiate CIFF/AUTO-ID development for DDG 51 class.
   b. (U)
   c. (U) Support tri-service NCTR (TRITIP).
4. (U) FY 1991 Plans:
   a. (U) Continue CIFF/AUTO-ID development.
   b. (U) Conduct DT/OT of CIFF/AUTO-ID.
   c. (U) Support tri-service NCTR (TRITIP).
   d. (U) Commence SLQ-20 antenna development.
5. (U) Program to Completion:
   a. (U) Continue tri-service NCTR efforts until transition to production.

E. (U) WORK PERFORMED BY: CONTRACTOR: Allied/Bendix Communications, Towson, MD; Scope Inc., Reston, VA. IN-HOUSE: NRL, Washington, DC; NOSC, San Diego, CA; NADC, Warminster, PA; NESEA, St. Inigoes, MD.

F. (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.

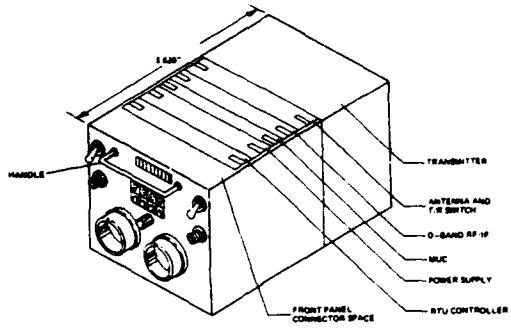
G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To
OPN #114	Actual	Estimate	Estimate	Estimate	Complete
		Not Applicable			Continuing

H. (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
Project Number: W1253 Project Title: COMBAT ID SYSTEM



POPULAR NAME: MARK XV

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		II 12/88			IIIA (4Q/93) IIIB (1Q/95)
Engineering Milestones		PDR (4Q/89)		CDR (1Q/91)	
T&E Milestones	D/V ADM Surf. Tests				DT&E/IOT&E
Contract Milestones		FSED Award (2/89 est.)			LRIP (94-96) Full Prod. (96-08)

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract		800	3,000	22,000	(USAF lead)
Support Contract	700	1,100	1,800	3,000	Continuing
In-House Support	6,793	13,723	15,063	25,015	Continuing
GFE/ Other					
Total	7,493	15,623	19,863	50,015	Continuing Continuing

Program Element: -0604211N Budget Activity: 4
Program Element Title: IDENTIFICATION FRIEND OR FOE SYSTEMS
Project Number: W1253 Project Title: COMBAT ID SYSTEM

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The MK XV Combat Identification System is a Tri-Service, NATO-interoperable, OSD-interest effort. MK XV will be a form, fit and function replacement for most present MK X/XII IFF systems. The system's development for three generic Navy platforms is under a "core" program under Air Force lead; "core" funding comes entirely from Air Force Program Element 0604625F under a Tri-Service budget based transfer. Navy specialized developments and integration engineering for more than 120 other USN/USMC/USCG platforms are under the Navy "unique" project. This project provides funds for the design, development, integration, analysis and test of Navy "unique" MK XV for Navy ships, submarines, shore stations and aircraft.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed support of "core" D/V phase ADM T&E, FSED RFP and specifications preparation; Air Force released RFP, received proposals and initiated source selection with Navy support.
   b. (U) Initiated information transfer of engineering specifications for many Navy "unique" platforms; initiated planning for 120-plus platforms.
   c. (U) Prepared for "core" Milestone II and NATO participation in full scale development.
2. (U) FY 1989 Program:
   a. (U) Complete "core" source selection support for Milestone II planned for December 1988; Air Force to commence FSED by February 1989.
   b. (U) Continue information transfer of engineering specifications and contractor designs to initial Navy "unique" platforms; continue planning for 120-plus Navy platforms.
   c. (U) Initiate specialized developments and integration engineering for early-priority "unique" platforms (F-14, E-2C, SH-60, AV-8B), commence planning/preparations for test and evaluation.
3. (U) FY 1990 Plans:
   a. (U) Continue "core" program information transfer of specifications and designs to Navy "unique" platforms; continue planning for 120-plus platforms.
   b. (U) Continue "unique" specialized developments and integration engineering; continue planning/preparation for test and evaluation.
4. (U) FY 1991 Plans:
   a. (U) Contract for integration engineering for ships and aircraft not covered by the "core" program.
   b. (U) Following "core" CDR, transfer baseline design information to all Navy "unique" platforms; solidify planning for 120-plus platforms.
   c. (U) Continue "unique" specialized developments and integration engineering; solidify designs/interfaces.
   d. (U) Initiate fabrication of early-priority specially-developed equipments; solidify plans for test and evaluation.

5. (U) Program to Completion:
   a. (U) Complete "unique" specialized developments and integration engineering for 120-plus Navy platforms; complete tests and evaluations.

Program Element: 0604211N Budget Activity: 4
Program Element Title: IDENTIFICATION FRIEND OR FOE SYSTEMS
Project Number: W1253 Project Title: COMBAT ID SYSTEM

b. (U) Initiate and complete contractual arrangements for production of "core" units, specialized Navy "unique" units and integration efforts to support Navy 15-year installation plan.

c. (U) Accomplish "core" Tri-Service IOC (first Battle Group equipped FY 1998) and Navy FOC (FY 2008).

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC, NOSC, San Diego, CA; NAC, Indianapolis, IN; NESEA, St. Inigoes, MD; NADC, Warminster, PA; NATC, Lexington Park, MD. CONTRACTORS (FSED): Allied/Bendix Corporation, Towson, MD; Raytheon Corporation, Marlborough, MA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: -

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	Navy-unique integration delay	-26,098

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: A reduction of -26,098 delays MK XV integration onto Navy-unique platforms.

F. (U) PROGRAM DOCUMENTATION: O. R. (MROC 20-83), 7/84; TEMP signed by services and submitted to OSD for approval.

G. (U) RELATED ACTIVITIES: PE 0604725F, Combat ID Systems; PE 0604790A IFF Equipment. These program elements fund the MK XV core program and the Army and Air Force unique integration efforts.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
OPN #114		Not applicable			Continuing

Program Element: 0604211N Budget Activity: 4
Program Element Title: IDENTIFICATION FRIEND OR FOE SYSTEMS
Project Number: W1253 Project Title: COMBAT ID SYSTEM

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: This project is covered by two Memoranda of Understanding. A third MOU with Italy for cooperative FSED of the MK XV IFF System is under negotiation with signature in the second quarter of FY89.

- o MOU for Cooperation in Development and Later Stages of the Nato ID System.
- o Signed by US, Canada, Belgium, Denmark, France, Germany, Italy, Spain, Turkey, United Kingdom, Netherlands.
- o US Signed 10 October 1986.
- o 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).
- o Signed by US, France, Germany, Italy, United Kingdom.
- o US signed 20 October 1987.
- o Covers cooperation in testing, use of common subcomponents, frequency allocation and other areas.

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1707	LAMPS Improvement	3,533	1,938	1,099	21,387	Cont.	Cont.
W1902	Penguin	16,483	7,934	6,175	0	0	85,328
Total		20,016	9,872	7,274	21,387	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Light Airborne Multi-Purpose System (LAMPS) MK III is a computer integrated ship/helicopter system that increases the effectiveness of surface combatants. LAMPS is optimized for anti-submarine and anti-surfare 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 for 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 1990/91 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1707	LAMPS	3,533	1,938	1,099	21,387	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Block I Upgrade includes increasing sonobuoy receiver capability from 31 to 99 channels, integrating system requirements for the MK-50 torpedo, integrating Global Positioning System (GPS), and Penguin missile capability. Also included is development work for a Flight Incident Recorder (FIR). Block II upgrade will provide acoustic enhancements, tactical data transfer and a classification sensor. Acoustic enhancements consist of Airborne Low Frequency Sonar (ALFS), UYS-2 acoustic processor, broadband processing, and digital sonobuoy capability. The tactical data transfer capability will enable the SH-60B to transfer its tactical data via UHF burst transmission to an ASN-123 or ASN-150 equipped air or surface platform. The classification sensor will be an inverse synthetic aperture radar (ISAR) which will be integrated into the SH-60B replacing the APS-124 radar and enabling the SH-60B to classify surface targets outside the range of surface to air weapons.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - DT/OT testing conducted on MK 50 Torpedo and 99 Channel sonobuoy receiver.
   - Commenced development of the flight incident recorder.

2. (U) FY 1989 Program:
   - Continue development of the FIR.
   - Evaluate ALFS demonstration models.
   - Complete OT testing of 99 Channel receiver and MK 50 Torpedo

3. (U) FY 1990 Plans:
   - Testing of FIR.
   - Conduct competition for Block II upgrade.

4. (U) FY 1991 Plans:
   - Commence development of Block II Upgrade for Acoustic Enhancements, tactical Data transfer and classification sensor.

5. (U) Program to Completion:
   - Complete Block Upgrade developments.
   - This is a continuing program.

FY 1990/91 BIENNIAL 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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Naval Air Test Center, Patuxent River, MD. CONTRACTORS: International Business Machines, Owego, NY; Sikorsky, Stratford, CT; Smiths Industries, Grand Rapids, MI.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: No Change

F. (U) PROGRAM DOCUMENTATION:

	BLOCK I	FIR	BLOCK II
TEMP	7/88	TOR 9/85	OR 6/88
		PMP 87-2	PMP 8/88

G. (U) RELATED ACTIVITIES: PE 0604610N MK 50 Torpedo Developement (integration with SH-60B); PE 0604777N Global Positioning System (integration with SH-60B); PE 0604219N Advanced Low Frequency Sonar (integration with SH-60B).

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

APPN/P-1		FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN-1	#19	-	-	50,100	20,000	Cont.
APN-5	#46	-	-	-	35,000	Cont.
OPN	#211*		Not applicable			Cont.

* P-1 data not available in this budget.

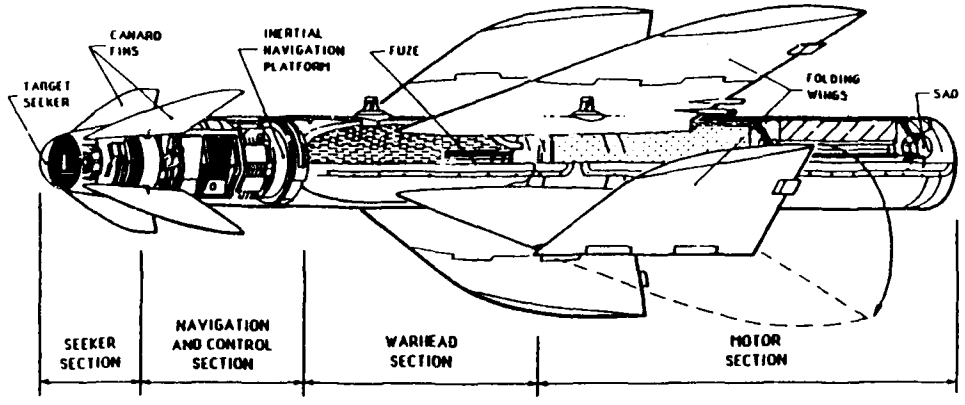
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) MILESTONE SCHEDULE:

BLOCK I				BLOCK II	
Penguin		FIR			
FSED	1/85	FSED	6/88	RFP	2Q/90
M/SIIIB	3Q/90	M/S IIIB	3Q/90	FSED	2Q/90
MK-50		GPS			
99 Channel					

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604212N Budget Activity: 4
Program Element Title: Light Airborne Multi-Purpose System MK III
Project Number: W1902 Project Title: PENGUIN Missile



POPULAR NAME: PENGUIN

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			AFP MS IIIB 3Q/90		—
Engineering Milestones	CDR 3/88 FCA 6/88				
T&E Milestones	DT-IIA/DT-IIB	OT-IIA 4Q89	OT-IIB OPEVAL 1Q90		
Contract Milestones		Long Lead 2/89	Initial Procurement		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	11,400K	2,061K	1,809K	0	15,270K
Support Contract	-0-	100K	100K	0	200K
In-House Support	5,083	5,773K	4,266K	0	15,122K
GFE/Other	-0-	-0-	-0-	0	-0-
Total	16,483K	7,934K	6,175K	0	85,452K -0-

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604212N Budget Activity: 4
Program Element Title: Light Airborne Multi-Purpose System MK III
Project Number: W1902 Project Title: PENGUIN Missile

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The PENGUIN Missile is currently in service with several NATO countries as a surface-to-surface and air-to-surface, anti-ship weapon. During tests, the missile was successfully test fired from a patrol boat and a high speed aircraft (F-16). This program will integrate PENGUIN for launch from a helicopter by modifying the motor and warhead (meeting USN insensitive munitions requirements) and the SH-60B helicopters to provide carriage and launch capabilities.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Contract Data Review completed.
b. (U) Logistic Review completed.
c. (U) Functional Configuration completed.

2. (U) FY 1989 Program:

a. Begin and complete DT-IIA/B and OT-IIA testing.
b. Commence OT-IIB (OPEVAL).
c. Negotiate production contract for missile (MOU with Government of Norway).
d. Continue test of ship shipalt installation.
e. Conduct captive carry testing.
f. Complete aircraft modification.

3. (U) FY 1990 Plans/Program to Completion:

a. OT-IIB completed.
b. Captive carry completed.
c. Milestone IIIB 3Q/FY 90.
d. Complete test ship shipalt installation.
e. Complete captive flight/separation/jettison testing.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA. CONTRACTORS: Naval Material Command, Haakonsvern, Norway.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604212N Budget Activity: 4
Program Element Title: Light Airborne Multi-Purpose System MK III
Project Number: W1902 Project Title: PENGUIN Missile

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Deviation	15 Mos. IOC slip	$6,175K
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Norsk Forsvarsteknologi changed concept of how to develop an Insensitive Munitions Rocket Motor from strip laminate casing to a monolithic case and caused a fifteen month slip due to hardware delivery delays. This schedule slip requires funding in FY-90 to complete development. A $6,175K department adjustment was made to complete PENGUIN development.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:
OR #017-05-84 4/84
NDCP 4/87
TEMP awaiting approval

G. (U) RELATED ACTIVITIES: PE 0604212N, LAMPS MK III - Project W1707

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

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
WPN P-1 #22/23	3.5	3.5	43.4	40.5	41.5

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
° MOU signed between US and Norway for development of missile on 26 September 1986.
° Production MOU to begin negotiations FY 89.

J. (U) TEST AND EVALUATION DATA: See Congressional Data Sheet.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT
Project Number: W1378 Project Title: AH-1 AIRCRAFT

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
AH-1 AIRCRAFT	11,880	11,600	18,295	17,067	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1990, a new wing tip station will begin FSD efforts that will provide 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 1988 Accomplishments:

a. (U) Milestone II; FSD contract awarded September 1988.
b. (U) Contractor began design and logistics effort.
c. (U) Government furnished equipment procured for prototype fabrication.
d. (U) Logistics Review Group Audit held third quarter.

2. (U) FY 1989 Program:

a. (U) Preliminary design review held, and detail design efforts near completion.
b. (U) Logistic documentation developed updated as required.

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT
Project Number: W1378 Project Title: AH-1 AIRCRAFT

3. (U) FY 1990 Plans:

a. (U) Critical design review held.
b. (U) Night Targeting System (NTS) fabrication and test of prototypes will be complete.
c. (U) Aircraft integration of prototypes scheduled.
d. (U) Checkout and ground tests will be performed.
e. (U) Nonrecurring engineering begun for aircraft modification.
f. (U) Wing tip station begins design and development efforts.
g. (U) Develop AH-1 mission capability improvements options.

4. (U) FY 1991 Plans:

a. (U) NTS contractor testing completes.
b. (U) DT-IIA, OT-IIA completed and DT-IIB begins.
c. (U) Wing Tip Station prototype development complete and integration efforts begin.

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

D. (U) WORK PERFORMED BY: CONTRACTOR: Israel Aircraft Industries, Tamam Plant, Yahud Industrial Zone, Israel; Kollsman, Merrimack, NH; Bell Helicopter Textron, Inc., Fort Worth, TX; Collins Radio Division, Rockwell International, Cedar Rapids, IA; Emerson, St. Louis, MO. IN-HOUSE: Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Test Center, Patuxent River, MD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHD	None	None	None
COST	None	1 yr. slip	-14,306

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The -14,306 will result in the deletion of the AH-1W Fire Control Computer and slip in the start of STINGER Integration efforts.

Program Element: 0604213N Budget Activity: 4
Program Element Title: HELICOPTER DEVELOPMENT
Project Number: W1378 Project Title: AH-1 AIRCRAFT

F. (U) PROGRAM DOCUMENTATION: NTS Operational Requirement #061-05-87 dated 26 December 1985. Memorandum of Understanding dated 4 August 1987 between the United States Government and the Government of Israel. Draft Test and Evaluation Master Plan #1244 27 April 1987. Wing tip station operational requirement #213-05-90 dated 19 April 1988.

G. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) APPN/P-1 APN/#48	0	0	11,592	27,222	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

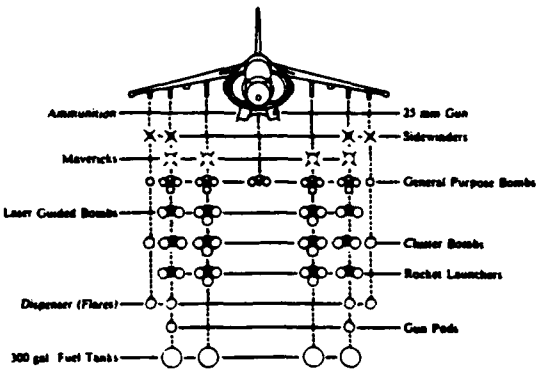
- o MOU signed by Government of Israel and the United States - Aug 1987.
- o Common development costs shared on a one third/two thirds basis respectively.
- o Unique development and actual aircraft modification costs are borne by requiring country.

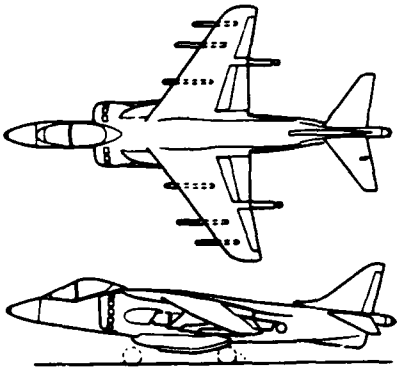
J. (U) MILESTONE SCHEDULE:

NTS PROGRAM:	DATE CALENDAR YR
Milestone IIA (APRB)	7/88
FSD Contract Award	9/88
Preliminary Design Review	3/89
Critical Design Review	11/89
Initial Flight Test	1/91
Trial Kit Procurement	11/90
DT/OT IIA Completed	6/91
Milestone IIIA (Limited Prod.)	10/91
DT/OT IIB Completed	5/92
Milestone IIIB (Full prod.)	9/92
WING TIP STATION	
FSD Contract Award/Design efforts begin	4/90
Design Reviews/aircraft integration begins	10/90
DT testing performed	4/91
OT testing completed	5/92
Milestone III (Full prod.)	9/92

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	TAV-8B IOC 7/88		N. ATTACK IOC 5/90		
Engineering Milestones	N ATK FSD ASPJ INTEG	COMP ASPJ INTEG 3/89			
T&E Milestones	N. ATK DT/OT OMNIBUS OFP	DEV TEST 408 OMNIBUS	FLT TEST 408 OMNIBUS	OMNIBUS OFP UPDATE	ANNUAL OFP UPDATE
Contract Milestones	Close AV-8B DEV CONTRACT		1st prod. DEL F402-RR- 408		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total / To Complete
Major Contract	29,317	29,804	21,317	22,608	1,283,416 / 77,453
Support Contract	1,181	1,500	1,400	1,300	31,231 / 4,275
In-House Support	3,925	5,000	4,900	4,600	118,825 / 14,449
GFE/ Other	2,032	2,456	1,893	1,761	45,381 / 6,571
Total	36,455	38,760	29,510	30,269	1,478,853 / 102,748

Program Element: 0604214N Budget Activity: 4
Program Element Title: AV-8B AIRCRAFT (ENGINEERING)
Project Number: W0652 Project Title: AV-8B

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The AV-8B will meet the Marine Corps requirements for a light attack aircraft to provide responsive offensive air power 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 that has 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 1988 Accomplishments:

a. (U) Completed AV-8B development contract.
b. (U) Completed AV-8B shipboard suitability and interface testing, including Shipboard Marine Remote Area Approach and Landing System (SMRAALS), and Close-in Approach Indicator - MOD II (CAI MOD II).
c. (U) Continued AV-8B weapons integration/envelope expansion/OFP update.
d. (U) Initiated development for correction of deficiencies identified during TAV-8B flight testing.
e. (U) Completed AV-8B Night Attack System contractor and Navy development flight testing.
f. (U) Completed AV-8B Night Attack System operational flight testing.
g. (U) Continued Pegasus engine upgrade development.
h. (U) Commenced ASPJ integration testing.

2. (U) FY 1989 Programs:

a. (U) Continue development of corrections for deficiencies identified during TAV-8B flight testing.
b. (U) Initiate development of corrections for deficiencies identified during Night Attack flight testing.
c. (U) Continue on-going P^{3}I projects.
d. (U) Commence altitude chamber and flight testing of F402-RR-408 upgrade engine.
e. (U) Continue weapons integration/envelope expansion with upgraded AV-8B and AV-8B Night Attack System Operational Flight Program (OFP) software.
f. (U) Complete ASPJ integration testing.

Program Element: 0604214N Budget Activity: 4
Program Element Title: AV-8B AIRCRAFT (ENGINEERING)
Project Number: W0652 Project Title: AV-8B

3. (U) FY 1990 Plans:

a. (U) Continue on-going P^{3}I 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.

4. (U) FY 1991 Plans:

a. (U) Continue on-going P^{3}I projects.
b. (U) Continue weapons integration/envelope expansion with upgraded AV-8B and AV-8B Night Attack System OFP software.

5. (U) Program to Completion:

a. (U) Continue on-going P^{3}I projects.
b. (U) Continue weapons integration/envelope expansion.
c. (U) Provide AV-8B and AV-8B Night Attack System OFP software updates annually through FY93.

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, Saint Louis, MO.

E. (U) COMPARISON WITH FY 1988 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Peg. Eng. Upgrade	None	+18,069
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Initiated development of Pegasus engine upgrade. The addition of +18,069 will support Pegasus Engine upgrade.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

Program Element: 0604214N Budget Activity: 4
Program Element Title: AV-8B AIRCRAFT (ENGINEERING)
Project Number: W0652 Project Title: AV-8B

F. (U) PROGRAM DOCUMENTATION:

OR	10/75	Rev 10/84
DCP	1/87	
TEMP	9/87	

G. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1	Procurement justification material does not contain this level of detail.				
APN-1/#7, 8					

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 FY84; TAV-8B production deliveries began in FY84; TAV-8B production deliveries began in FY87, production deliveries of the AV-8B Night Attack System will begin in September 1989.

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT

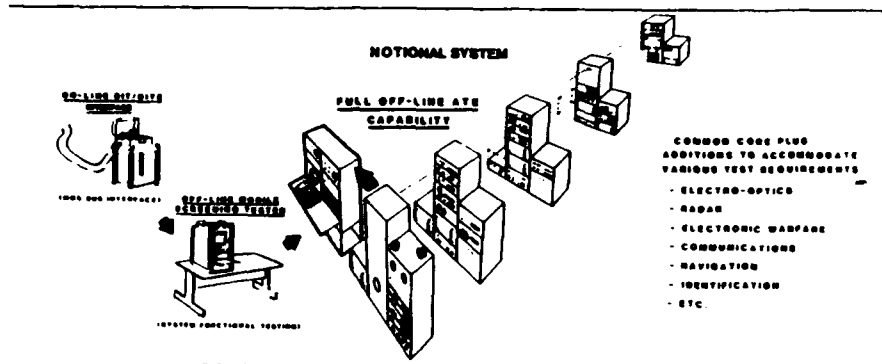
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0852	Consolidated Automated Support System (CASS)	59,195	66,780	53,718	12,049	Cont.	Cont.
S1857	Calibration Standards	3,906	3,174	4,015	4,135	Cont.	Cont.
W0601	A/C Handling and Service	0	0	4,346	4,379	Cont.	Cont.
W1842	A/C Gas Turb. Test Facility	0	0	1,992	1,992	Cont.	Cont.
TOTAL		63,101	69,954	64,071	22,555	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The program element consists of four projects; W0852, Consolidated Automated Support Systems (CASS) S1857, Metrology Calibration Standards (CAL Stds). W0601, Aircraft Handling and Servicing Equipment and W1842 Aircraft Gas Turbine Test Facility. 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CASS



CONSOLIDATED AUTOMATED SUPPORT SYSTEM (CASS)

POPULAR NAME: CASS

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			111A-1/90	IIIB-1/91	
Engineering Milestones		FCA-6/89 PAT-9/89	PCA-9/90		
T&E Milestones		DT-IIB/C-7/89 OT-IIA-9/89	OT-IIB-4/90		Continuing
Contract Milestones			LPO-1/90	FPO-1/91	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	56,000	59,963	47,439	8,589	Continuing
Support Contract	563	1,400	750	100	Continuing
In-House Support	2,538	5,242	5,354	3,325	Continuing
GFE/ Other	94	175	175	35	Continuing
Total	59,195	66,780	53,718	12,049	Continuing

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CASS

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
a. (U) Conducted major reviews of contractor's design and development progress.
b. (U) Fabrication, assembly, test (FAT) and integration of pre-production units commenced.
c. (U) Development Testing (DT-IIA) conducted.
d. (U) Preliminary and detailed development for avionics test program (PAT) sets started.
e. (U) Preparations for TECHEVAL (DT-IIC) and OPEVAL (OT-IIB, completed and DT/OT on planned schedule.

2. (U) FY 1989 Program:
a. (U) Fabrication, assembly, test and integration of pre-production units will be completed.
b. (U) System software integration will be completed.
c. (U) Self-maintenance Test Program Set (TPS) and Support of Support (SOS) and calibration TPS integration will be completed.
d. (U) Design and development for avionics TPS will be completed and integration begun.
e. (U) Conduct DT-IIB, DT-IIC (TECHEVAL) and OT-IIA.
f. (U) Conduct Functional Configuration Audit (FCA).
g. (U) ILS maintenance plan will be delivered.

3. (U) FY 1990 Plans:
a. (U) Complete FAT and PAT of pre-production units and integration of avionics test program sets (TPS).
b. (U) Complete ILS evaluation; continue R&M analysis.
c. (U) Obtain approval for and begin limited production.

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CASS

d. (U) Complete qualification/certification of a dual competitive source for full production.

e. (U) Conduct OT-IIB 4/90 - 9/90.

f. (U) Commence Physical Configuration Audit (PCA) and establish product baseline to Level III drawings.

4. (U) FY 1991 Plans:

a. (U) Obtain approval for and commence full production.

b. (U) Complete PCA and the initial training courses for CASS operators and maintenance technicians.

c. (U) Commence Pre-planned Product Improvement (P^3I). Among the basic concepts of CASS will be the ability to insert new technology without impacting application software, and ease of reconfiguration to adapt to changes in airwing mix or weapon system modifications thereby avoiding obsolescence and the need for new testers.

5. (U) Program to Completion:

a. (U) Continue P^3I program to support introduction of new technology and weapons systems.

b. (U) Conduct T&E as required, coincident with new weapon systems.

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., Hunstville, AL.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	+1,532

NARRATIVE DESCRIPTION OF CHANGES

1. TECHNICAL CHANGES: None.
2. SCHEDULE CHANGES: None.
3. COST CHANGES: Funding plus will be utilized to develop a joint USAF/Navy CASS upgrade to meet USAF high mobility tester (HIMOT) requirement. HIMOT will support F-15, F-16, F-111 and A-7 for USAF and the USAF/USN V-22.

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0852 Project Title: CASS

F. (U) PROGRAM DOCUMENTATION:

NDCP	4/86
TEMP	7/86

G. (U) RELATED ACTIVITIES: A Memorandum of Agreement (MOA) is currently being executed between the Naval Air Systems Command and the Air Force Logistics Command to establish liaison and possibly lead to eventual procurement of CASS Portable Test Sets (CPTSs) for the Air Force High Mobility Tester (HIMOT) requirement. Air Force planning indicates HARM and AMRAAM Missiles will be supported by CPTS.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1					
#67 Common Grd Eqp	0	0	169,878	173,077	Cont.
(APN-7)	0	0	75	100	600

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: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: S1857 Project Title: CALIBRATION STANDARDS (CALSTD)

C. (U) PROJECT 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 apart of a Joint Logistics Commanders directed effort.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Program:
a. (U) Continued Imaging IR Calibration System, Navy Requirements Analysis, Advanced Instrument Controller, Equipment Tolerancing System and Aircraft Voltage Standard (10 ppm).
b. (U) Completed Ruggedized A/C volt Std Cal. Interface Device.

2. (U) FY 1989 Program:
a. (U) Continue Equipment Tolerancing System, Navy Requirements Analysis, 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.

3. (U) FY 1990 Plans:
a. (U) Continue Navy-wide technology assessment for metrology requirements, funding for Navy requirements at National Bureau of Standards (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 standand.

4. (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.

5. (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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W0601 Project Title: ACFT HANDLING AND SERVICE EQUIPMENT

C. (U) PROJECT DESCRIPTION: Project is to improve fleet readiness by application of new technology to DOD support equipment systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans: 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) Advanced engine test systems with state-of-the-art digitized capability.

b. (U) Increased propulsion engine start capability to meet increased start requirements for future aircraft.

c. (U) Hydraulic test systems with capability to test hydraulic aircraft pumps and motors at 8000 psi.

d. (U) Non-destructive inspection of large areas of advanced composite materials.

e. (U) Boresight equipment for existing and future generation aircraft.

4. (U) FY 1991 Plans: Continue the projects initiated in FY 1990.

5. (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 part of a coordinated Tri-Service effort endorsed, supported and directed by the Joint Logistics Commanders. 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604215N Budget Activity: 4
Program Element Title: SUPPORT EQUIPMENT
Project Number: W1842 Project Title: A/C GAS TURBINE FACILITIES

C. (U) PROJECT DESCRIPTION: 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 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans: Commence development of configurations for turbojet/fan, turboshaft, turboprop engine test facilities; develop modular aspects of test facilities for configuration management and logistic support. Due to funding reduction this effort will not complete utnil FY 1991.

4. (U) FY 1991 Plans:
   a. (U) Complete configuration development.
   b. (U) Conduct analysis to assure facility configuration/suitability for conducting performance tests, re: engine test procedures and maintenance plans.
   c. (U) Scale model verification and compatibility testing moved into FY 1992.

5. (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) 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. There is no unnecessary duplication of effort within the Navy or the Department of Defense.

G. (U) OTHER APPROPRIATION FUNDS: This is not a non-acquisition program.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604218N Budget Activity: 4
Program Element Title: Air/Ocean Equipment Engineering
Project Number: X0532 Project Title: Fleet Air Ocean Eq

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0532	Fleet Air Ocean Eq.	2,074	2,036	2,467	2,777	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENTS: Program funds engineering development of sensors/systems designed to measure atmospheric/oceanographic parameters for optimum selection/employment of Naval weapon syst./sensors/platforms

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Conducted Automatic Observing System (AOS) site surveys and developed major installation plan.
   b. (U) Conducted analysis of the Mini-Rawinsonde System (MRS) for shorebased applications.
   c. (U) Awarded contract for the Shipboard Meteorological and Oceanographic Observing System (SMOOS) FSED prototype.
   d. (U) Completed SMOOS System Design Review (FSED).
2. (U) FY 1989 Program:
   a. (U) Build four SMOOS EDM systems.
   b. (U) Complete AOS site survey.
   c. (U) Start NDI equipment evaluation for operational requirements.
3. (U) FY 1990 Planned Program:
   a. (U) Conduct SMOOS TECHEVAL.
   b. (U) Start development of AOS interfaces.
   c. (U) Continue installation engineering and support planning for AOS.
4. (U) FY 1991 Planned Program:
   a. (U) Achieve Milestone III AFP of SMOOS.
   b. (U) Start development of P^{3}I for SMOOS sensors and TESS (3) for small combatants.
   c. (U) Continue evaluation of NDI equipment for fulfilling operational requirements.
5. (U) Program to Completion:
   a. (U) Continue development and test of P^{3}I sensors into SMOOS.
   b. (U) Continue evaluation of NDI equipment for fulfilling operational requirements.

D. (U) WORK PERFORMED BY: IN HOUSE: Naval Air Development Center, Warminister, PA; Naval Electronics Systems Engineering Center, Vallejo, CA.

E. (U) RELATED ACTIVITIES: PE 0603207N, Air/Ocean Tactical Applications; PE 0604707F, Weather Systems Engineering Development.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN #207	0	0	3,336	9,790	Continuing	Progam

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604219N Budget Activity: 4
Program Element Title: Airborne ASW Developments
Project Number: W0485 Project Title: CV Helo Avionics Improvement

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0485	CV Helo Avionics	0	0	8,105	8,605	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Program improves the performance, reliability and maintainability in current ASW helicopter platforms. This project upgrades the primary sensor of the SH-60F CV Inner Zone Helicopter by developing the Airborne Low Frequency Sonar (ALFS) using new sensor technology. ALFS will be integrated with the AN/UYS-2 computer for acoustic processing. Current operational requirement for the ALFS establishes the need for an improved dipping sonar beginning in the mid-1990s to maintain effectiveness against projected threat submarines. The ALFS will provide long range active search, detection and classification of subsurface threats, and provide an embedded training capability to maintain combat ready skills.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: Not applicable.
2. (U) FY 1989 Program: Not applicable.
3. (U) FY 1990 Plans: Award FSED contract and commence development.
4. (U) FY 1991 Plans: Continue sonar FSED.
5. (U) Program to Completion: Continue sonar FSED. Aircraft integration work will be initiated in FY 1992 for test bed effort for DT-IIA. Complete testing OT-IIA, DT-IIB, OT-IIB.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN. CONTRACTORS: TBD for development of sonar (Compete in FY 1990). Sikorsky Aircraft Division, Stratford, CT (FY 1992 for aircraft integration).

E. (U) RELATED ACTIVITIES: None.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN/211	Not applicable					Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

REVISED 10/88

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element: Title: P-3 Modernization Program

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1152	Adv. Signal Processor Sys Integration	4,381	4,937	12,013	11,439	Cont.	Cont.
W1588	P-3 UPDATE IV Avionics	91,997	129,476	140,049	34,315	37,667	493,260
W1926	LRAACA	1,304	65,832	205,085	231,599	410,708	914,528
TOTAL		97,682	200,245	357,147	277,353	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program is the most cost effective alternative to upgrade the P-3 force to counter the quieter, faster, Soviet submarine threat. This program provides upgrades to the aircraft defensive and offensive systems to enhance the P-3C's surface and subsurface tracking, classification, and attack capability. The ASP System Integration (W1152) Project provides an improved acoustic system to process more advanced active & passive sonobuoys; and increase the operational capability of the Advanced Signal Processor (ASP). 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 increasingly 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 Long Range Air ASW Capability Aircraft (LRAACA) (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. LRAACA 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.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1152 Project Title: ASP System Integration

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

Project Number	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1152	4,381	4,937	12,013	11,439	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project provides the P-3C UPDATE III with an improved acoustic system that will process more advanced active and passive sonobuoys and maintain pace with the emerging threat. It will increase the operational capability of the Advanced Signal Processor (ASP) by integrating the current hardware/software configuration with Passive Tracking Algorithms (PTA), a 32-channel half-bandwidth capability (Channel Expansion-CHEX); constant resolution (CR) modes, Broadband, Digital Track (Post CHEX); 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 ASP and CP-901 Tactical Computers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
° Complete Update III CHEX Implementation and QA testing.
° Commence and Terminate Update III CHEX DT at NATC.
° Update III CHEX software technical deficiency corrections and implementation.

2. (U) FY 1989 Program:
° Update III CHEX software technical deficiency corrections & stability testing.
° CHEX and ACAP Release 4.0 Development Test (DT) to be conducted Jur.-Aug 1989.
° ACAP 5.0 (constant resolution, Broadband, and SSQ-53D) software requirements definition and start of software implementation.
° Develop the processing & define designs for incorporating advanced sensors & acoustic algorithms for future updates of ACAP software.
° Develop Post CHEX requirements definition.
° Requirements definition and start of software implementation for Tactical Surveillance Sonobuoy (TSS) validation.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1152 Project Title: ASP System Integration

3. (U) FY 1990 Plans:
   - CHEX and ACAP release 4.0 OT to be conducted Oct-Dec 1989.
   - Integration of ACAP release 5.0 software into ASP hardware.
   - Update III Post CHEX software implementation and QA.
   - Digital Track integration testing.
   - ASP system controller software implementation and testing.
   - Integration of Limited capability TSS system (ACAP release 6.0).
   - Limited capability TSS implementation and QA.
   - DT of Limited System TSS.
   - Develop requirements and specifications for Full Capability TSS system for ASP Integration.
4. (U) FY 1991 Plans:
   - Integration and Evaluation of Post-CHEX software.
   - Continue requirements and specifications definition for full capability TSS system.
   - Continue Integration of full capability TSS system (ACAP release 6.0) software into ASP hardware.
   - ASP system controller software implementation.
5. (U) Program to Completion:
   - Test and Evaluation of Post CHEX Software.
   - Correction of Post-CHEX deficiencies - FY 1992.
   - Develop requirements and specifications for Block II advanced sensors, (Enhanced Low Cost Sonobuoy System), Acoustic Algorithms, and - FY 1993.
   - Continue integration of Advanced Sensor - FY 1993.
   - Test and Evaluation of Advanced Sensor software.
   - This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC Warminster, PA; NATC Patuxent River, MD. CONTRACTORS: IBM, Manassas, VA; Lockheed Aeronautics and Space Company, Burbank, CA: Computer Sciences Corporation, Warminster, PA; Pacer, Bedford, MA: UNISYS, St. Paul, MN.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	CHEX SLIP	+9,263
SCHD	NONE	NONE	NONE
COST	NONE	NONE	NONE

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Channel Expansion (CHEX) was removed from TECHEVAL (July 1988) due to software instability. A plan has been implemented to correct deficiencies. This adjustment added one year to all milestones. Increased FY 90 funding +$9,263 to reflect a more realistic profile necessary to execute the program.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1152 Project Title: ASP System Integration

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)

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN-5* #53	8,339	7,250	2,600	2,800	23,989
APN-6 #53	450	1,050	550	550	3,150

* Funding for CHEX, Post-CHEX and Block I and II Sensors only.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENT: None

J. (U) MILESTONE SCHEDULE:

ACAP 5.0 Software Release	JUN 1989
CHEX IOC	
ACAP 6.0 Software Release	MAR 1991
Post-CHEX TECHEVAL	DEC 1991
Post-CHEX OPEVAL	JUN 1992
Post-CHEX IOC	
TSS Advanced Sensor TECHEVAL	JAN 1993
TSS Advanced Sensor OPEVAL	MAY 1993
TSS IOC	

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1588 Project Title: P-3 Update IV Avionics

POPULAR NAME: UPDATE IV

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				MSIIIA 3Q91	MSIIIB 3Q/92
Engineering Milestones	PDR 2/88 CDR 6/88				
T&E Milestone			DTIIA/B 4Q/90	OTIIA 1Q/91 TEVAL 3Q/91 OEVAL 4Q/91	
Contract Milestones		WST/IAT 01/89		ALP 2Q/91	AFP 3Q/92 RFT 2Q/93

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	72,260	92,609	84,062	2,480	275,525 10,089
Support Contract	2,652	4,427	4,826	2,456	80,783 4,281
In-House Support	8,510	7,071	12,266	7,602	43,761 4,381
GFE/Trainers Other	8,575	25,369	38,895	21,777	93,191 18,916
Total	91,997	129,476	140,049	34,315	493,260 37,667

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1588 Project Title: P-3 Update IV Avionics

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments:
   - ° Continue development of UPDATE IV avionics system.
   - ° Preliminary Design Review - February 1988.
   - ° Critical Design Review - June 1988.

2. (U) FY 1989 Program:
   - ° Installation of prototype system aboard flying test bed.
   - ° Delivery of software development laboratory and avionics integration laboratory to Navy.
   - ° Contractor laboratory ground and flight test execution.
   - ° Continue development of EMSP SEM-E.
   - ° Award trainer contract for UPDATE IV (UIV) WST and Integrated Avionics Trainer (IAT).

3. (U) FY 1990 Plans:
   - ° Contractor ground and flight test.
   - ° Continue development of EMSP SEM-E.
   - ° Conduct initial development and operational Navy test of weapon system for UPDATE IV avionics suite.

4. (U) FY 1991 Plans:
   - ° Conduct Milestone IIIA.
   - ° Conduct TECHEVAL/OPEVAL.
   - ° Approval for limited production (ALP).
   - ° Continue development of UIV WST & IAT trainers.

5. (U) Program to Completion:
   - ° Conduct Milestone IIIB 3Q/92.
   - ° Approval for Full Production - 3Q/92.
   - ° UIV WST and IAT trainers are Ready For Training (RFT) - NAS Jacksonville 2Q/93.

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, NY; Trainer Acquisition TBD.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1588 Project Title: P-3 Update IV Avionics

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	NONE	+63,078

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: UPDATE IV Milestone II decision for FSED (Jul 87) approved an increase of +33,980 in FY 1990 over the previous pre-contract estimate. UPDATE IV Tactical Trainer development was transferred from PE 0604708N to PE 0604221N W1588, Increasing FY 1990 +25,391. Other necessary budget adjustments resulted in +3,706.

F. (U) PROGRAM DOCUMENTATION: TEMP 5/87; AP 6/87; NDCP 7/87

G. (U) RELATED ACTIVITIES: UPDATE IV avionics will be incorporated into LRAACA (PE 0604221N W1926), and retrofitted into existing P-3C UPDATE IIs. Prior to FY 1990 the UPDATE IV trainer was included in Initial Trainer Acquisition P.E. 0604708N.

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

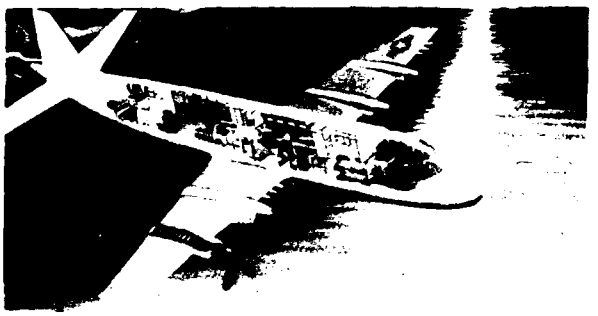
APPN/P-1		FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN-5	APN #52	0	0	0	66,100	Continuing
APN-6	APN #52	0	0		19,133	Continuing

** UPDATE IV Avionics equipment is an integral part of the LRAACA program, thus, APN-1 funding has been reflected in the LRAACA summary profile.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
- Development MOU with Federal Republic of Germany (FRG) is being negotiated.
- FRG financial commitment will be made when Development MOU is signed (est Apr 89).
- Collaboration includes Boeing Aerospace, Texas Instruments, and AT&T.

J. (U) TEST AND EVALUATION: This information is contained in the FY 1990/1991 Congressional Data Sheets.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1926 Project Title: Long Range Air ASW Capable Aircraft



POPULAR NAME: LRAACA

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

SCHEDULE	FY1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MSII 01/89			MSIIIA 3Q/92 MSIIIB 3Q/93 MSIIIC 3Q/94
Engineering Milestones		PDR 8/89	CDR 3/90		
T&E Milestones				DTII 4Q/91	OTII 2Q/92 TEVAL 1Q/93 OPEVAL 4Q/93
Contract Milestones		FSED CONTR AWD 01/89			

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	200	52,000	152,980	202,019	688,600 281,401
Support Contract	210	2,156	2,223	2,780	16,852 9,483
In-House Support	676	4,680	4,680	15,457	39,492 13,999
GFE/Trainers Other	218	6,996	45,202	11,343	169,584 105,825
Total	1,304	65,832	205,085	231,599	914,528 410,708

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1926 Project Title: Long Range Air ASW Capable Aircraft

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The LRAACA project will competitively procure 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 LRAACA provides greater payload and range/on-station time with fewer personnel and lower operating and support costs (versus existing P-3C capabilities). Specific improvements include incorporation of the P-3 UPDATE IV mission avionics.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - Contractor Proposals received/commence proposal evaluation - Feb 1988.
   - BAFO Proposals rec'd/Final proposal Evaluation - Aug 88/Sep 88.
   - Operational Test Assessment Conducted - September 1988.

2. (U) FY 1989 Program:
   - Award studies Contract - October 1988
   - Milestone II - January 1989
   - FSED Contract Award - January 1989.
   - Continue engineering design of prototype aircraft.
   - Conduct preliminary design reviews.
   - Place order for GFE (Prototype Aircraft).
   - Contractor obtain vendor qualifications.
   - Contractor commence component testing.
   - Commence prototype fabrication/manufacture.
   - Commence fabrication of static and fatigue test articles.

3. (U) FY 1990 Plans:
   - Complete critical engineering design of prototype aircraft.
   - Continue design reviews.
   - Contractor continue evaluation of vendor qualifications.
   - Contractor continue component testing.
   - Continue prototype aircraft number one fabrication/manufacture.

4. (U) FY 1991 Plans:
   - Commence prototype aircraft number two fabrication/manufacture.
   - Continue production readiness reviews.
   - Conduct prototype aircraft number one final assembly.
   - Conduct contractor ground and initial flight test of prototype aircraft number one.
   - Conduct initial development testing.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1926 Project Title: Long Range Air ASW Capable Aircraft

5. (U) Program to Completion:
° Delivery of prototype aircraft #1 and #2 to Navy.
° Award LRAACA Trainer Contract for CPT/OFT/NAMT 2Q/93.
° Conduct TECHEVAL/OPEVAL in FY 1993/1994.
° Obtain Approval for Full Production in FY 1994.
° Perform DT III/BIS/OT III - TBD.

D. (U) WORK PERFORMED BY: IN-HOUSE: NATC, Patuxent River, MD; NADC, Warminster, PA. CONTRACTORS: TBD. An FSED contract award is scheduled for January 1989. Lockheed Aeronautical Systems Company, Burbank, CA has been selected as the winner of the LRAACA competition.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	IOC Changed	None
COST	None	None	+202,118

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL: None.

2. (U) SCHEDULE CHANGES: Definition of IOC changed. This moved IOC from Aircraft delivery schedule remains the same. IOC is defined as the A review of the program indicated that the first three lot one aircraft are required at the Fleet Replacement Squadron to enable training for the transition of aircrew and maintenance personnel. IOC will now occur with the delivery of which go to an operational squadron.

3. (U) COST CHANGES: In FY 1990 Navy adjustments: transferred +130,000 non-recurring APN funds within this project into RDT&E,N to more approriately represent funding; and increased LRAACA RDT&E,N +72,966 to improve the schedule while changing the pilot production aircraft (APN) schedule, and adjusting the project for inflation. Department adjustment decreased FY 1990 funding -848.

F. (U) PROGRAM DOCUMENTATION: OR 11/87; DCP 12/88; TEMP 12/88.

G. (U) RELATED ACTIVITIES: LRAACA will utilize the mission avionics being developed under PE 0604221N W1588 - UPDATE IV Avionics.

Program Element: 0604221N Budget Activity: 4 - Tactical Programs
Program Element Title: P-3 Modernization Program
Project Number: W1926 Project Title: Long Range Air ASW Capable Aircraft

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

	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
APN-1 APN #22,23	0	0	0	19,880	6,245,533
APN-6 APN #67	0	0	0	0	695,348

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

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1990/ 1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604260N Budget Activity: 4
Program Element Title: CH/MH-53E

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0901	Helicopter Night Vision Systems	4,324	0	0	0	0	4,324
W1109	CH/MH-53E	6,609	8,826	8,102	9,644	Cont.	Cont.
TOTAL		10,933	8,826	8,102	9,644	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element contains two projects, W0901 Helicopter Night Vision System which provides an IR Night Vision System for the CH-53E transport helo and MH-53E minesweeping helo, and W1109 CH/MH-53E which relates to a needed engine upgrade and integration of a Global Positioning System and composite main rotor blade.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604260N Budget Activity: 4
Program Element Title: CH/MH-53E
Project Number: W0901 Project Title: HELICOPTER NIGHT VISION SYSTEM

C. (U) PROJECT DESCRIPTION: This effort provides an infrared Night Vision System for the Marine Corps CH-53E transport and the Navy MH-53E minesweeping helicopters. The present Marine Corps and Navy helicopters' ability to perform amphibious warfare and tactical minesweeping operations is severely restricted by the lack of 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.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed integration of the system to the airframe.
b. (U) Commenced ground and flight tests.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans: Not Applicable.

4. (U) FY 1991 Plans: Not Applicable.

5. (U) Program to Completion: Not Applicable.

E. (U) WORK PERFORMED BY: Sikorsky Aircraft Division; United Technologies Corporation, Stratford, CT; Martin Marietta, Orlando, FL.

F. (U) RELATED ACTIVITIES: Intergration of U.S. Army AH-64 Helo Pilot Nignt vis System (FLIR) into H-53E.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 APN-5/#45			6.0	0.0	Cont.

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604260N Budget Activity: 4
Program Element Title: CH/MH-53E
Project Number: W1109 Project Title: CH/MH-53E

C. (U) PROJECT DESCRIPTION: This project provides for the development of an upgrade to the H-53E T-64-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 also provides for funding of development required to integrate a Global Positioning System (GPS) into the MH-53E. This project provides funding for development of a Composite Main Rotor Blade (CMRB).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Awarded upgraded engine development contract.
b. (U) Commenced specification and source selection development for GPS integration.

2. (U) FY 1989 Program:

a. (U) Complete development and flight test of upgraded engine.
b. (U) Commence GPS integration effort.

3. (U) FY 1990 Plans:

a. (U) Fabricate and test GPS prototype.
b. (U) CMRB contract award.
c. (U) CMRB fabrication test.

4. (U) FY 1991 Plans: GPS TECHEVAL and flight test.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NAC Indianapolis, IN; NATC Patuxent River, MD; CONTRACTORS: Sikorsky Aircraft, Stratford, CT; General Electric Corp., Lynn, MA.

F. (U) RELATED ACTIVITIES: Program Element 0604777N, Global Positioning System (GPS) is a space-based radio positioning navigation system which is a joint Army/Navy/Air Force project with the Air Force as the lead Service.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 APN-5/#45	Not Applicable				Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604261N Budget Activity: 4 - Tactical Program
Program Element Title: Acoustic Search Sensors Engineering

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0478	Expendable, Reliable Acoustic Path Sonobuoy	4,132	4,326	6,778	5,563	9,201	30,000
W0480	ASW Sensors & Processing	1,545	1,075	3,786	3,540	Cont.	Cont.
W1624	Broadband Acoustic Sys	13,076	11,391	5,723	13,650	Cont.	Cont.
W2000	Horizontal Line Array	3,685	9,073	9,660	10,256	Cont.	Cont.
W2001	Tactical Surveillance Sonobuoy	12,717	16,874	23,886	21,556	Cont.	Cont.
	Total	35,155	42,739	49,833	54,565	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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) improve cost and operational effectiveness through the use of automated production lines, development of , exploitation of , and promotion of competition. (4) improve logistics support; (5) develop advanced aircraft avionics and software to process the mid-1990/2005 sensors.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604261N Budget Activity: 4 - Tactical Program
Program Element Title: Acoustic Search Sensors (Engineering)
Project Number: W0478 Project Title:Expendable Reliable Acoustic Path Sonobuoy

C. (U) PROJECT DESCRIPTION: The 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 [redacted] 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 1988 Accomplishments:
   a. (U) Completed technical evaluation of contract proposal.
   b. (U) Awarded one Firm Fixed Price (FFP) FSED contract to remain within funding cap contained in Congressional language
   c. (U) Initiated contractor engineering tests

2. (U) FY 1989 Program:
   a. (U) Complete System Design Review
   b. (U) Complete contractor engineering tests
   c. (U) Initiate contractor demonstration tests

3. (U) FY 1990 Plans:
   a. (U) Complete Preliminary Design Review
   b. (U) Continue full-up model development

4. (U) FY 1991 Plans:
   a. (U) Complete Critical Design Review
   b. (U) Complete contractor demonstration tests and initiate Navy demonstration tests

5. (U) PROGRAM TO COMPLETION:
   a. (U) Complete OPEVAL in 1994
   b. (U) Initiate rate production in 1995

E. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NAC, Indianapolis, IN; NWSC, Crane, IN; NATC, Patuxent River, MD. CONTRACTORS: ERAPSCO (MAGNAVOX/SPARTAN).

F. (U) RELATED ACTIVITIES: NONE.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY-88	FY-89	FY-90	FY-91	To Complete
OPN	Not Applicable				Continuing

* No P-1 line item in this budget

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NONE.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604261N Budget Activity: 4 - Tactical Program
Program Element Title: Acoustic Search Sensors (Engineering)
Project Number: W0480 Project Title: ASW Sensors & Processing

C. (U) PROJECT 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

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   - Doppler Enhancement (DE) - Completed flight tests, selected implementation approach and initiated software development.
2. (U) FY 1989 Program:
   - DE - 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. Cancel algorithm for DE.
3. (U) FY 1990 Plans:
   - Acoustic Intercept System (AIS) - Complete acquisition documentation.
   - Award two Firm Fixed Price FSED contracts for the AIS processor development.
   - (U) Commence systems integration.
4. (U) FY 1991 Plans:
   - AIS - Initiate hardware development test.
   - Complete design development and development testing, and initiate operational evaluation.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminister, 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 0604217N, S-3 Weapon System Improvement Program (host platform)
PE 0604211N, P-3 Modernization (host platform)

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY-88	FY-89	FY-90	FY-91	To Complete
OPN *		Not Applicable			Continuing

* No P-1 line item in this budget

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604261N Budget Activity: 4 - Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W1624 Project Title: Broadband Acoustic System

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1624	Broadband Acoustic Systems	13,076	11,391	5,723	13,650	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develop passive sonobuoys to detect and localize quiet threat submarines by exploiting their broadband acoustic signals. This project addresses broadband alerting sonobuoys that will be deployed in a high density field concept for initial detection of quiet broadband targets in barriers or screens or for small area search. Designs will be pursued that are compatible with advanced manufacturing technology (automated production) to produce an alerting sonobuoy at significantly reduced costs; the Low Cost Sonobuoy System (LCSS). The LCSS initiative is a three tiered development program of baseline LCSS, Enchanced LCS (ELCS) and Improved LCS (ILCS) to progressively build on these technologies and develop tactics to counter the increasingly quieter threat.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued sonobuoy launcher development testing.
   b. (U) Completed AN/ARR-78 sonobuoy receiver scanner modification design.
   c. (U) Initiated P-3 software integration and S-3 requirements definition.
   d. (U) Incorporated sonobuoy design engineering changes to enhance operational utility.
   e. (U) Conducted Test, Analyze and Fix (TAAF) program.

2. (U) FY 1989 Program:
   a. (U) Initiate system studies for the ELCS system.
   b. (U) Conduct development test of sonobuoy design enhancements, launcher and receiver modifications.
   c. (U) Complete design and code of P-3C software changes.

3. (U) FY 1990 Plans:
   a. (U) ELCS designs will be fabricated for development tests.
   b. (U) Award ELCS ADM contracts to two contractors.
   c. (U) Initiate ELCS system component test and evaluation.

Program Element: 0604261N Budget Activity: 4 - Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W1624 Project Title: Broadband Acoustic System

4. (U) FY 1991 Plans:
   a. (U) Complete demonstration/validation of ELCS.
   b. (U) Prepare contract procurement package for award of ELCS FSD contracts.
   c. (U) Conduct system component test and evaluation for ELCS.
   d. (U) Initiate ELCS avionics impact study.
   e. (U) Develop ELCS B-Specification.

5. (U) Program to Completion:
   a. (U) Complete development, test and evaluation of ELCS and ILCS systems.

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminster, PA; NAC, Indianapolis, IN; NWSC, Crane, IN; NATC, Patuxent River, MD; NSWC, White Oak, MD. CONTRACTORS: Sparton Corporation, Jackson, MI; Sippican Ocean Systems, Inc., Marion, MA, Hazeltine, L. I. NY; Magnavox, Fort Wayne, IN; Hermes Dartmouth, NS, Canada.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	LCS not effective	No IOC	-5.565M
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: LCS was assessed. The decision was made to not procure LCS and to increase emphasis within Broadband Acoustic Systems on the development of Enhanced Low Cost Sonobuoy (ELCS).
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

OR	3/85
AP	2/86
TEMP	3/86
RDC	9/87

Program Element: 0604261N Budget Activity: 4 - Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W1624 Project Title: Broadband Acoustic System

G. (U) RELATED ACTIVITIES:
PE 0604221N, P-3 Modernization (host platform)
PE 0604217N, S-3 Weapons System Improvement Program (host platform)
PE 0604212N, LAMPS Improvement

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY-88	FY-89	FY-90	FY-91	To Complete
OPN *		Not Applicable			Continuing

* No P-1 line item in this budget.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

Low Cost Sonobuoy System	MS II FY 83/4Q
Enhanced Low Cost Sonobuoy	MS II FY 92/1Q MS III FY 96/1Q

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604261N Budget Activity: 4 - Tactical Program
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W2000 Project Title: Horizonal Line Array (HLA

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W2000	Horizontal Line Array (HLA)	3,685	9,073	9,660	10,256	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The HLA sonobuoy is an expendable air launched sensor utilized by ASW aircraft to achieve long range acoustic detection of submarine targets in a battle group screen and large search areas. HLA consists of a self-tensioning horizontal line array of passive hydrophones and is designed to transmit multiplexed digital acoustic data to the aircraft for processing. HLA Air Deployable Active Receiver (ADAR) utilizes the HLA sonobuoy with modified avionics as a multi-static active receiver for use with low frequency active sources. The primary goal is detection and localization of 1990 threat submarines in all environments in the 1995-2005 timeframe.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continue display/post-processing algorithm development and tests.
   b. (U) Continue processor software requirements specification and prototype software.

2. (U) FY 1989 Program:
   a. (U) Complete processor software requirements specification and prototype software
   b. (U) Initiate processor software design, code and test
   c. (U) Complete prototype display/post-processing scheme
   d. (U) Award one fixed price type contract for FSED

3. (U) FY 1990 Plans:
   a. (U) Initiate sonobuoy component tests and system integration
   b. (U) Continue processor software design, code, test and integration

Program Element: 0604261N Budget Activity: 4 - Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W2000 Project Title: Horizontal Line Array (HLA)

4. (U) FY 1991 Plans:
   a. (U) Complete sonobuoy component tests
   b. (U) Initiate sonobuoy full-up tests
   c. (U) Complete processor software design, code and tests

5. (U) Program to Completion:
   a. (U) Complete HLA TECHEVAL and OPEVAL leading to full production in 1995
   b. (U) Conduct ADAR development and initial operational test

D. (U) WORK PERFORMED BY: IN-HOUSE: NADC, Warminister, PA; NAC, Indianapolis, IN; NWSC, Crane, IN; NATC, Patuxent River, MD. CONTRACTOR: TBD

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	1YR DELAY	-17,640K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The reduction of -$17,640K resulted in a one year delay of HLA development and test, and delayed initiation of ADAR into FSED to FY92.

F. (U) PROGRAM DOCUMENTATION:

OR	11/85
AP	1/87
TEMP	(6/89)

Program Element: 0604261N Budget Activity: 4 - Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W2000 Project Title: Horizontal Line Array (HLA)

G. (U) RELATED ACTIVITIES:

PE 0602771N, Undersea Target Surv. Tech. (active source development)
PE 0603254N, Air Anti-Submarine Warfare (advanced development for HLA and HLA/ADAR)
PE 0603708N, Advanced Acoustic Processing (detection algorithm development)
PE 0604217N, S-3 Weapon System Improvement Program (host platform)
PE 0604217N, P-3 Modernization (host platform)

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY-88	FY-89	FY-90	FY-91	To Complete
OPN *		Not Applicable			Continuing

* No P-1 line item in this budget

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

J. (U) MILESTONE SCHEDULE:

	HLA	ADAR
MS II	7/89	12/91
TECHEVAL	1/95-6/95	7/93-1/94
OPEVAL	7/95-10/95	2-6/94
MS IIIB	1/96	8/94

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604261N Budget Activity: 4-Tactical Programs
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W2001 Project Title: Tactical Surveillance Sonobuoy (TSS)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W2001	Tactical Surveillance Sonobuoy	12,717	16,874	23,886	21,556	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 modfications to maintain performance against the quieter 1990 threat.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed systems design and preliminary design reviews.
   b. (U) Initiated contractor engineering tests.

2. (U) FY 1989 Program:
   a. (U) Initiate processor software development.
   b. (U) Initiate platform display prototype development.
   c. (U) Complete contractor engineering tests.
   d. (U) Conduct contractor demonstration tests.
   e. (U) Complete critical design review.

3. (U) FY 1990 Plans
   a. (U) Complete processor software development.
   b. (U) Complete prototype display and platform interface specifications.
   c. (U) Complete Navy development tests and initiate TECHEVAL.
   d. (U) Initiate ETSS engineering development.

Program Element: 0604261N Budget Activity: 4-Tactical Program
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W2001 Project Title: Tactical Surveillance Sonobuoy (TSS)

4. (U) FY 1991 Plans:
   a. (U) Complete TECHEVAL and OPEVAL.
   b. (U) Procure ETSS test articles.

5. (U) Program to Completion:
   (U) Complete ETSS development and initial operational testing in FY 1994.

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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	Maintain Schedule	+6,486K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NONE.
2. (U) SCHEDULE CHANGES: NONE.
3. (U) COST CHANGES: FY 1990 +6,598K will maintain schedule with ETSS and execute ETSS FSED.

F. (U) PROGRAM DOCUMENTATION:

	TSS	ETSS
TOR	6/85	6/85
DOP	12/85	12/85
OR	6/85	6/85
AP	8/86	N/A
TEMP	2/88	N/A

Program Element: 604261N Budget Activity: 4 - Tactical Program
Program Element Title: Acoustic Search Sensors (Eng)
Project Number: W2001 Project Title: Tactical Surveillance Sonobuoy (TTS)

G. (U) RELATED ACTIVITIES:
PE 0602771N, Undersea Target Surveillance Technology (candidate technology approaches)
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)

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY-88	FY-89	FY-90	FY-91	To Complete
OPN *		Not Applicable			Continuing

* No P-1 line item in this budget

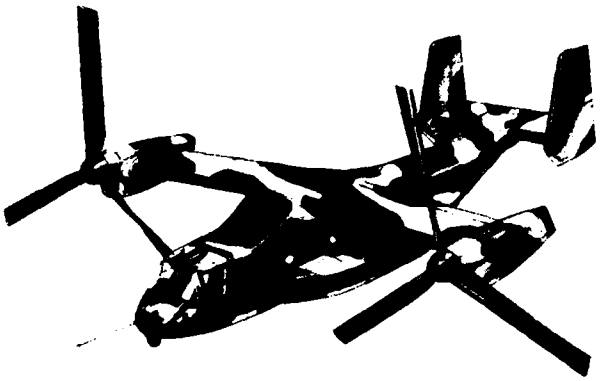
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: N/A

J. (U) MILESTONE SCHEDULE:

	MS II	TECHEVAL	OPEVAL	MS III
TSS	9/87	5/90 - 11/90	1/90 - 4/91	6/91
ETSS	4/90	5/93 - 11/93	1/94 - 4/94	FY95

FY 1990/1991 BIENNIAL 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:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		Prod. Cont. Awards	MS-IIIA	MS-IIIB	MS-IIIC
Engineering Milestones					
T&E Milestones	OT-IIA IIIA	8/89 OT-IIB 12/89	8/90 OT-IIC	8/91	Continuing
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	423,030	264,800	192,868	133,600	2,253,435
Support Contract	5,581	5,777	5,971	3,985	37,782
In-House Support	32,420	32,310	23,346	22,563	173,964
GFE/GFSE Other	1,967	0	0	0	21,755
Total	462,998	302,887	221,185	160,148	2,486,936 98,461

Program Element: 0604262N Budget Activity: 4
Program Element Title: V-22 OSPREY
Project Number: W1425 Project Title: V-22

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The V-22 program is designed to provide an aircraft to meet the amphibious/ vertical assault needs of the Marine Corps, the strike 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 2000 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 1988 Accomplishments: Flight preparation began for aircraft numbers one through four.

2. (U) FY 1989 Program:

a. (U) Development and operational testing is to be conducted at both the contractors' sites and at various Government sites.
b. (U) Flight preparation begins for aircraft numbers five and six.
c. (U) First flight is scheduled.

3. (U) FY 1990 Plans:

a. (U) Approval for Limited Production is scheduled.
b. (U) Complete DT-IIE/OT-IIB testing.

4. (U) FY 1991 Plans:

a. (U) Complete DT/OT-IIC testing.

5. (U) Program to Completion:

a. (U) FY 1992 completes FSD phase.
b. (U) Obtain Approval for Full Production.

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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-1,141

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: This reduction of -1,141 will be applied to field activity support.

F. (U) PROGRAM DOCUMENTATION:

JSOR	8/85
DCP	5/86
TEMP, M960	7/86
ACQ PLAN	7/86
JTP/NTP	12/86

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	
APPN/P-1						
APN-1/#15, 16	0	333,924	1,418,572	1,726,633	Cont.	

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 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604262N Budget Activity: 4
Program Element Title: V-22 OSPREY
Project Number: W2064 Project Title: VV-22

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
VV-22	0	0	0	17,932	63,909	81,841

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The VV-22 is a variant of the MV-22 tilt-rotor aircraft for use as an executive transport. The VV-22 will have a sophisticated communications suite and upgraded interior. The VV-22 will replace the VH-3D helicopter, which is approaching the end of its service life.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans: Not Applicable.

4. (U) FY 1991 Plans:

   a. (U) Award Full Scale Development Contract.
   b. (U) Begin cabin design.
   c. (U) Begin communication suite integration design.

5. (U) Program to Completion:

   a. (U) Begin mock-up for cabin configuration.
   b. (U) Perform component fabrication and assembly.
   c. (U) Conduct component testing.
   d. (U) Deliver production aircraft.

D. (U) WORK PERFORMED BY: CONTRACTORS: Bell-Boeing, Fort Worth, TX, Allison Gas Turbine, General Motors Corp., Indianapolis, IN.

Program Element: 0604262N Budget Activity: 4
Program Element Title: V-22 OSPREY
Project Number: W2064 Project Title: VV-22

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

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: Not Applicable.

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	0	0	0	0	TBD	TBD

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

J. MILESTONE SCHEDULE:

FSD contract award FY 1991
Milestone III FY 1993
Aircraft delivery FY 1996/1997

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604264N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEMS (ALSS)
Project Number: W0606 Project Title: AVIATION PERSONNEL LIFE SUP. SYSTEM

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ALSS	18,288	16,965	24,354	20,513	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Provides engineering development, evaluation, fleet introduction and support of aircrew clothing and devices which enhance mission performance; protect from natural and generated stresses and hazards; and integrate with inflight escape, survival and rescue provisions. Program includes adaptation of nondevelopment items, joint service developments, NATO/allied cooperative ventures, and integration with existing ALSS, aircraft and maintenance/ logistics processes. Subprojects: Inflight systems; escape/crash safety systems; rescue and survival systems; special mission equipment; mission specific equipment. Acronyms: On Board Oxygen Generating System (OBOGS), Dual Service G Suit (DSGS), 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, BAVI-Body Armor Vest Integration, AILSS-Advanced Integrated Life Support Systems, ATCS-Advanced Technology Crew Station, AODS-Aircrew Oxygen Delivery System.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Inflight Systems:
      (1) OBOGS: Initiated airframe compressor study.
      (2) DSGS: Procured prototypes.
   b. (U) Escape and Crash Safety Systems:
      (1) NACES: Initiated T-45 DT.
      (2) STRIP: Initiated program development.
   c. (U) Survival and Rescue Systems:
      (1) PRC-112: Monitored USA development program: USA lead.
      (2) SOA: Tested nondevelopmental items for survival kit/vest.
      (3) PAESS: Procured prototype; finalized design.
   d. (U) Special Mission Equipment:
      (1) LEP: DT-II/OT-II; initiated incremental IOC Procurement.
      (2) NAERP: Analyzed USAF data.
   e. (U) Mission Specific Equipment:
      (1) T-HELMET: Evaluated USAF HUG-53/P for Navy application.
      (2) R-HELMET: OR approved: prepared TEMP; initiated DT.
      (3) BAVI: OR approved; initiated development; USA lead.

Program Element: 0604264N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEMS (ALSS)
Project Number: W0606 Project Title: AVIATION PERSONNEL LIFE SUP. SYSTEM

2. (U) FY 1989 Programs:
   a. (U) Inflight Systems.
      (1) OBOGS: Prepare contracts for new monitors.
      (2) DSGS: Initiate DT.
   b. (U) Escape and Crash Safety Systems.
      (1) NACES: Complete sled testing; OPEVAL.
      (2) STRIP: Continue program development.
   c. (U) Survival and Rescue Systems.
      (1) PRC-112: Navy FOT&E and procure 1st increment for IOC.
      (2) SOA: Prepare ECPs. test, initiate TORS for CAT I-III items.
      (3) PAESS: Initiate DT; TEMP approval.
   d. (U) Special Mission Equipment.
      (1) LEP: Conduct TECHEVAL; conduct OPEVAL; staff AFP.
      (2) NAERP: TEMP approval; receive test articles; begin DT.
   e. (U) Mission Specific Equipment.
      (1) T-HELMET: Prepare solicitations; conduct DT; prepare ECP.
      (2) R-HELMET: Prepare solicitations; conduct DT; prepare ECP.
      (3) BAVI: TEMP approval; initiate TECHEVAL; USA lead.

3. (U) FY 1990 Plans:
   a. (U) Inflight Systems:
      (1) OBOGS: Complete TECHEVAL; conduct DT; initiate multi-man concentrator.
      (2) DSGS: Monitor USAF contract.
      (3) AILSS: Initiate development.
      (4) ATCS: Develop crew station design guidelines.
      (5) AODS: Milestone II; initiate development.
   b. (U) Escape and Crash Safety:
      (1) NACES: Continue technology transfer for 2nd sourcing.
      (2) STRIP: Execute contract; initiate DT.
   c. (U) Survival and Rescue Systems:
      (1) PRC-112: Procure 2nd increment for IOC.
      (2) SOA: Prepare ECPs; convene Adhoc meeting.
      (3) PAESS: Complete TECHEVAL.
   d. (U) Special Mission Equipment:
      (1) LEP: IOC.
      (2) NAERP: Complete DT; TECHEVAL P-3C/AV-8.
   e. (U) Mission specific Equipment:
      (1) T-HELMET: Conduct DT/OPEVAL; staff AFP.
      (2) R-HELMET: Conduct DT/OPEVAL; staff AFP.
      (3) BAVI: Compete DT; conduct OPEVAL; staff AFP.

4. (U) FY 1991 Plans:
   a. (U) Inflight Systems:
      (1) OBOGS: Backup oxygen system DT; multi-man concentrator DT.
      (2) DSGS: IOC.
      (3) AILSS: Continue development.
      (4) ATCS: DT of proposed designs.
      (5) AODS: TEMP approval; initiate DT-1.

Program Element: 0604264N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEMS (ALSS)
Project Number: W0606 Project Title: AVIATION PERSONNEL LIFE SUP. SYSTEM

b. (U) Escape and Rescue Systems:
(1) NACES: Establish 2nd sourcing IOC T-45/F-14D.
(2) STRIP: Restraint system qualification.
c. (U) Survival and Rescue Systems:
(1) SOA: Prepare ECPs; complete DT-1; initiate DT-2.
(2) PAESS: Complete OPEVAL; AFP.
d. (U) Special Mission Equipment:
(1) LEP: Initiate DT of follow-on systems.
(2) NAERP: Complete OPEVAL; ALP; DT-III; ECP/OSIPS.
(3) PRC-112: Complete procurement for IOC.
e. (U) Mission Specific Equipment:
(1) T-HELMET: IOC.
(2) R-HELMET: IOC.
(3) 21st-H: Milestone II; DT&E.

5. (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 Advanced Systems Company, Seattle, WA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	Various	None
COST	None	None	None

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: OBOGS improvements to A-6F delayed; start up of various ALSS items delayed.
3. (U) COST CHANGE: None.

F. (U) PROGRAM DOCUMENTATION:

	OR	TEMP		OR	TEMP
NACES	12/83	1/88	PAESS	8/86	IN PREP
OBOGS		5/83	R-HELMET	1/88	IN PREP
NAERP	11/86	IN PREP	PRC-112		IN REVIEW
LEP	6/86	IN PREP	BAVI	3/88	IN PREP

Program Element: 0604264N Budget Activity: 4
Program Element Title: AVIATION LIFE SUPPORT SYSTEMS (ALSS)
Project Number: W0606 Project Title: AVIATION PERSONNEL LIFE SUP. SYSTEM

G. (U) RELATED ACTIVITIES: P.E. 0602112N, Aircraft Technology; P.E. 0602233N, Mission Support Technology; P.E. 0603216N, Aviation Life Support Systems. Related Air Force efforts, supported 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1					
APN/#61	554	0	0	0	Cont.
OPN/#210	6,504	5,765	7,555	7,893	Cont.
OPN/#303	7,100	300	6,193	126	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

	II	IIIA	IIIB		II	IIIA	IIIB
NACES	3Q/85	2Q/89	4Q/89	T-HELMET		2Q/90	2Q/91
NAERP	3Q/88	3Q/91	3Q/92	LEP	3Q/88	4Q/89	4Q/90
PAESS			1Q/91	R-HELMET		4Q/88	3Q/89
BAVI			4Q/90	PRC-112			4Q/90

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Engine CIP	33,262	35,675	43,073	47,323	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Aircraft Engine Component Improvement Program (CIP) provides in-service engineering support for all Navy aircraft engines, transmissions, propellers, starters, auxiliary power units, electrical generating systems, fuel systems and fuels, and lubricants. The effort is needed because the exposure of such complex, high-tech systems as engines to the operational environment which inevitably results in unforeseen problems, that 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 operation nor account for the vast array of variables (environment, usage, maintenance technique and expertise, hardware aging, etc.) which cause problems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) F404 Engine (F18 Hornet)

(1) (U) Redesigned auxiliary gearbox bearings to prevent lubrication system contamination and bearing failure.

(2) (U) Commenced qualification testing to significantly extend the life of the combustor case by introduction of new materials.

(3) (U) Conducted flight test of pilot fuel nozzles for improved combustor deceleration flameout margin.

(4) (U) Completed initial design reviews to eliminate silver coated self-locking nuts in order to prevent corrosion cracking.

b. (U) J52 Engine (A6-E Intruder and EA-6B Prowler)

(1) (U) Initiated redesign of compressor exit guide vane, inlet guide vane arm, compressor first stator, hub, and disks to address abnormal wear rates and low-cycle-fatigue lives.

(2) (U) Initiated redesign of turbine outer air seal and front accessory bearing to preclude premature inflight bearing failures.

(3) (U) Conducted testing of redesigned oil and fuel plumbing.

(4) (U) Redesigned main fuel control deceleration cam, sequencing cam, speed set lever, and eliminated pressure ratio bleed control.

(5) (U) Completed redesign of ninth, tenth, and eleventh stage inner air seals and blade root seals to continue improvements in stall margin.

c. (U) F402 Engine (AV8B Harrier)

(1) (U) Continued Digital Engine Control System software package and hardware modifications to improve engine starting.

(2) (U) Completed testing on single crystal first stage high pressure turbine blade; continued testing on second stage high pressure turbine blade. This will double the blade life.

(3) (U) Completed investigation of first and second stage low pressure turbine blade shroud wear flight safety problem.

(4) (U) Completed qualification of a fix to eliminate 2nd stage low pressure compressor disc cracking.

(5) (U) Continued strain gage investigation of low pressure compressor delivery duct cracking.

(6) (U) Qualified hardened stem for the fuel metering unit.

d. (U) F110 Engine (F14 Super TOMCAT):

(1) (U) Updated F14 fatigue/engine monitoring system airborne diagnostic algorithms.

(2) (U) Provided higher temperature fan duct bleed port seal.

(3) (U) Ruggedized inlet guide vane actuation system.

2. (U) FY 1989 Program:

a. (U) F404 Engine (F18 Hornet):

(1) (U) Complete qualification on new self-locking nuts to eliminate silver contamination.

(2) (U) Complete qualification of new material incorporated in number 4 bearing to prevent bearing failure.

(3) (U) Complete qualification of a new steel vs titanium compressor casing to prevent casing burn through fires.

b. (U) J52 Engine (A6-E Intruder and EA-6B Prowler):

(1) (U) Continue front accessory bearing redesign.

(2) (U) Initiate redesign of anti-icing valve.

(3) (U) Accomplish P408 RAM configuration baseline to allow development of P409 variant.

c. (U) F402 Engine (AV8B Harrier):

(1) (U) Complete thermal paint test on bull nose nozzle and validation. Twice the life improvement is anticipated.

(2) (U) Complete qualification of revised oil tank.

(3) (U) Qualify a fix for gear pump drive shaft spline wear.

d. (U) F110 Engine (F14 Super TOMCAT):

(1) (U) Continue F14 fatigue/engine monitoring system airborne and ground station diagnostic algorithm updates.

(2) (U) Improve supersonic deceleration characteristics.

(3) (U) Continue lube system temperature and over-servicing margin improvements. Qualify new heat exchanger.

(4) (U) Continue lead-the-fleet engine testing.

(5) (U) Conduct altitude test for starter design changes.

(6) (U) Initiate improved air start capabilities.

(7) (U) Mission Endurance Test engine build up.

e. (U) ACCESSORIES

(1) (U) Qualify AC/DC 50 ampere regulated converters to improve DC electrical system reliability on F18, AV8B, and V22 aircraft.

(2) (U) Modify existing air turbine starter for use on F110.

(3) (U) Complete qualification of F14D air turbine starter.

(4) (U) Improve EA-6B air turbine starter reliability and safety.

f. (U) Cease CIP support of 3 engines (J85, J79, TF41).

3. (U) FY 1990 Plans:

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) The FY 1990 program will include problems that are uncovered during the conduct of the FY89 CIP program effort through analysis of the "Health of the Fleet" parameters. Tasks will include:

(1) Commence support for F405 (T45).

(2) (U) Improve engine reliability and maintainability by improving on the design of marginal components.

(3) (U) Reduce maintenance and spare part cost through the review, evaluation, and introduction of improved repair techniques.

(4) (U) Reduce/eliminate causes of engine performance deterioration.

(5) (U) Improve reliability of electrical distribution system.

(6) (U) Evaluate advance technology high efficiency generator.

4. (U) FY 1991 Plans:

a. (U) The FY 1991 program will include problems that are uncovered during the conduct of the FY90 CIP program effort through analysis of the "Health of the Fleet" parameters.

b. (U) CIP support for the T406 engine will commence in FY 1991.

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

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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	F404/F110/T-56-427/T406	None	-$9,026

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Department and Navy adjustments of -$9,026 will impact the level of support for the listed engines.

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, jointly funded 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, thereby, eliminating unnecessary duplication of effort.

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

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1	Not Applicable				Cont.

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

J. (U) MILESTONE SCHEDULE: Work tasks under the 15 - 18 CIP contracts are established and managed individually to resolve fleet problems and reduce cost of ownership.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604270N Budget Activity: 4
Program Element Title: Consolidated EW Program

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0805	SHIPBD C&D	146*	*	*	*	*	*
X1794	C^3CM	0	0	7,462	4,618	Cont.	Cont.
X1795	CMAS	2,252	6,602	4,266	4,030	Cont.	Cont.
R1882	DVAL	1,378	2,169	1,011	1,057	Cont.	Cont.
R1742	EW TECH DEV	299	993	922	829	Cont.	Cont.
C0066	COMM/NON COMM ECM	738	1,142	1,586	2,505	302	6,541
C1961	MEWSS	591	1,956	999	1,003	Cont.	Cont.
C1928	TERPES	5,645	6,513	**	**	**	**
S0954	SURFACE EW	36,485	52,521	37,775	44,151	Cont.	Cont.
W0638	TACAIR EW	56,187	82,994	71,774	82,765	Cont.	Cont.
W0619	ASPJ	16,117	7,198	5,617	5,012	0	258,735
W0556	EW COUNTER RES	61,707	26,060	12,760	6,357	3,942	344,208
TOTAL		181,545	188,148	144,172	152,327	Cont.	Cont.

* Note: Project X0805 transferred to Project X1794 with the consolidation of the EW programs/projects.

** 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, development and testing of electronic warfare devices for emergency contingencies.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604270N Budget Activity: 4
Program Element Title: Consolidated EW Program
Project Number: X1794 Project Title: C^3 Countermeasures (C^3CM)

C. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project includes Shipboard Communications Countermeasures (SCCM). SCCM is the shipboard component of the Navy Command, Control and Communications Countermeasures (C^3CM) Program which will enable the fleet to decrease the effectiveness of adversaries C^3 systems. Various techniques will be utilized against a wide spectrum of signal types and frequencies. The SCCM will use processed data [(to select, sequence, and generate appropriate countermeasure transmissions. SCCM will use existing shipboard systems antennas, amplifiers, and transmitters on a shared basis as feasible.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.
2. (U) FY 1989 Program: Not Applicable.
3. (U) FY 1990 Plans:
   a. (U) Full Scale Development including Critical Design Review (CDR).
   b. (U) Complete concept of operations evaluations including a wide spectrum of Signals of Interest (SOI's) and frequency bands for EDM.
   c. (U) Integrate for test purposes SCCM EDM into the [and begin systems integration testing of hardware and software.
4. (U) FY 1991 Plans:
   a. (U) Complete systems integration testing with [
   b. (U) Perform TECHEVAL/OPEVAL.
   c. (U) Request production approval.
   d. (U) Commence requirement development efforts for candidate block upgrade.
   e. (U) Obtain any necessary ancillary shipboard equipments.
5. Program to Completion:
   a. (U) P^3I-Obtain Milestone II approval.
   b. (U) P^3I-Develop FSD.
   c. (U) P^3I-Obtain Production approval.
   d. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: NAVOCEANSYSCEN San Diego CA., NAVSWC Dahlgren VA., NRL Washington D.C. Contractors: Sanders Associates, Inc. Nashua, NH.

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 1988 Actual	FY 1989 Estimate	FY1990 Estimate	FY1991 Estimate	To Complete
OPN #80	Not		Applicable		Continuing

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604270N Budget Activity: 4
Program Element Title: Consolidated EW Program
Project Number: X1795 Project Title: C^3CM Decision Aid

C. (U) PROJECT DESCRIPTION: Command, Control and Communications Countermeasures (C^3CM) Assessment Simulator (CMAS) is a unique, large scale, high resolution, real time, all source simulator which will provide an interactive C^3/C^3CM modeling and data base capability to assess countermeasures effectiveness of applicable system under development.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed system integration testing, to include tests of the Post-Analysis Module, Man-Machine Interface Module, and System Control and Utilities Module.
b. (U) Completed development of data base design document and users manual.

2. (U) FY 1989 Program:

a. (U) Complete coding, debugging, and testing of modules.
b. (U) Initiate C^3CM system development and tactical support analysis efforts.
c. (U) Continue interface to the Navy Command and Control System (NCCS) Afloat Land Based Test Site (LBTS).

3. (U) FY 1990 Plans:

a. (U) Initiate C^3 sensors intelligence update.

4. (U) FY 1991 Plans:

a. (U) Complete coding/testing of interface to NCCS Afloat.
b. (U) Complete design and development of LBTS simulation/stimulation software modules.
c. (U) Complete transfer CMAS software algorithms to EWCM.

5. (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: The Electronic Warfare Coordination Module (EWCM) is PE: 0604230N will incorporate subsets of CMAS software and functional algorithms to support C^3CM planning and assessment capabilities onboard Battle Group/Force Command ships.

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: 0604270N Budget Activity: 4
Program Element Title: Consolidated EW Program
Project Number: R1882 Project Title: Datalink Evaluation Analysis (DVAL)

C. (U) PROJECT DESCRIPTION: DVAL evaluates the anti-jam capabilities of developmental Navy electromagnetically dependent systems and to identify methods for reducing signal vulnerabilities to hostile exploitation.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Acquired generic simulator to simulate hostile jamming.

b. (U) Completed test phase for MK XV Identification Friend or Foe-(IFF) system. Results provided recommendations to correct major limitations.

c. (U) Completed evaluation of Milstar Terminal vulnerability to geographical location and detection.

d. (U) Completed interim study of NAVSTAR Global Positioning System (GPS) Susceptibility modules.

e. (U) Completed study on MILSTAR Terminal susceptibility to partial and multitone jamming.

f. (U) Completed preliminary analysis reports on Joint Tactical Information Distribution System (JTIDS), and NAVSTAR GPS. Completed MK XV IFF Pre-DVAL Final Report.

g. (U) Completed High Frequency Anti-Jam (HFAJ) report on the Anti-Jam results of the dual assessment conducted by JHU/APL.

2. (U) FY 1989 Program:

a. (U) Develop EHF SATCOM, MK XV IFF, and SLC Susceptibility Reports.

b. (U) Develop JTIDS Susceptibility Pre-test Report.

c. (U) Develop GPS Assessibility/Feasibility Pre-Test Report.

3. (U) FY 1990 Plans:

a. (U) Continue development of JTIDS, MK XV IFF, Remote Piloted Vehicle (RPV), and Satellite Laser Communications (SLC) Susceptibility Reports.

b. (U) Complete EHF SATCOM, and GPS Susceptibility Reports.

4. (U) FY 1991 Plans: Continue development of JTIDS, MK XV IFF, and RPV Susceptibility Reports.

5. (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: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (S/NF) FY 1988 Accomplishments:

a. (S/NF) Developed and successfully tested Activated Metal Decoy (AMD) for multi-service application. AMD is an active countermeasures device for

2. (U) FY 1989 Program:

a. (U) Develop and test a set of small deployable jammers and passive decoys for Battle Group defense.

3. (U) FY 1990 Plans:

a. (S) Develop and test Offboard Decoys to counter a growing threat to slow flying fixed wing aircraft.

4. (U) FY 1991 Plans:

a. (U) Extend FY 1990 program to include ship and high speed tactical aircraft applications.

5. (U) Program to Completion:

a. (U) Investigate and develop simple methods to counter the threat using decoys and Miniature Electronic Circuitry.

b. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: Naval Research Laboratory, Washington, DC; 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 APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 990/1991 BIENNIAL 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) PROJECT DESCRIPTION: The goal of this program is to satisfy the continuing requirement for COMM/NON-COMM Systems which will provide the Marine Corps the ability to jam/deceive enemy transmitters. A standoff communications jammer is required which will jam Very High Frequency (VHF) and Ultra High Frequency (UHF) tactical transmitters as a replacement for the currently fielded AN/ULQ-19 jammer. A similar requirement exists to field a system capable of jamming High Frequency (HF) transmitters.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Included VHF/UHF Communication Electronic Countermeasures (CECM) system requirements as an option on USN AN/ASQ-XX() Communications jammer RFP.

2. (U) FY 1989 Program:

a. (U) Complete Milestone III and obtain production decision for a joint VHF/UHF CECM.
b. (U) Conduct 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 systems.

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: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: MEWSS is an Electronic Warfare suite of equipment designed to fit in a highly mobile tactical vehicle. It will provide the ground commander with a mobile Electronic Warfare system capable of operating in a variety of tactical situations. The Electronic Warfare suite will be modular in design to facilitate quick installation and removal. It will detect, locate and degrade enemy tactical Amplitude Modulation (AM) and Frequency Modulation (FM) radio communications.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed planning for Initial Operational Capability (IOC) of phase I system.
   b. (U) Released request for proposals to industry for Full Scale Engineering Development of the Pre-Planned Product (P^3I) program (Phase II).

2. (U) FY 1989 Program:
   a. (U) Achieve IOC of Phase I.
   b. (U) Award contract for the development of Phase II system with production options.

3. (U) FY 1990 Plans:
   a. (U) Continue development of P^3I effort.

4. (U) FY 1991 Plans:
   a. (U) Continue development of P^3I effort.

5. (U) Program to Completion:
   a. (U) Obtain Milestone III approval for production.
   b. (U) Produce twelve P^3I packages and update existing systems.
   c. (U) This is a continuing project.

E. (U) WORK PERFORMED BY: In-house: None. Contractors: To be determined by competitive contracting process for Phase II. Bids on RFP due 28 Feb 89.

F. (U) RELATED ACTIVITIES: None.

G. (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	0	0	0	0	*TBD	*TBD
(U) MILCON	0	0	0	0	0	0

* Note: PMC requirement for Phase II will be identified in POM 92 submission.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Shipboard EW Imp	36,485	52,521	37,775	44,151	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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), 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) Advanced IR Decoy (Torch Distraction).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed FOT&E for Low Band OTH-D Improvements.
   b. (U) Completed Tactical Emitter Feature (TEFE) Phase I for SLQ-32.
   c. (U) Continued testing of SLQ-32 with SADI/DDI Integration.
   d. (U) Completed SLQ-32 ADCAP (Advanced Capability) Improvements. Completed CDR.
   e. (U) Completed SLQ-32 CV/CVN variant factory acceptance.
   f. (U) Defined program for SLQ-32 block upgrade.
   g. (U) Completed Electronic Warfare Control System architecture.
   h. (U) Completed AEWS TWT NRE; initiated High-Power Amplifier testing.
   i. (U) Awarded NULKA FSED vehicle contract, completed Phase I FSED of payload through CDR.
   j. (U) OUTLAW BANDIT information available at higher classification.
   k. (U) Began scale model measurements to economize RCS measurement.
   l. (U) Continued development of infrared measurement capability.
   m. (U) Completed TECHEVAL/OPEVAL.
2. (U) FY 1989 Program:
   a. (U) OT&E SLQ-32 High Band C-Targeting and EMI Improvements.
   b. (U) Award FSED contracts for [ ] program for SLQ-32.
   c. (U) Conduct DDI at-sea testing of SADI with SLQ-32.
   d. (U) Conduct OT&E of CV/CVN SLQ-32(V)4. Commence improvement integration.
   e. (U) Continue SLQ-32 ADCAP FSED.
   f. (U) Initiate FSED for SLQ-32 Block Upgrade Project.
   g. (U) Award [ ] payload contract, continue engineering development payload/vehicle.

FY 1990/1991 BIENNIAL 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

h. (U) Complete milestone III decisions for AEB.
i. (U) Commence and complete development of TORCH Distraction round.
j. (U) Continue Outlaw Bandit.

3. (U) FY 1990 Plans:
a. (U) Continue Phase E FSED for SLQ-32.
b. (U) Complete SLQ-32 ADCAP factory testing.
c. (U) Continue integration of improvements in SLQ-32(V)4.
d. (U) Complete EWCS/RAIDS architecture design and software development.
e. (U) Conduct AIEW Industry Concept study.
f. (U) Initiate [ ] model testing of the NULKA system.
g. (U) Continue Radar Cross Section Measurement development.
h. (U) Continue Outlaw Bandit.

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 Electronic Warfare Control System (EWCS)/RAIDS.
e. (U) Commence development of AIEW.
f. (U) Continue DTII testing of NULKA system.
g. (U) Continue Radar Cross Section Measurement development.
h. (U) Continue Outlaw Bandit.

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

D. (U) WORK PERFORMED BY: In-House: NRL, Washington D.C., NSWC, Dahlgren, VA and White Oak, MD; NWSC, Crane, IN; NOSC, San Diego, CA. Contractors: Raytheon Co., Goleta, CA; ARGO Systems, Inc., Sunnyvale, Ca; S.T. Research Corp., Newington, VA; General Instrument, Hicksville, NY; 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 FY 1988/1989 AMENDED DESCRIPTIVE SUMMARY:

(Dollars in Thousands)

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHED	None	None	None
COST			-18,603

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: Department adjustment of -18,603 will result in identified impacts.

FY 1990/1991 BIENNIAL 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

F. (U) PROGRAM DOCUMENTATION:
1. (U) 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) SLQ-32 TEMP for CV/CVN -- In development.
5. (U) EWCS TOR -- Sep 85; RAIDS OR in review.
6. (U) NULKA TEMP -- Joint TEMP signed by USN Oct 88. Awaiting RAN signature.
7. (U) AEB TEMP -- Nov 83. Undergoing revision.

G. (U) RELATED ACTIVITIES: NATO SEA GNAT, PE: 0604569N

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

	(U) PROCUREMENT	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
1.	(U) SLQ-32 (332312)	71,538	71,020	95,909	92,754	Cont.
2.	(U) WLR-1H (332320)	1,070	6,174	0	0	
3.	(U) Launcher (355655)	7,575	5,846	9,541	6,645	Cont.
4.	(U) Expend. (335655)	15,398	18,233	34,970	58,762	Cont.
5.	(U) OPN/#76 ADCAP, TEFE,AIEW,EWCS/RAIDS	Not Applicable				Cont.
	DDI	0	0	0	600	Cont.
	CV/CVN	37,631	27,199	21,012	0	
6.	(U) OPN/#78	Not Applicable				Cont.
7.	(U) OPN/#255	0	0	11,734	24,076	Cont.
8.	(U) OPN/#243	Not Applicable				Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

(U) Project NULKA is a cooperative R&D program between the USN and Australia to develop an advanced electronic warfare decoy system to protect surface ships against ASMs. MOA signed by SECNAV and the MOD in August 1987. Total Program cost, in US dollars, $94 million. The U.S. share of the common work is 78%, Australia 22%. U.S. is responsible for developing the electronic payload. Australia is responsible for developing the rocket motor, flight control systems, launcher and for final system integration. U.S. prime contractors are Sippican, Inc. and GI. Australian prime contractor is AWA, Ltd. Program is in R&D phase. Payload CDRs were held in August 88. CDRs for Australia are scheduled for Nov 88. Program to be restructured.

(U) U.S. R&D FUNDING (dollars in millions)

J. (U) MILESTONE SCHEDULE:
1. (U) SLQ-32 Low Band OT&E --
2. (U) SLQ-32 High Band and EMI Improvement OT&E --
3. (U) SLQ-32 CV/CVN OT&E -
4. (U) SLQ-32 Advanced Capability-DDI DT/OT at sea test --
5. (U) SLQ-32 Phase E Block Upgrade TEFE FSED -
6. (U) DDI/SADI DT-IIIE/OT-IIIB at sea test
7. (U) EWCS FSED --
8. (U) NULKA -- Milestone III unknown. Program to be restructured.
9. (U) AEB -- Milestone III IOC:
10. (U) TORCH Distraction -- EDM

FY 1990/1991 BIENNIAL 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	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Airborne EW	56,187	82,994	71,774	82,765	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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Advanced Airborne Expendable Decoy-Towed (AAED-T), Integrated Defensive Avionics Program (IDAP), PROFORMA Countermeasures (PCM): Commenced Full Scale Engineering Development (FSED).

b. (U) Generic Expendable (GEN-X) and APR-39(XE-2): Continued FSED.

c. (U) AN/AAR-47: Completed integration and testing.

d. (U) AN/AVR-2: Completed Operational Evaluation (OPEVAL).

e. (U) Fly's Eye: Continued risk reduction.

f. (U) Bol chaff: Completed Foreign Weapons Evaluation (FWE) and planning for Technical Evaluation (TECHEVAL).

g. (U) FEWSG: Initiated AN/ALT-40 Upgrade development effort.

h. (U) IR Countermeasures (IRCM), Laser CM and Electro Optical Countermeasures (EOCM), IR Decoy, RF Countermeasures (RFCM) techniques: Continue development.

i. (U) Strike Electronic Warfare Simulation (SEWS): Continue development.

2. (U) FY 1989 Program:

a. (U) AAED-T, IDAP, APR-39(XE-2), ALE-47, and GEN-X: Continue FSED.

b. (U) APR-39(XE-2): Complete TECHEVAL, commence OPEVAL.

c. (U) Fly's Eye: Risk reduction. Transfer to INEWS/ICNIA.

d. (U) BOL CHAFF: Complete TECHEVAL and commence OPEVAL.

e. (U) PCM: Continue FSED Phase I, aircraft integration.

f. (U) Airborne Self-Protection Jammer (ASPJ): Commence Pre-Planned Product Improvement (P3I) engineering development.

g. (U) IR Decoy, IRCM, Laser CM and EOCM: Continue development.

h. (U) Continue AN/ALT-40 upgrade development. Develop EDM.

FY 1990/1991 BIENNIAL 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

i. (U) Production decision for AVR-2.

j. (U) ALR-67 Advanced Special Receiver (ASR), Multi-Chaff: Commence FSED.

k. (U) RF Countermeasures (RFCM): Continue technique development for new and existing equipments.

l. (U) SEWS: Continue development.

3. (U) FY 1990 Plans:

a. (U) AAED-T, ASR, EA-6B ADVCAP P^{3}I, ASPJ P^{3}I, ALE-47, and IDAP: Continue FSED.

b. (U) GEN-X, APR-39(XE-2), and BOL chaff: Complete OPEVAL

c. (U) ALQ-164: Conduct OPEVAL.

d. (U) PCM: Complete software 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. (G) RFCM: Continue technique development.

h. (H) SEWS: Continue development.

4. (U) FY 1991 Plans:

a. (U) AAED-T, ASR, IDAP, GEN-X, ALE-47, EA-6B P^{3}I, and ASPJ P^{3}I: Continue FSED.

b. (U) GEN-X: Commence P^{3}I.

c. (U) APR-39(XE-2): Procurement decision.

d. (U) FEWSG: Complete upgrade of AN/ALT-40. Initiate FEWSG mission avionics upgrade.

e. (U) IR Decoys, IRCM, Laser CM and EOCM: Continue advanced development.

f. (U) ALE-47, AAED-T, and IDAP: Conduct Operational Testing.

g. (U) PCM: Continue hardware Phase II development.

h. (U) RFCM: Continue technique development.

i. (U) SEWS: Continue development.

5. (U) Project to Completion: This is a continuing project.

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; Sanders Associates, 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.

FY 1990/1991 BIENNIAL 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

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
Tech	None	None	None
Schedule	None	None	None
Cost	None	One year delay in full production of AAED&IDAP	-7,978

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NA
2. (U) SCHEDULE CHANGES: NA
3. (U) COST CHANGES: Department adjustment of -7,978 will result in one year delay in production of AAED and IDAP.

F. (U) PROGRAM DOCUMENTATION:

1. (U) The following programs have current and approved Operational Requirements, Test & Evaluation Plans, or Navy Decision Coordination Proposals: AAED, ASR, IDAP, GEN-X, AAR-47, BOL, FEWSG, PCM, and ASPJ P3I.

G. (U) RELATED ACTIVITIES: Joint Service programs: APR-39 (XE-2), AVR-2, ALE-47, ALQ-162, AAR-47.

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

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
(U) PROCUREMENT					
a. (U) APN-1/BLI#1, 5,8,10,12, 16,17,23	54,297	46,600	39,600	42,600	Cont.
b. (U) APN-5/BLI#65	22,737	87,152	50,471	115,727	Cont.
c. (U) APN-6/BLI#67	4,820	3,220	5,556	4,731	Cont.
d. (U) OPN/BLI#196	16,535	17,546	39,469	45,186	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-			NA
5. (U) APR-39A(XE2)			NA
6. (U) AVR-2	-------		NA
7. (U) Bol chaff	-------		NA
8. (U) PCM	-------		
9. (U) ALQ-47	-------		

FY 1990/1991 BIENNIAL 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

POPULAR NAME: Airborne Self-Protection Jammer (ASPJ)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					
Engineering Milestones	NA				
T&E Milestones	DT-IIC/OT-IIA			OPEVAL F/A-18C	
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major	2,068	2,080	1,738	0	89,714
Support Contract	7,450	588	321	210	69,005
In-House Support	5,809	4,530	3,558	4,802	69,916
GFE/ Other	790	0	0	0	30,100
Total	16,117	7,198	5,617	5,012	258,735 0

FY 1990/1991 BIENNIAL 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 (ASPJ)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Airborne Self-Protection Jammer (ASPJ), designated AN/ALQ-165, is a joint Navy and Air Force program to develop a defensive electromagnetic countermeasure system for self-protection of tactical aircraft (F/A-18, F-14, A-6, 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 1988 Accomplishments:
   a. (U) Continued ASPJ optimization laboratory testing at PMTC.
   b. (U) Completed ASPJ development flight testing in the F/A-18A.
   c. (U) Conducted Initial Operational Test and Evaluation (IOT&E) laboratory testing at AFEWES.
   d. (U) Continued ASPJ prototype engineering and development flight testing in the F-14D, A-6, and AV-8B.
   e. (U) Commenced initial operational test and evaluation (IOT&E) in the F/A-18A.

2. (U) FY 1989 Program:
   a. (U) Commence Developmental Flight Testing (DT) using FSD units in the AV-8B.
   b. (U) Continue ASPJ participatory flight testing in the F-14D.
   c. (U) Complete Initial Operational Test and Evaluation (IOT&E) in the F/A-18C with FSD units.

3. (U) FY 1990 Plans:
   a. (U) Conduct Production Verification (PV) system integration on F/A-18C.
   b. (U) Conduct F-14D operational testing using FSD units.

4. (U) FY 1991 Plans:

   a. (U) Complete Development and Operational Flight Test in the F/A-18C with PV Systems.
   b. (U) Commence Development Flight testing in the AV-8B with PV units.
   c. (U) Complete F-14D FOT&E with PV units.

FY 1990/1991 BIENNIAL 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 (ASPJ)

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; Grumann Aerospace Corporation, Bethpage, Long Island, NY; McDonnell Douglas Corporation, St. Louis, MO; General Dynamics Corporation, Fort Worth, TX; and, Honeywell Inc., Minneapolis, MN.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	Delay production decision to 3Q/89	None
COST	None	None	None

Impact of Changes:

Technology: None

Schedule: Technical problems experienced during Developmental Flight Testing extended duration of the flight test program, delaying the Defense Acquisition Board Milestone IIIA Decision, and award of the Limited Production Contract until 3Q/FY89.

Cost: None.

F. (U) PROGRAM DOCUMENTATION:

1. (U) DCP 02/88
2. (U) TEMP 10/87

FY 1990/1991 BIENNIAL 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 (ASPJ)

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988	FY-1989	FY 1990	FY-1991	To Complete
APN/#7,8,9,10,11,12	Procurement justification material does not contain this level of detail.				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604270N Budget Activity: 4
Program Element Title: Consolidated EW Program
Project Number: W0556 Project Title: EA-6B Advanced Capability (ADVCAP)

POPULAR NAME: EA-6B ADVANCED CAPABILITY (ADVCAP)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	RPG EDM DEL 149 EDM DEL	1st flight 1st flight			
Engineering Milestones	Reliability/ Maint. Demo		Phase II Software Dev		N/A
T&E Milestones		Developmental Testing	Operational Testing		OPEVAL FY92 OPEVAL FY92
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	61,707	18,200	7,846	3,750	344,208
Support Contract	0	100	75	50	Cont.
In-House Support	0	7,760	4,839	2,557	Cont.
GFE/ Other	0	0	0	0	0
Total	61,707	26,060	12,760	6,357	344,208 3,942

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604270N Budget Activity: 4
Program Element Title: Consolidated Electronic Warfare
Project Number: W0556 Project Title: EA-6B ADVCAP

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This program element funds the continuing development and/or integration of all electronic warfare systems for the EA-6B tactical support aircraft. Enhancements to the aircraft to accommodate EW improvements are also included. Major efforts include the development and integration of a new Advanced Capability (ADVCAP) Receiver Processor Group (RPG) and the development and integration of a communications jammer (ALQ-149) and a Communications/Radar Exciter (CRE), into the EA-6B. These efforts provide for the electronic countermeasure response to advanced threat weapon systems which are expanding in frequency, density and technical complexity. The EA-6B weapon system is designed for airborne detection and jamming of enemy command and control systems and radars associated with targeting, surveillance, anti-aircraft artillery, and air-to-surface, surface-to-surface and surface-to-air missiles. It will support carrier based tactical aircraft and battlegroup operations in dense radar-controlled environments.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments
   a. (U) Delivered first ALQ-149 Engineering Development Model (EDM).
   b. (U) Delivered first RPG EDM.
   c. (U) Conducted reliability development and weapon replaceable assembly (WRA) maintainability demonstration.
   d. (U) Commence system integration, logistic support development and test aircraft final assembly.

2. (U) FY 1989 Program:
   a. (U) Deliver final EA-6B ADVCAP RPG EDMs.
   b. (U) Complete delivery of ALQ-149 EDMs.
   c. (U) Conduct reliability development and WRA maintainability demonstration.
   d. (U) Continue system integration, logistics support development and test aircraft final assembly.
   e. (U) Conduct contractor flight tests.
   f. (U) Initiate CRE Full Scale Engineering Development (FSED).

3. (U) FY 1990 Plans:
   a. (U) Conduct Operational Assessment in support of Low Rate Initial Production Decision (Milestone IIIA).
   b. (U) Continue integration of RPG and ALQ-149 on EA-6B.
   c. (U) Continue logistics support development.
   d. (U) Continue contractor flight tests.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604270N Budget Activity: 4
Program Element Title: Consolidated Electronic Warfare
Project Number: W0556 Project Title: EA-6B ADVCAP

4. (U) FY 1991 Plans:
   a. (U) Continue logistics support development.
   b. (U) Continue integration of RPG and ALQ-149 on EA-6B.
5. (U) Program to Completion:
   a. (U) Conduct Navy Technical Evaluation (TECHEVAL) planned for FY 92.
   b. (U) Conduct OPEVAL in support of Full Production Decision planned for FY 93.
   c. (U) Complete logistics support development.
   d. (U) Complete software development and integration tests
   e. (U) Complete integration of RPG and ALQ-149 on EA-6B.
   f. (U) Complete CRE integration with RPG and ALQ-149.

D. (U) WORK PERFORMED BY: In House: Pacific Missile Test Center, Point Mugu, CA,; Naval Air Test Center, Patuxent River, MD; Naval Weapons Center, China Lake, CA; Naval Research Laboratory, Washington, D.C.; Naval Air Development Center, Warminster, PA; and Naval Avionics Center, Indianapolis, IN; Naval Weapons Support Center, Crane, IN. Contractors: Grumman Aerospace Corporation, Bethpage, NY; Eaton Corporation, Deer Park, NY; Raytheon Corporation, Goleta, CA; Litton Amecon, College Park, MD; Applied Physics Laboratory, Laurel, MD; Sanders Associates, Nashua, NH; Teledyne Systems, Northridge, CA: Texas Instruments, Ridgecrest, CA; and Teledyne Microwave, Sunnyvale, CA; PRB Associates, Hollywood, MD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY1990 Cost
Tech	None	None	None
Schedule	None	None	None
Cost	None	None	-18,026

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NA
2. (U) SCHEDULE CHANGES: NA
3. (U) COST CHANGES: ACAT III efforts and funding moved to Project W0638 with the consolidation of Electronic Warfare programs.

F. (U) PROGRAM DOCUMENTATION: The ADVCAP NDCP was approved in September 1985. TEMP 157-10 is in review with final approval expected in FY 89/2Q. The ALQ-149/CRE NDCP was approved FY 88/2Q. ALQ-149 TEMP is in review with final approval expected in FY-89/2Q.

G. (U) RELATED ACTIVITIES: Sea-Based EW Squadrons PE#0204154N.

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

APPN/BLI	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
(U) APN-1/#4,5	0	0	55,000	343,356	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604301N Budget Activity: 4
Program Element Title: MK-92 FCS UPGRADE

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0179	MK 92 FCS UPGRADE	3,279	2,919	5,000	5,192	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This effort corrects design deficiencies in the FCS MK-92 Coherent Receiver/Transmitter (CORT) Upgrade discovered during land based and at-sea testing. Integrates the upgraded MK-92 into the FFG-61 combat system configuration and into FFG-7 class ships without some elements of the FFG-61 configuration (e.g., AN/SYS-2(V)2, AN/SPS-49(V)5).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued work on combat system integration and on design deficiencies identified in land based and at-sea testing.
2. (U) FY 1989 Program:
   a. (U) Provide computer programs to support an integrated FFG 61 AAW Combat System at builder's trials.
   b. (U) Complete development and testing of design corrections resulting from development and operational testing.
   c. (U) Initiate development of changes to backfit CORT in FFG 7 class ships without AN/SPS-49(V)5 and AN/SYS-2(V)2.
3. (U) FY 1990 Plans:
   a. (U) Complete FCS MK 92 MOD 2 (with CORT) simulation to certify the computer programs.
   b. (U) Conduct DT-II/OT-IIB on FFG-61.
   c. (U) Complete changes to backfit CORT without AN/SPS-49(V)5 and AN/SYS-2(V)2.
4. (U) FY 1991 Plans:
   a. (U) Complete analysis of DT-II/OT-IIB test data.
   b. (U) Correct problems discovered during DT-II/OT-IIB.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWSES Port Hueneme, CA. CONTRACTOR: UNISYS Corporation, Great Neck, NY. OTHER: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD: Automation Industries, Vitro Laboratories Division, Silver Spring, MD.

E. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN #223	78,000	50,100	0	0	0	244,100

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

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
AEGIS Weapon Sys Mods	5,426	8,976	12,221	7,623	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 validated in NISC threat assessment #018-87 of November 1987. Additionally, development for operational support is required to maintain currency with CG 47 Baseline Upgrades in Program Element 0604307N. Funds provide for development of updates to the AEGIS Weapon System, and development of Part Task Trainers for AEGIS training. VLS funds provide for modifications necessary for compatibility with the newer baselines of the AEGIS Weapon System and to introduce AN/UYK-44 computers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Continued design and engineering for AN/SPY-1A radar system ORDALTS for the transmitter and signal processor. Started fabrication of proof kits for testing at the AEGIS Combat System Center, (ACSC), Wallops Island, VA.

b. (U) Started computer program nuclear safety analysis for AN/UYK-44 computer programs for the Vertical Launching System (VLS).

c. (U) Continued VLS Phase III canister safe and enable switch system development.

d. (U) Conducted integration testing of VLS AN/UYK-44 computer programs.

e. (U) Completed development of Part Task Trainers for AEGIS training sites.

2. (U) FY 1989 Programs:

a. (U) Complete proof kit development and fabrication of AN/SPY-1A radar system ORDALTS and test at the ACSC.

b. (U) Evaluate the utility of backfitting double-duty Cross Field Amplifier (CFA) tubes for the transmitter.

c. (U) Complete final integration testing for initial delivery of VLS AN/UYK-44 computer programs.

d. (U) Conduct Critical Design Review (CDR) for AN/UYK-44 integration.

e. (U) Continue VLS Phase III canister safe and enable switch system development.

f. (U) Begin development of FCS stable master oscillator and SPY-1 ECCM ORDALTS.

Program Element: 0604303N Budget Activity: 4
Program Element Title: AEGIS AREA AIR DEFENSE
Project Number: S1776 Project Title: AEGIS WEAPON SYSTEM MODS.

3. (U) FY 1990 Plans:
a. (U) Continue design and engineering for AN/SPY-1A signal processor ORDALTS.
b. (U) Begin development of SPY-1B and D ORDALTS.
c. (U) Complete final integration testing for delivery of Nuclear Certified VLS AN/UYK-44 computer programs and deliver.
d. (U) Complete development of VLS Phase III canister safe and enable switch system.
e. (U) Continue Development of SPY-1A and B ECCM ORDALTS.

4. (U) FY 1991 Plans:
a. (U) Complete testing for SPY-1A and B ECCM ORDALTS.
b. (U) Continue AN/SPY-1A and B ORDALT engineering and conduct studies for further AEGIS Weapon System upgrade.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Warfare Center, Dahlgren, VA; Naval Training Engineering Center, Norfolk, VA; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	NONE

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:

TLR	Dec 82
DCP-16	Mar 78
TEMP 124 Rev 3	Apr 80
ILS Plan 123-P/S	May 83
NTPS-30-8512A	Feb 88
Acquisition Plan, 166-80, Rev B, CH 5	Jan 88

Program Element: 0604303N Budget Activity: 4
Program Element Title: AEGIS AREA AIR DEFENSE
Project Number: S1776 Project Title: AEGIS WEAPON SYSTEM MODS.

G. (U) RELATED ACTIVITIES: P.E. 0604307N relates to Engineering Development of AEGIS Combat System; P.E. 0603382N (Battle Group AAW Coordination), relates to increased coordination of Battle Group missile control for the AEGIS Weapon System.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program

a. OPN/(229) procurement justification material does not contain this level of detail.

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

J. (U) MILESTONE SCHEDULE:

		DATE
1.	(U) Complete Vertical Launching System (VLS) safety analysis	2Q/FY89
2.	(U) CDR for VLS AN/UYK-44 integration	2Q/FY89
3.	(U) AN/SPY-1A ORDALT test	4Q/FY89
4.	(U) Deliver nuclear certified VLS UYK-44 computer programs	1Q/FY90
5.	(U) Complete testing of SPY-1 ECCM ORDALTS	4Q/FY91

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1447	CG C/S Engineering	27,454	23,534	21,817	17,654	Cont.	Cont.
S1337	DDG C/S Engineering	64,052	33,461	33,158	33,695	Cont.	Cont.
S1937	DDG Weapons Development	13,845	1,757	0	39,150	Cont.	Cont.
TOTAL		105,351	58,752	54,975	90,499	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: AEGIS Combat System will provide immediate and effective capability to counter the current and expected air, surface and sub-surface threats as articulated in NISC Threat Assessment #018-87 dated November 1987. Since the construction period of the ship classes extends into the late 1990's, 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, and 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. The Extended Planning Annex (EPA) proposes a new cruiser class, CGXX, to provide AEGIS Battle Group Anti-Air Warfare capability, strike capability, and advanced Anti-Submarine Warfare capability. This program will fund combat system definition for the ship, and start combat system engineering and development using the DDG 51 combat systems as the base.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C/S Engineering	27,454	23,534	21,817	17,654	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The baseline AEGIS Combat System was developed under Program Element 0604304N, Combat System Engineering Development, and was introduced into the fleet with the development of USS TICONDEROGA in 1983. The Combat 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 in response to the NISC validated Threat Assessment #018-87 dtd Nov 87.
This project provides upgrades to integrate new equipments and systems to maintain pace with the threat. Three major improvements have been approved which are engineered 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 to AN/UYK-43/44 computers and provides in-creased Battle Group capability in the AEGIS Display System.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Introduced AN/UYQ-21 displays into Baseline 3 in the emulate mode.
b (U) Integration and testing of Baseline 4 computer programs in AN/UYK-43 computers began at the Combat System Engineering Development Site.
c. (U) Conversion of MK 86 Gunfire Control System to the AN/UYK-43 began as a cruiser-unique change in Baseline 4.
2. (U) FY 1989 Program:

a. (U) Adaptation of Baseline 4 cruiser unique requirements to DDG 51 computer programs will continue.
b. (U) Baseline 4 Combat System integration and testing will continue.
c. (U) Upgraded AEGIS Display System Doctrine and advanced graphics will be integrated and tested.

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 1990 Planned Program

a. (U) A Baseline 4 major engineering test (E-03) will be conducted at the Combat System Engineering Development Site. (E-03)

b. (U) 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 AN/SPS-47(V)7, MK 86 Air Gun Mode and Ship Signal Exploitation System (SSES) upgrades into Combat System.

e. (U) Conduct CDR and commence coding of AN/SPS-47(V)7, MK 86 Air Gun Mode and SSES upgrades.

4. (U) FY 1991 Planned Program:

a. (U) AEGIS Display System force capability and OTH-T upgrades will be integrated and tested.

b. (U) Complete coding of AN/SPS-47(V)7, MK 86 Air Gun Mode and SSES upgrades.

5. (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.; FAC, Corona, CA.; PMTR, Pt. Mugu, CA.; and NRL, Washington, DC. Contractors: RCA, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	AN/SPS-49(V)7,MK 86 Air Gun Mode and SSES Upgrade	None	+2,360
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The +2,360 increase provides: 1) AN/SPS-49(V)7 interface with AN/UYK-43B computer which replace AN/UYK-7's in the AEGIS Weapon System; 2) increased air search capabilities with direct interface between SPY and MK 86 Gun; and 3) SSES upgrades.

2. SCHEDULED CHANGES: Not applicable.

3. COST CHANGES: Not applicable.

Program Element: 0604307N Budget Activity: 4
Program Element Title: AEGIS COMBAT SYSTEM ENGINEERING
Project Number: S1447 Project Title: CG Combat Systems Engineering

F. (U) PROGRAM DOCUMENTATION:

TRL, Rev 1, Chg 1	Dec 82	
DCP-134	2 Mar 78 (Except Waiver ltr)	
TEMP 100, Rev 2	Sep 81	
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: 0604575N (AN/SQS-53C), develops Anti-Submarine Warfare Sonar for AEGIS Destroyer; 0604355N (Vertical Launch Anti-Submarine Rockets), develops the Anti-Submarine Rockets for AEGIS Combat System; 0604303N (AEGIS Area Air Defense), provides modification and development of the AEGIS Weapon System and development of the Vertical Launching System; 0604366N (Standard Missile Improvements), relates to missile development for the AEGIS Weapons System; and 0603382N (Battle Group Anti-Air Warfare Coordination), relates to coordination of Battle Group Anti-Air defenses; 0603318N (AEGIS ER), develops extended range surface-to-air missile for AEGIS ships with Vertical Launchers.

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

		FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1.	(U) PROCUREMENT						
a.	(U) SCN*	4,127,000	0	0	0	0	25,864,400
	(CG 47)	(5)	(0)	(0)	(0)	(0)	(27)
b.	(U) SCN*	5,500	3,678,833	3,946,100	4,843,600	9,460,367	24,809,500
	(DDG 51)	(0)	(5)	(5)	(6)	(10)	(29)
c.	(U) OPN(229)	Procurement justification material does not contain this level of detail.					
2.	(U) MILCON	19,400	8,470	None	3,100		

* SCN costs are for ship construction. Conbat systems costs cannot be separately identified.

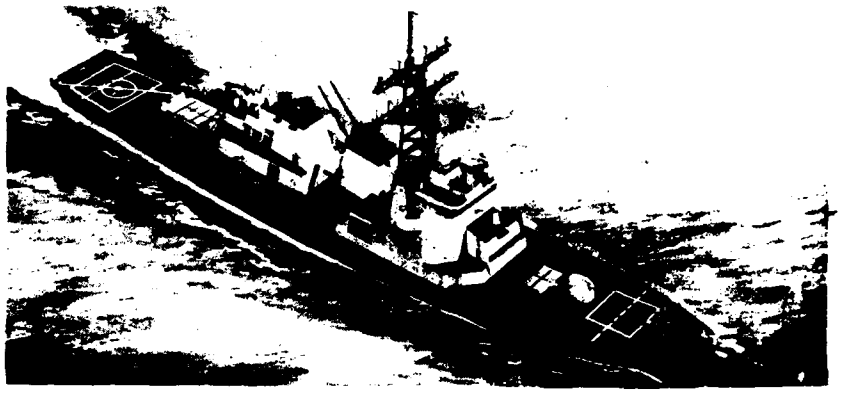
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

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) Baseline 3 Computer program Delivery to CG-59.	Sep 1988
3.	(U) AAW demonstration at the Combat System Engineering Development Site.	Oct 1988
4.	(U) Conduct Operational Test OT-IIB-2 at the Combat System Engineering Development Site.	Sep 1988
5.	(U) Baseline 4 major engineering test conducted at the Combat System Engineering Site.	Oct 1989
6.	(U) Conduct AEGIS Light-off in CG-65.	Jan 1990
7.	(U) CG 65 Delivered.	Nov 1990
8.	(U) ARLEIGH BURKE (DDG 51) Delivered.	Feb 1991

FY 1990/1991 BIENNIAL 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



POPULAR NAME: N/A

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

SCHEDULE	CY 1988	CY 1989	CY 1990	CY 1991	To Complete
Program Milestones	None	None	None	IIIB	None
Engineering Milestones	PTC 2/11/88	DDG Instl--9/89-3/90 E03 10/89	DDG Dlvy 2/91 ALO 4/90		Cont.
T&E Milestones	DT-IIB-2 8/88 OT-IIB-2/9/88 SQT 10/88	SQT 11/89	Ship Test--5/90-1/91		Cont.
Contract Milestones	None	None	None	None	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	$45,472	$19,985	$19,334	$19,782	Cont.
Support Contract	$ 2,422	$ 1,507	$ 1,459	$ 1,316	Cont.
In-House Support	$16,158	$11,969	$12,365	$12,597	Cont.
GFE/ Other	None	None	None	None	None
Total	$64,052	$33,461	$33,158	$33,695	Cont.

CLASSIFIED BY:
DECLASSIFY ON:

Program Element: 0604307N Budget Activity: 4
Program Element Title: AEGIS COMBAT SYSTEM ENGINEERING
Project Number: S1337 Project Title: DDG C/S ENGINEERING

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 the project S1447 with 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 tests of computer programs and equipments. Also Planned Improvements/Modification to the Destroyer Combat System will be developed and integrated as Baseline Five Upgrades and will include Joint Tactical Information Distribution System (JTIDS)/Command and Control Processor (C^2P), Combat Direction Finding (DF), Tactical Data Information Exchange System (TADIX B) and AEGIS ER.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued integration and testing of Destroyer Baseline 4 Combat System computer programs.
   b. (U) Conducted a major engineering test of the DDG 51 (Combat System and Anti-Surface Warfare elements) at the Combat System Engineering Development Site.
   c. (U) Delivered Combat System equipment and computer programs to USS ARLEIGH BURKE (DDG 51).
   d. (U) Conducted Destroyer Combat System Development Test DT-IIB-2 and Operational Test OT-IIB-2 at the Combat System Engineering Development Site.
2. (U) FY 1989 Program:
   a. (U) Prepare for major engineering test (E-03) of Combat System at the Combat System Engineering Development Site.
   b. (U) Continue Destroyer Baseline 4 engineering and incorporate final modifications to the Destroyer Combat System.
3. (U) FY 1990 Planned Program:
   a. (U) Conduct major Combat System engineering test (EO-3) 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.
   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 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) FY 1991 Planned Program:
a. (U) Delivery 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.
5. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NOSC,San Diego, CA., Naval Electronic Systems Engineering Agent, St.Inigoes, MD., NSWC, Dahlgren, VA. NUSC, New London, CT, Fleet Analysis Center, Corona, CA, PMTR, Pt Mugu, CA, and NRL, Washington, DC, CONTRACTORS: RCA, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	AEGIS C/S Upgrades	None	+26,479
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The +26,479 increase will result in upgrades to the Combat System to be forward fit in DDG 51 Class ships. They included integration of AN/SPS67(V)3, ASW Trainer upgrade and TWS Trainer upgrade into the AEGIS Weapon System (B/L 4, Phase II); and JTIDS/C2P/TADIL J, Combat DF, and AEGIS ER integration (B/L 5).
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
TEMP 801, Rev 3	Jul 86
TEMP 801, Rev 4	Oct 88
Acq Plan 369-86, Rev A-1	Aug 86
NTPS-30-8511A	Sep 87

Program Element: 0604307N Budget Activity: 4
Program Element Title: AEGIS COMBAT SYSTEM ENGINEERING
Project Number: S1337 Project Title: DDG C/S ENGINEERING

G. (U) RELATED ACTIVITIES: 0604575N (AN/SQS-53C), develops the Anti-Submarine Warfare Sonar; 0604355N (Vertical Launch Anti-Submarine Rockets), develops the Anti-Submarine Rockets; 0604303N (AEGIS Area Air Defense), provides modification and development of the AEGIS Weapon System and development of the Vertical Launching system; 0604366N (STANDARD Missile Improvements), missile development for the AEGIS Weapon System; 0603382N (Battle Group Anti-Air Warfare Coordination), coordinates Battle Group Anti-Air defense. 0603318N (AEGIS ER), develops an extended range surface-to-air missile for AEGIS ships with Vertical Launchers.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U) Procurement *						
a. SCN (CG 47)#10	4,127,000 (5)	0 (0)	0 (0)	0 (0)	0 (0)	25,864,400 (27)
b. (U) SCN (DDG 51) #11, #12	5,500 (0)	3,678,833 (5)	3,946,100 (5)	4,843,600 (6)	9,460,367 (10)	24,809,500 (29)
c. (U) OPN/(229)	Procurement justification material does not contain this level of detail.					

* SCN costs are for ship construction. Combat system costs cannot be spearately identified.

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

J. (U) TEST AND EVALUATION: See Congressional Data Sheet for DDG-51.

FY 1990/1991 BIENNIAL 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) RESOURCES: (Dollars in Thousands)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
DDG Weapons Development	13,845	1,757	0	39,150	Cont.	Cont.

B. (U) PROJECT DESCRIPTION: This program is required to develop selected systems and subsystems for the ARLEIGH BURKE (DDG 51) class ships and responds to NISC validated Threat Assessment #018-87 dtd Nov 87. 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) AN/SPY-1D radar Development/Operational Tests DT/OT-IID-2 was conducted at the Combat System Engineering Development Site.
   b. (U) AN/SPY-1D radar system engineering was completed.
   c. (U) Integration and testing of the MK 160 Gun Computing System was completed at the Combat System Engineering Development Site.
   d. (U) Destroyer MK 34 Gun Weapon System Engineering was completed.
   e. (U) Destroyer Anti-Submarine Warfare Control System integration and testing was completed at the Combat System Engineering Development Site.
   f. (U) Destroyer Combat System Developmental/Operational Tests was conducted at the Combat System Engineering Development Site.
2. (U) FY 1989 Program: Destroyer Anti-Submarine Warfare system engineering will be completed.
3. (U) FY 1990 Planned Program: Not applicable.
4. (U) FY 1991 Planned Program: Begin development/design of radar upgrade (EDM-4B) planned for introduction in an FY 93 Destroyer. Upgrades consist of computer programs and equipment modifications which will enhance capability against seaskimming targets.
5. (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

Program Element: 0604307N Budget Activity: 4
Program Element Title: AEGIS COMBAT SYSTEM ENGINEERING
Project Number: S1937 Project Title: DDG Weapons Development

Surface Weapons Center, Dahlgren, VA. Naval Underwater Systems Center, New London, CT; Fleet Analysis Center; Corona, CA; Pacific Missile Test Range, Pt Mugu, CA; and Naval Research Laboratory, Washington, DC. CONTRACTORS: RCA, 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Not applicable.

F. (U) RELATED ACTIVITIES: Program Element 0604575N (AN/SQS-53C), develops the Anti-Submarine Warfare Sonar for AEGIS Destroyer; Program Element 0604355N (Vertical Launch Anti-Submarine Rockets), develops the Anti-Submarine Rockets for AEGIS Combat Systems; Program Element 0604303N (AEGIS Area Air Defense), provides for the modification and development of the AEGIS Weapon System and development of the Vertical Launching System; Program Element 0604366N (STANDARD Missile Improvements), relates to missile development for the AEGIS Weapon System; Program Element 0603382N (Battle Group Anti-Air Warfare Coordination), relates to coordination of Battle Group Anti-Air defense; Program Element 0603318N (SM-2 BLK IV), develops an extended range surface-to-air missile for AEGIS cruisers with Vertical Launchers and AEGIS destroyers.

Program Element: 0604307N Budget Activity: 4
Program Element Title: AEGIS COMBAT SYSTEM ENGINEERING
Project Number: S1937 Project Title: DDG Weapons Development

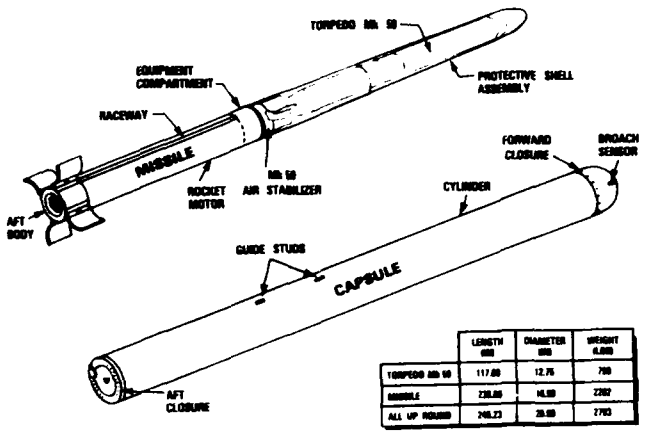
G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U) PROCUREMENT						
a. SCN	4,127,000	0	0	0	0	25,864,400
(CG 47) Quantity	(5)	(0)	(0)	(0)	(0)	(27)
b. (U) SCN	5,500	3,678,833	3,946,100	4,843,600	9,460,367	24,809,500
(DDG 51) Quantity	(0)	(5)	(5)	(6)	(10)	(29)
c. (U) OPN/(229)	Procurement justification material does not contain this level of detail.					

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604309N Budget Activity: 4 -Tactical Programs
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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					M/S IIIA 3Q/92 M/S IIIB 1Q/94
Engineering Milestones		First Flight 9/89	Sys PDR 6/90	System CDR 5/91	
T&E Milestones					TECHEVAL SURF 4Q/92 SUB 1Q/93 OPEVAL SURF 2Q/93 SUB 4Q/93
Contract Milestones			Second Source 10/90		LRIP-I 1Q/91 LRIP-II 1Q/93

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	84,037	60,827	82,032	91,390	743,955
Support Contract	1,520	1,200	2,700	2,900	18,414
In-House Support	19,523	17,300	43,100	45,600	323,006
GFE/Other Support					
Total	105,080	79,327	127,832	139,890	1,085,375 299,449

Program Element: 0604309N Budget Activity: 4-Tactical Programs
Program Element Title: ASW Standoff Weapon
Project Number: S0883 Project Title: Sea Lance

B. (U) DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

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 #010-87 of August 1987. 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 Mulitipurpose 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 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 1988 Accomplishments:
   a. (U) Completed Phase III single and two body aerodynamic wind tunnel tests.
   b. (U) Conducted preliminary In-tube shock test.
   c. (U) Initiated fabrication of Full Scale Development test missiles for Contractor Test and Evaluation non-separation flight tests.
      - Fabricated and assembled applicable subsystems.
   d. (U) Conducted guided rocket motor Peculiar Support Equipment Critical Design Reviews.
   e. (U) Completed T-33 Navigation Test.
2. (U) FY 1989 Program:
   a. (U) Conduct Dynamic launch.
   b. (U) Start surface ship development and integration.
   c. (U) Conduct Modal Survey Test.
   d. (U) Conduct CTE Flight Certification Testing.
   e. (U) Conduct Contractor Test and Evaluation non-separation flight tests.
3. (U) FY 1990 Plans:
   a. (U) Conduct System Preliminary Design Review.
   b. (U) Complete VLS launch adaptor development.
   c. (U) Conduct Software Critical Design Review.
   d. (U) Initiate capsule fabrication.
   e. (U) Conduct Separation Sled test.
   f. (U) Conduct Surface CCS interface tests.
   g. (U) Continue component qualification testing.
   h. (U) Complete Launch Tube Assembly tests.
   i. (U) Conduct canister flyout test.
   j. (U) Conduct surface ship at-sea navigational alignment test.

Program Element: 0604309N Budget Activity: 4-Tactical Programs
Program Element Title: ASW Standoff Weapon
Project Number: S0883 Project Title: Sea Lance

4. (U) FY 1991 Plans:
   a. (U) Conduct System Critical Design Review.
   b. (U) Conduct Contractor Test and Evaluation flights at White Sands Missile Range.
   c. (U) Conduct the following major system tests:
      - Float-up/Sub-Clearance test.
      - Hazard Assessment tests.
      - Submarine CCS Interface test.
   d. (U) Initiate Test, Analyze and Fix program.
   e. (U) Initiate missile and capsule qualification testing.
   f. (U) Conduct first Production Readiness Review.
   g. (U) Initiate launch adapter qualification testing.
5. (U) Program to Completion:
   a. (U) Commence development of technical manuals, revise Firing Craft procedures (OD44971).
   b. (U) Deliver prototype ORDALT kits for the CCS MK 1.
   c. (U) Conduct MIL-S-901C and in-tube shock qualifications tests.
   d. (U) Complete Test, Analyze and Fix test.
   e. (U) Complete Phase II submarine clearance tests.
   f. (U) Complete environmental and electrical launch adaptor, missile and capsule qualification tests.
   g. (U) Conduct a software functional configuration audit.
   h. (U) Complete a SEA LANCE MK-50 system qualification.
   i. (U) Conduct Milestone IIIA review and revisit decision on SEA LANCE Nuclear Depth Bomb variant.
   j. (U) Complete Contractor Test and Evaluation flight tests.
   k. (U) Provide software integration laboratory Operational Test and Evaluation (OT&E) support.
   l. (U) Complete the Technical and Operational Evaluation of the SEA Lance MK-50 weapon.
   m. (U) Start procurement of long lead items for production and award first production buy.
   n. (U) Conduct final Production Readiness Review.
   o. (U) Complete Full Scale Development (FSD) phase (FY 1994).

D. (U) WORK PERFORMED BY: CONTRACTOR: Boeing Aerospace, Seattle, WA SUBCONTRACTORS: Westinghouse Oceanic Systems Division, Cleveland, OH; Hercules, Inc., McGregor, TX; Litton Industries, Woodland Hills, CA; and Westinghouse Electric Corporation, Sunnyvale, CA. IN-HOUSE: Naval Underwater Systems Center, Newport, RI (lead laboratory - systems integration); Naval Weapons Center, China Lake, CA (lead laboratory - missile); Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Ordnance Station, Indian Head, MD.

Program Element: 0604309N Budget Activity: 4-Tactical Programs
Program Element Title: ASW Standoff Weapon
Project Number: S0883 Project Title: Sea Lance

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-2,962

NARRATIVE DESCRIPTION OF CHANGES

1. TECHNOLOGY: None
2. SCHEDULE: None
3. COST: The reduction of -2,962 removed money that was to be used to close out the VLA system. The VLA program was continued, so funds were no longer needed for closeout.

F. (U) PROGRAM DOCUMENTATION:

MENS 1/80
DCP 3/86 (Revision in approval cycle 9/88)
TEMP 5/86 (Revision in approval cycle 9/88)
AP 8/87 (Revision in approval cycle 9/88)

G. (U) RELATED ACTIVITIES:

PE#	Title
0604610N	MK 50 Advanced Lightweight Torpedo
0603560N/0604524N	Submarine Combat System Development
0603634N	Tactical Nuclear Development
0205620N	Surface Ship Fire Control System Development

The Torpedo MK 50 (0604610N) is planned to be the conventional payload for SEA LANCE. Weapons control for submarine-launched SEA LANCE is under development in the CCS MK-1, AN/BSY-1 and AN/BSY-2 Submarine Combat Control Systems. Weapons control for surface SEA LANCE is under development in MK 116 Fire Control System. A joint Department of Defense/Department of Energy Project Officer Group conducted a Phase 2A Design Definition and cost effort for the Nuclear Depth Bomb payload under Program Element 0603634N. This work was required under joint Department of Defense/Department of Energy memorandum of understanding for nuclear weapons development, and is preparatory to Phase 3 Engineering Development for the nuclear depth bomb package.

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

APPN/P.1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
WPN (311200)	-	-	1.8	46.7	2117.7	2164.4
Milcon (0211991)	-	-	-	9.4	17.7	27.1

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA: See Congressional Data sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604314N Budget Activity: 4
Program Element Title: AMRAAM
Project Number: W0981 Project Title: AMRAAM

POPULAR NAME: AMRAAM

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		DAB IIIB			
Engineering Milestones		PCA SOFTWARE			
T&E Milestones			OT-IIA 1Q/90 Navy	OT-IIIA 1Q/91 Navy	Continuing
Contract Milestones	LOT II	LOT III	LOT IV	LOT V	Continuing

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	15,364	4,225	1,500	135	Continuing
Support Contract	300	623	300	300	Continuing
In-House Support	7,040	8,462	5,946	3,160	Continuing
GFE/ Other					
Total	22,704	13,310	7,746	3,595	Continuing Continuing

Program Element: 0604314N Budget Activity: 4
Program Element Title: AMRAAM
Project Number: W0981 Project Title: AMRAAM

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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. Efforts include the analysis of Navy unique applications, simulation capability development, aircraft missile integration tasks, and procurement of hardware to support Navy test and evaluation tasks.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Conducted intensive developmental refinement of missile components and trade-off analysis.
b. (U) Completed F/A-18 aircraft integration in preparation for Navy AMRAAM operational testing.
c. (U) Initiated live warhead firing flight tests.
d. (U) Continued FSD flight testing program with F-14 and F/A-18 live missile firings.
e. (U) Continued preparation for operational testing with extensive system level integration with F/A-18 tactical configuration.
f. (U) Continued F-14D missile compatibility planning efforts.
g. (U) Procured assets required for Initial Operational Test and Evaluation.
h. (U) Executed Insensitive Munitions Plan.

2. (U) FY 1989 Program:

a. (U) Continue evaluation of enhanced ECCM software and conduct analysis of trade-offs.
b. (U) Initiate Operational Test and Evaluation (OT&E) with extensive testing and analysis.
c. (U) Commence verification of F/A-18 AMRAAM capability.
d. (U) Continue F-14D integration through development of planning documents.

3. (U) FY 1990 Plans:

a. (U) Commence Operational Testing.
b. (U) Continue execution of Insensitive Munitions Plan.
c. (U) Continue refinement of missile performance.
d. (U) Participate in AMRAAM P^{3}I program.

Program Element: 0604314N Budget Activity: 4
Program Element Title: AMRAAM
Project Number: W0981 Project Title: AMRAAM

4. (U) FY 1991 Plans:

a. (U) Continue Operational Testing.
b. (U) Continue Insensitive Munitions Plan.
c. (U) Continue refinement of missile performance and participate in follow-on AMRAAM improvement programs.

5. (U) Program to Completion: Navy R&D efforts on AMRAAM are continuing in order to participate with executive service follow-on efforts.

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: Armament Division, Advanced Medium Range Air-to-Air Missile Joint System Program Office, Eglin, Air Force Base, FL.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	None

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:

JSOR	9/78
MENS	11/78
MOU	8/80
ILSP	5/85
DCP	6/87
SDDM	10/85
TEMP	6/87

Program Element: 0604314N Budget Activity: 4
Program Element Title: AMRAAM
Project Number: W0981 Project Title: AMRAAM

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. Other programs which are related to full employment capability include target identification and improved aircraft radar counter-counter-measures and aircraft multiple target track and missile guidance. Air Force P.E. 0604314F, Advanced Medium Range Air-to-Air Missile provides funding for full scale development contracts for this program. There is no unnecessary duplication of efforts with the Service/Agency or the Department of Defense.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN/#9	0	34,802	129,785	382,512	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- The cooperative agreement signed by the U.S., the Federal Republic of Germany, and the United Kingdom in August 1980 provides for U.S. development and production of the Advanced Medium Range Air-to-Air Missile (AMRAAM) while GE and UK are responsible for the development and production of the Advanced Short Range Air-to-Air Missile (ASRAAM). All three nations are responsible for their respective aircraft integration work and the non-developing nation(s) may opt to purchase or co-produce the others' weapon.

	Development Funding Participation*	
	AMRAAM	ASRAAM
Federal Republic of Germany	0%	45%
United Kingdom	0%	45%
Norway (limited role)	0%	10%

  * Funding commitment varies with task and license.

- AMRAAM is in the final stages of full scale development with Air Force and Navy procuring missiles from Lot III in FY 1989.

- Conceptual phase commenced in 1976.

- Congressionally mandated cap for Air Force/Navy production is $7.6B (FY84$).

J. (U) TEST AND EVALUATION DATA: Not applicable to OSD/OMB Budget submission.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR-TO-AIR MISSILE SYSTEMS ENGINEERING

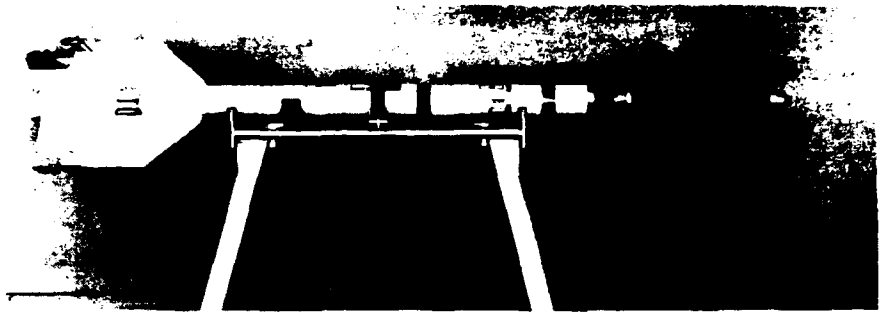
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0456	AIM-9M PIP	22,485	21,113	32,168	25,890	28,837	162,876
W1738	ASRAAM SUPP	88	18	1,183	2,721	Cont.	Cont.
TOTAL		22,573	21,131	33,351	28,611	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR TO-AIR MISSILE SYSTEMS ENGINEERING
Project Number: W0456 Project Title: AIM-9M PIP(9R)



POPULAR NAME: SIDEWINDER

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				LOW RATE PROD. DECISION	
Engineering Milestones	CDR 9/88		GOV UPDATES 11/89 - 9/90		
T&E Milestones		DT-IIB 1/89-8/89	DT-IIC OT-IA 1/90 - 9/90	OT-IIB 1/91 - 9/91	
Contract Milestones		1st Del. EMs 3/89	1st Del 4/90	Last Del 8/91	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	10,010	7,700	11,160	7,770	66,500 16,000
Support Contract	40	200	1,500	3,200	4,940 0
In-House Support	12,435	13,213	19,508	14,920	91,436 13,000
GFE/ Other					
Total	22,485	21,113	32,168	25,890	162,876 28,837

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR TO-AIR MISSILE SYSTEMS ENGINEERING
Project Number: W0456 Project Title: AIM-9M PIP(9R)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The AIM-9M Product Improvement Program will upgrade the United States' forces with a superior air-to-air missile by increasing current head-on acquisition range, increasing background discrimination and increasing counter counter-measures capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Initiated captive carry flight test at Naval Weapons Center.
b. (U) Initiated buildup for first Engineering Test Vehicles (ETV) firing.
c. (U) Contractor commenced fabrication of 15 Engineering Models (EM's).

2. (U) FY 1989 Program:

a. (U) Contractor commence delivery of 15 EM's.
b. (U) Initiate test and evaluation of EM's.
c. (U) Conduct live firings of ET and EM missiles.

3. (U) FY 1990 Plans:

a. (U) DT-IIC.
b. (U) OT-IA.

4. (U) FY 1991 Plans:

a. (U) OT-IIB.
b. (U) Low rate production decision.

5. (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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	8,139

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR TO-AIR MISSILE SYSTEMS ENGINEERING
Project Number: W0456 Project Title: AIM-9M PIP(9R)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Additional +8,139 for engineering support at NWC, China Lake.

F. (U) PROGRAM DOCUMENTATION:

OR	2/86
TEMP	2/87

G. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604354N Budget Activity: 4
Program Element Title: AIR-TO-AIR MISSILE SYSTEMS ENGINEERING
Project Number: W1738 Project Title: ASRAAM

C. (U) PROJECT DESCRIPTION: Advancing threat and the need for strong interoperability with NATO Allies require an advanced short-range missile for mid-1990's through 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 1988 Accomplishments:

a. (U) Completed initial restructure of ASRAAM development program. Initiated aircraft integration discussions with Naval Weapons Center and contractors.

2. (U) FY 1989 Program:

a. (U) Continue involvement in evaluation of ASRAAM technical approach.

3. (U) FY 1990 Plans:

a. (U) Continue technical and operational evaluation of ASRAAM, includes aircraft integration requirements.

4. (U) FY 1991 Plans:

a. (U) Monitor ongoing development efforts and continue evaluation of technical and operational aspects of ASRAAM. Negotiate and award integration contract.

5. (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 ACTIVITIES: Not Applicable.

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

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

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	IIIA/IOC SEP		IIIB FEB		Continuing
Engineering Milestones	B/L 1 PRR	B/L 2 CDR	B/L 2 PRR		Continuing
T&E Milestones	Block 1 OPEVAL	DT III/ OT III		B/L 3 DT/OT	Continuing
Contract Milestones	Block 1 B/L 1 Prod.		Block 1 B/L 2 Prod.		Continuing

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	N/A	N/A	N/A	N/A	N/A
Support Contract	N/A	N/A	N/A	N/A	N/A
In-House Support	5,201	4,894	4,031	5,894	Continuing
GFE/Other	2,238	285	400	400	Continuing
Total	7,439	5,179	4,431	6,294	Continuing Continuing

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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 primary defense systems. It is intended for simple installation on a large variety of Navy Ships. 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 in 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 occurred 9/88. 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 1988 Accomplishments:
   a. (U) Conducted DT/OT of Block I upgrade on ex-STODDARD, OPEVAL in a fleet ship.
   b. (U) Gained Approval for Limited Production (Milestone IIIA).
   c. (U) Qualified 20mm tungsten penetrator.
2. (U) FY 1989 Program:
   a. (U) Perform EMI testing (CIWS/SLQ-32) at NSWC Dahlgren, VA and at-sea in a fleet ship.
   b. (U) Conduct Tactical Missile Test of Block I on ex-STODDARD.
   c. (U) Perform engineering and effectiveness analysis to assess potential system upgrades against the threat.

3. (U) FY 1990 Plans:
   a. (U) Gain Block I Approval for Full Production (Milestone IIIB).
   b. (U) Perform engineering and effectiveness analysis to assess potential system upgrades against the threat.
   c. (U) Plan for IOT&E for Block I Baseline 3 upgrade.
   d. (U) Upgrade remote-capable Terminal Defense Test Platform.
   e. (U) Conduct AEGIS interface testing.
   f. (U) Conduct high velocity tungsten/DU penetrator evaluation.
4. (U) FY 1991 Plans:
   a. (U) Perform engineering and effectiveness analysis to assess potential system upgrades against the threat.
   b. (U) Conduct IOT&E for Block I Baseline 3.
   c. (U) Conduct Block I/NATO AAW interface testing.
   d. (U) Upgrade remote-capable Terminal Defense Test Platform.
   e. (U) Revise Development Options Paper for follow-on CIWS.
5. (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: NSWC Dahlgren, VA; NAVORDSTA, Louisville, KY. CONTRACTORS: General Dynamics, Pomona, CA; General Electric, Pittsfield, MA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Improved fire control algorithm versus maneuvering and supersonic threats	Defer AFP to FY90. No impact on IOC	None -
SCHD	N/A	N/A	N/A
COST	N/A	Delay FSD of next generation CIWS	-9752

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Based on evaluation of the DT-IIF/OT-IIC test results, the Navy directed that the FY 89 tactical missile tests, which will test Block I CIWS AFP will be considered when the test report is complete.

2. (U) SCHEDULE CHANGES: No significant schedule changes have occurred.

3. (U) COST CHANGES: The reduction of -9752 results from deferring FSD for the next generation CIWS to FY 92.

F. (U) PROGRAM DOCUMENTATION: CIWS Block I TEMP 142-I 7/87.

G. (U) RELATED ACTIVITIES: Program Element 0603319N, (NATO AAW Systems).

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						
WPN (411000) #56						
(411001)	28,023	19,449	66,022	68,100	Cont.	Cont.
Quantity	5	5	20	19		
SCN (Various)	116,836	67,011	80,032	111,557	Cont.	Cont.
Quantity	24	15	13	19		

Program Element: 0604358N Budget Activity: 4
Program Element Title: Close-In Weapon System (PHALANX)
Project Number: S0172 Project Title: Close-In Weapon System (PHALANX)

WPN MODS (420500)	#62	45,186	54,557	68,695	80,784	Cont.	Cont.

(U) MILCON: None

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

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604361N Budget Activity: 4
Program Element Title: NATO SEASPARROW

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0173	NATO SEASPARROW	1,883	4,930	4,895	5,874	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 Assignment (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 1988 Accomplishments:
   a. (U) Initiated correction of RIM-7M FCS OPEVAL deficiencies.
   b. (U) Initiated work on MK 23 TAS OCP to associate RADAR/IR/ESM.
2. (U) FY 1989 Program:
   a. (U) Support RIM-7M (PIP) OPEVAL.
   b. (U) Implement MK 23 TAS operational computer program modifications to support RAM GMWS; incorporate TAS TEWA enhancements.
   c. (U) Begin integration of the AN/SAR-8 (Infra-Red Search and Target Designation (IRSTD)) equipment with the MK 23 TAS.
3. (U) FY 1990 Plans:
   a. (U) Initiate development of UYK-44 computer program to support TAS integration of CV/CVN ACDS Model 5.1 (Block 1).
   b. (U) Landbased test of Radar/IR/ESM correlation mods.
   c. (U) Continue IRSTD integration effort.
4. (U) FY 1991 Plans:
   a. (U) Continue development of UYK-44 computer program to support TAS integration of CV/CVN ADCS Model 5.1 (Block 1).
   b. (U) Test TAS OCP in support of RAM GMWS and AN/SAR-8.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Weapon Systems Engineering Station, 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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0176	Standard Msl Testing	19,596	17,071	16,449	10,745	Cont.	Cont.
S0439	Standard Msl Improvement	12,845	38,496	49,825	38,329	Cont.	Cont.
TOTAL		32,441	55,567	66,274	49,074	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND SYSTEM CAPABILITIES: The STANDARD Missile family of area defense missiles are the primary surface-to-air missiles employed in AEGIS, TARTAR, and TERRIER weapon systems. STANDARD Missiles are now operational in approximately 100 ships and are programmed for over 130 ships through the 1980's. This program element supports development of low altitude and ordnance improvements to the latest version of the STANDARD missile, SM-2. Additionally, under Project S0176, this program element provides missiles and support for tests with new systems such as the Vertical Launching System, AEGIS Weapon System, TERRIER/TARTAR New Threat Upgrade (NTU) systems and for development and operational testing of missile improvements.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENTS
Project Number: S0176 Project Title: Standard Missile Testing

C. (U) PROJECT DESCRIPTION: Project fabricates and procures test missiles and interface test units; test planning, performance and analysis of STANDARD Missile Improvements (Project S0439) including support required for missile interfacing and integration into operational and new weapon systems and launchers.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed planned SM-1 Block VIB at-sea testing.
   b. (U) Completed SM-2 Block III land and at-sea testing.
2. (U) FY 1989 Program:
   a (U) Begin to transition SM-2 Block IIIA engineering developmental hardware to flight test hardware and begin assembly of ordnance sections for delivery in FY-90.
3. (U) FY 1990 Plans:
   a. (U) Complete assembly of ordnance sections and integration into FTR's to support DT/OPEVAL Testing.
   b. (U) Conduct flight testing at Whites Sands Missile Range (WSMR) and at sea and begin data analysis to support Milestone III.
4. (U) FY 1991 Plans:
   a. (U) Continue engineering efforts to incorporate any "lessons learned " from flight testing.
   b. (U) Complete data analysis of flight tests.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: NWC, China Lake, CA, NSWC, Dahlgren, VA. 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. John Hopkins University, Applied Physics Laboratory, Laurel, MD.

F. (U) RELATED ACTIVITIES: PE 0603318N (AEGIS ER - SM-2 Block IV), PE 0604372N (New Threat Upgrade), PE 0604307N (AEGIS Combat System Engineering)

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(SM-2 MR/ER) WPN(15)	Procurement justification material does not contain this level of detail.					

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENT
Project Number: S0439 Project Title: STANDARD MISSILE IMPROVEMENTS

POPULAR NAME: STANDARD MISSILE

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	ARB BLK VIB/ III MAY		MS III BLK IIIA-OCT		Continuing
Engineering Milestones	PDR IIIA MAR	CDR IIIA NOV	PRR IIIA FEB		Continuing
T&E Milestones	(DT/OT II for SM-1 Block VIB and SM-2 Blocks III and IIIA) Blk VIB/III FEB-SEP		Blk IIIA WSMR-FEB Blk IIIA SEA-APR Blk IIIA OT JUN-AUG		Continuing
Contract Milestones	BLK III PROD.		BLK IIIA PROD.		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	7,371	26,543	39,031	25,263	Continuing
Support Contract	1,138	1,873	1,000	3,800	Continuing
In-House Support	4,336	10,080	9,794	9,266	Continuing
GFE/Other					
Total	12,845	38,496	49,825	38,329	Continuing

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENT
Project Number: S0439 Project Title: STANDARD MISSILE IMPROVEMENTS

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
STANDARD Missile fuze and guidance performance degrades when the target is in close proximity to the sea surface. The improvement program will improve performance against [ ] It will be implemented in two phases as follows. Phase I will add a fuze altimeter [ ] which enables improved target detection [ ] Phase II will add [ ] will improve lethality throughout the SM-2 Block III/IIIA engagement envelope. 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 will expand this effort by incorporating a dual mode [ ] seeker to improve the missile's capability [ ]

These improvements are being developed in such a way that current systems in the fleet can be back fitted 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 1988 Accomplishments:

a. (U) Completed AEGIS computer integration.
b. (U) Conducted Preproduction Reliability Design Review (PRDR) for SM-1 Block VIB and SM-2 Block III.
c. (U) Obtained NAVSEA Acquisition Review Board (ARB) approval for ORDALT procurement of SM-2 Block III. SM-1 Block VIB approval pending completion of additional flight test.
d. (U) Completed SM-2 Block IIIA Preliminary Design Review (PDR) in Mar 88.
e. (U) Conducted Flight Test Round Design Release in Sep 88.

2. (U) FY 1989 Program:

a. (U) Complete Phase I performance validation.
b. (U) Complete AEGIS vertical and rail launch performance validation for SM-2 Block IIIA.
c. (U) Incorporate missile homing improvements into Block IIIA development effort.

3. (U) FY 1990 Plans:

a. (U) Continue engineering efforts to support successful Critical Design Review (CDR).
b. (U) Continue missile homing improvements development.

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENT
Project Number: S0439 Project Title: STANDARD MISSILE IMPROVEMENTS

4. (U) FY 1991 Plans:

a. (U) Complete documentation of the SM-2 Block IIIA program.
b. (U) Continue FSED of missile homing improvements.

5. (U) Program to Completion: This is a continuing program and improvements will be initiated as necessitated by the evolving threats.

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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Improved Guidance	None	+18,253
SCHED	None	Two-year slip	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The increase of +18,235 expands the scope of the existing Standard Missile Improvement Program to incorporate missile homing improvements which will improve the missile's capability to resolve seeker ambiguities and engage low radar cross section targets.

2. (U) SCHEDULE CHANGES: Planned efforts to begin in FY92 are crossfit of ECCM improvements developed for SM-2 Block IV into SM-2 Block IIIA; and insensitive munitions improvement.

3. (U) COST CHANGES: None

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 (Navy) 22 April 88
NDCP - approved 10 May 88

Program Element: 0604366N Budget Activity: 4
Program Element Title: STANDARD MISSILE IMPROVEMENT
Project Number: S0439 Project Title: STANDARD MISSILE IMPROVEMENTS

G. (U) RELATED ACTIVITIES: Program Element 0603318N (AEGIS ER) supports development of SM-2 Block IV. As part of that program the ordnance section being developed in this program element for SM-2 Block IIIA is to be provided as GFE to Raytheon.

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

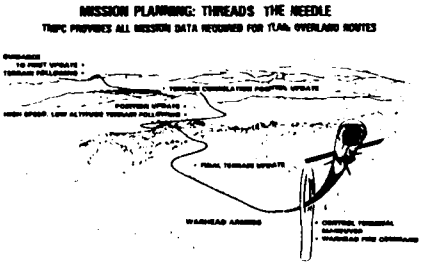
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate
WPN #15/35	3.8	20.9	1.5	7.1

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

J. (U) TEST AND EVALUATION DATA: This information is contained in the FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604367N Budget Activity: 4
Program Element Title: TOMAHAWK
Project Number: W1784 Project Title: THEATER MISSION PLANNING CENTER



POPULAR NAME: Theater Mission Planning Center (TMPC)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS 2 APS		MS 3A TMPCU MS2 ISPS	MS 3B TMPCU MS 3A APS	MS 3B APS MS3 ISPS
Engineering Milestones	TMPC U Phase II APS IOC TMPC(8.1)	Design Review TMPC U IOC TMPCU(8.2)	Design Review APS	IOC TMPCU	IOC APS IOC ISPS
T&E Milestones	DTIII/OTIII TMPC B/L,8.1	DTIII/OTIII TMPC B/L,8.2	DTIIA/C/ OTIIA/C DT/OT IIB APS	OPEVAL TMPCU, APS DT/OT IIB APS	DT/OT ISPS
Contract Milestones	TMPCU design FSED APS	TMPC U APS	TMPC U APS	ISPS APS	ISPS APS

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	(33,650)*	(22,402)*	13,943	15,692	160,265
Support Contract	0	0	0	0	0
In-House Support	(122)*	(1,723)*	4,200	3,144	11,063
GFE/Other	0	0	0	0	0
Total	(33,772)*	(24,125)*	18,143	18,836	Cont. Cont.

TMPCU = TMPC Upgrade APS= Afloat Planning System ISPS = Integrated Strike Planning System
* TMPC in FY 88 & FY 89 funded in P.E. 0604707N and APS in FY 88 & FY 89 appeared in Project P.E. 0604367N.

Program Element: 0604367N Budget Activity: 4
Program Element Title: TOMAHAWK
Project Number: W1784 Project Title: THEATER MISSION PLANNING CENTER

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments: (From P.E. 0604707N)
   a. (U) Established critical design freeze for TMPC Block 8.2.
   b. (U) Continued TMPC Tech Base and upgrade program engineering development.
   c. (U) Initiated TMPCU Phase II and APS FSED.

2. (U) FY 1989 Program: (From P.E. 0604707N)
   a. (U) Complete TMPC Tech base.
   b. (U) Continue TMPC Upgrade program and APS.

3. (U) FY 1990 Plans:
   a. (U) Complete TMPC Upgrade program development.
   b. (U) Install first TMPC suite and APS EDM Units.
   c. (U) Commence Integrated Strike Planning System (ISPS) development.

4. (U) FY 1991 Plans:
   a. (U) Install second operational TMPC Upgrade suite and complete TMPCU.
   b. (U) Continue APS development.
   c. (U) Continue development of ISPS.

5. (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; CINCPAC, Camp Smith, HI. CONTRACTORS: McDonnell Douglas Astronautics, St. Louis, MO; Tiburon Systems Inc., San Jose, CA; Science Application Inc., Arlington, VA; Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; General Dynamics Convair, San Diego, CA.

Program Element: 0604367N Budget Activity: 4
Program Element Title: TOMAHAWK
Project Number: W1784 Project Title: THEATER MISSION PLANNING CENTER

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHED	None	1 year delay	None*
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

* No accurate comparison can be made due to consolidation of similar mission planning projects from other program elements.

1. (U) ENGINEERING CHANGES: None

2. (U) SCHEDULE CHANGES: TMPC IOC delay until FY 91 to allow for additional test and evaluation.

3. (U) COST CHANGES: Not applicable.

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	8/38	12/88
APS	6/86	9/87	N/A	7/88	12/88
ISPS	7/87	7/88	10/88	-	-

G. (U) RELATED ACTIVITIES: Surface Combined ORD/MISSL, TOMAHAWK (P.E. 0204229N) complements carrier battle group strike capacity at sea and ashore while expanding U.S. Navy offensive capability to units other than the carrier force. A TOMAHAWK vertical launch capability for SSN-688 class attack submarines is being developed in P.E. 0604370N, SSN 688 Class VLS. Although these missions are completely different and do not overlap, each program impacts the other.

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

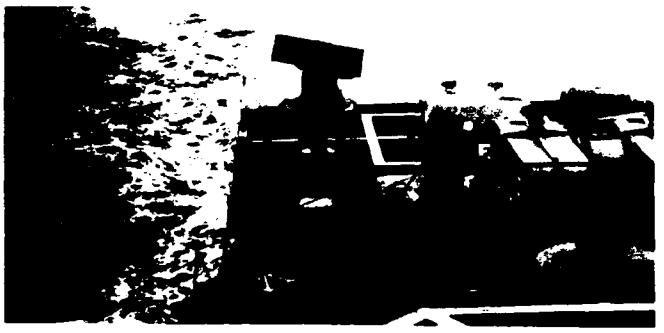
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
WPN/# 6,7,30	Procurement justification material does not contain this level of detail.				
OPN/# 230, # 231					

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: 0604369N Budget Activity: 4
Program Element Title: 5" ROLLING AIRFRAME MISSILE
Project Number: S0167 Project Title: 5" ROLLING AIRFRAME MISSILE



POPULAR NAME: RAM

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			IIIB-6/90		
Engineering Milestones	PRE-OPEVAL CDR 6/88		FUZE UPGRADE CDR 2/90	IR SEEKER UPGRADE: BEGIN EDM FAB 4/91	
T&E Milestones			DT-IIE/OT-IIB-5/90		
Contract Milestones		1ST PROD GMLS 01/89 GMRP 12/88	DUAL SOURCE COMPETITION 7/90	DUAL SOURCE COMPETITION 7/91	ANNUAL DUAL SOURCE

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	4,287	2,515	1,150	1,700	Continuing
Support Contract	2,275	1,350	1,042	765	Continuing
In-House Support	4,032	4,049	3,069	446	Continuing
GFE/ Other					Continuing
Total	10,594	7,914	5,261	2,911	Continuing

Program Element: 0604369N Budget Activity: 4
Program Element Title: 5" ROLLING AIRFRAME MISSILE
Project Number: S0167 Project Title: 5" ROLLING AIRFRAME MISSILE

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 1988 Accomplishments:
   a. (U) Continued missile build for TECHEVAL/OPEVAL.
   b. (U) Continued Guided Missile Launcher System computer efforts.
   c. (U) Continued RAM related testing of TAS MK 23 computer programs.
   d. (U) Removed Guided Missile Launcher System from USS DAVID R. RAY.
   e. (U) Tested missile producibility changes.
   f. (U) Tested Guided Missile Launcher System producibility changes.
   g. (U) Initiated microprocessor conversion testing and software verification in Guided Missile Launcher System.
   h. (U) Completed loader design and initiated loader fabrication.
   i. (U) Completed shipping container design and initiated fabrication.
   j. (U) Initiated target acquisition/CDS compatibility studies.

2. (U) FY 1989 PROGRAM:
   a. (U) Continue Guided Missile Launcher System computer software testing and validation.
   b. (U) Initiate low altitude fuze efforts.
   c. (U) Continue Guided Missile Launcher System development.
   d. (U) Continue testing and validation of TAS MK 23 tactical computer programs.
   e. (U) Initiate Navy technical evaluation and incorporation of any required corrective actions.
   f. (U) Continue target acquisition/CDS compatibility studies.
   g. (U) Install Guided Missile Launcher System on operational test ship.

3. (U) FY 1990 Plans:
   a. (U) Conduct TECHEVAL/OPEVAL.
   b. (U) Conduct critical design review on upgraded fuze.
   c. (U) Select technical approach for IR Seeker Upgrade.
4. (U) FY 1991 Plans:
   a. (U) Breadboard upgraded IR Seeker.
   b. (U) Initiate fabrication of upgraded IR Seeker EDMs.
5. (U) Program to Completion:
   a. (U) Test upgraded fuze.
   b. (U) Complete fabrication of upgraded IR Seeker EDMs.

Program Element: 0604369N Budget Activity: 4
Program Element Title: 5" ROLLING AIRFRAME MISSILE
Project Number: S0167 Project Title: 5" ROLLING AIRFRAME MISSILE

c. (U) Conduct critical design review of upgraded IR Seeker.
d. (U) Test, analyze and fix (TAAF) and hardware in the loop simulation of upgraded IR Seeker.
e. (U) Test upgraded IR Seeker.
f. (U) Multicolor IR Seeker.
g. (U) Extended range RAM.
h. (U) Integration software for new systems.

D. (U) WORK PERFORMED BY: IN-HOUSE: NWC, China Lake, CA (Acquisition Engineering Agent). NSWC, Dahlgren, VA; NSWSES, Port Hueneme CA; Naval Ordnance Missile Test Facility, White Sands, NM; FLTAC, Corona, CA; Naval Weapons Handling Center, Colts Neck, NJ; PMTC, Point Mugu, CA. PRIME CONTRACTOR - General Dynamics Corp., Ontario, CA. OTHERS: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; EG&G, Washington Analytical Services Center, Rockville, MD; Hughes Aircraft Company Ground Systems Group, Fullerton, CA; Santa Barbara Research Corporation , Goleta, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	+603

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: Budget year funding increase of +603 results from Navy (+612) and OSD (-9) budget adjustments. This increase compensates for a Navy adjustment of -600 in FY 1989.

F. (U) PROGRAM DOCUMENTATION:

OR:	5/75	
FSED MOU:	3/79	
NDCP:	1/81	(REVISION SUBMITTED 10/88)
ILSP:	1/85	
TEMP:	3/87	(REVISION SUBMITTED 12/88)
AP:	8/87	(REVISION SUBMITTED 8/88)
PRODUCTION MOU:	3/87	

Program Element: 0604369N Budget Activity: 4
Program Element Title: 5" ROLLING AIRFRAME MISSILE
Project Number: S0167 Project Title: 5" ROLLING AIRFRAME MISSILE

G. (U) RELATED ACTIVITIES: Program Element 0604361N, (NATO SEASPARROW), for RAM/TAS integration; Program Element 0603609N, (Conventional Munitions), for fuze, guidance, and target detector improvements.

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

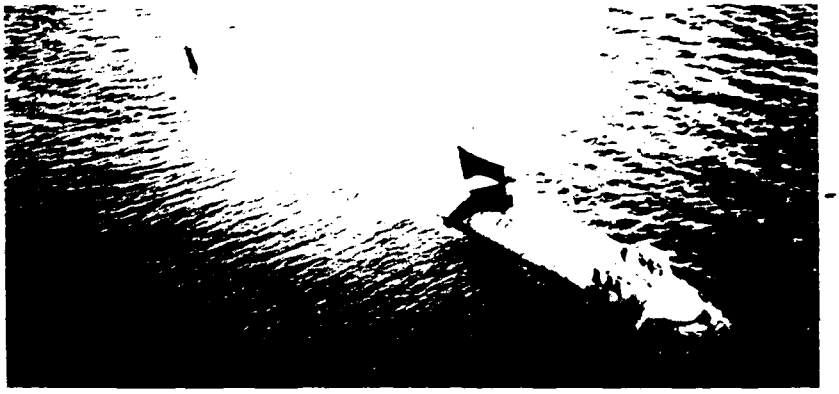
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
WPN #16 Missiles	44,900	51,800	90,300	86,900	541,200	974,200
Procurement Quantity	(240)	(260)	(580)	(540)	(4,321)	(5,941)
OPN (GMLS) #227	11,562	23,824	32,718	36,295	332,400	443,228
Procurement Quantity	(2)	(4)	(7)	(8)	(63)	(85)

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: RAM is a NATO cooperative program with the Federal Republic of Germany. The RAM missile and its launching system are presently in full-scale engineering development. On 17 October 1986, OUSD (IP and 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 Demark). The production MOU was approved and signed by both countries on 3 August 1987. The MOU requires dual-source production of the guidance and control section of the missile and coproduction of the Guided Missile Launching System. After qualification of both sources, a U.S. prime contractor (General Dynamics/Valley Systems Division) and a GE follower (RAM System GmbH) will compete as early as 1990 for combined annual U.S. and GE missile requirements. GD/VSD will be the prime contractor for the launcher, with RAM Sys performing over half of the fabrication effort in GE. Both countries will share joint costs, either pro-rata or equally.

J. (U) TEST AND EVALUATION DATA: This information is included in the FY1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL 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:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					
Engineering Milestones	Computer program C4.1 Cert. 4/88				Full Shock capability 9/92
T&E Milestones	DT-IIE 4/88 DT-IIF 6/88	DT-III 8/89 OT-IIB 2/89		DT-IIG 9/90	OT-III OT-IV OT-IIC 12/90
Contract Milestones		Design & Integration 10/88 Phase III FSED 6/88			

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	14,900	11,500	5,900	8,600	233,652
Support Contract	1,200	500	500	500	6,506
In-House Support	1,865	2,009	2,554	3,252	44,262
GFE/Other	0	0	0	0	0
Total	17,965	14,009	8,954	12,352	284,420 10,050

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604370N Budget Activity: 4

Program Element Title: SSN 688 Class VLS

Project Number: S1500 Project Title: SSN 688 Class VLS

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

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 1988 Accomplishments: Ship and fire control system readiness testing, a successful TECHEVAL using both the Tomahawk anti-ship missile (TASM) and Tomahawk land attack missile-conventional (TLAM-C), the successful launch of an Inert Test Vehicle (ITV) from the USS LOUISVILLE and partial conduct of OPEVAL. The ITV was the first launch from a Class configured bow, and the first launch using a production CLS. The missile launches during TECHEVAL were the first vertical launches using the CCS MK-1 Mod 2 computer program C4.1.

2. (U) FY 1989 Program:
   a. (U) Complete OPEVAL for TASM and TLAM-C weapons.
   b. (U) Preparation of missiles and support systems for conduct of missile/capsule (land attack-nuclear variant) TECH/OPEVAL in FY 1990.
   c. (U) Develop and incorporate ship, fire control, and CLS changes to correct both operational test and fleet usage identified problems.
   d. (U) Conduct sonar impingement testing with AN/BSY-1 Acoustic Set.

3. (U) FY 1990 Plans:
   a. (U) Support AN/BSY-1 TECH/OPEVAL by accomplishment of VLS integration testing and vertical missile launch support.
   b. (U) Evaluate VLS system modification and improvements.

4. (U) FY 1991 Plans:
   a. (U) Conduct TECHEVAL for TLAM-N.
   b. (U) Correct OPEVAL deficiencies.
   c. (U) Develop and plan test for system modifications to provide full shock capability.
   d. (U) Define VLS system improvements and performance modifications.

5. (U) Program to Completion:
   a. (U) Complete component development and testing for shock capability.
   b. (U) Conduct OT&E efforts to validate OPEVAL corrections and fire control updates.
   c. (U) Complete program milestones and terminate RDT&E funding requirements for TOMAHAWK VLS.
   d. (U) Complete development of VLS system performance modifications.
   e. (U) Conduct OPEVAL for TLAM-N.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604370N Budget Activity: 4
Program Element Title: SSN 688 Class VLS
Project Number: S1500 Project Title: SSN 688 Class VLS

D. (U) WORK PERFORMED BY: 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. In-house: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; and Pacific Missile Test Center, Point Mugu, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: -

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	NONE	NONE

NARRATIVE DESCRIPTION OF CHANGES

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:
Program Element 0604367N, TOMAHAWK Missile System.
Program Element 0603569N, Advanced Submarine Development
Program Element 0604524N and 0604562N, Submarine Combat Control Systems Programs

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN (24284N) VLS Suppport Equipment (232)	6,607	7,347	10,103	6,151	16,576	56,412

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION: This information is contained in the FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE

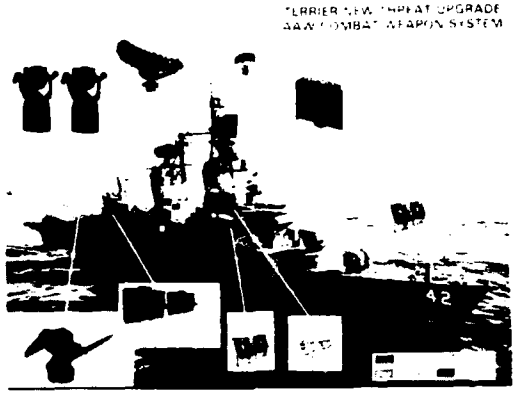
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0188	TERRIER SM-2/NTU	10,545	7,782	2,846	6,435	Cont.	Cont.
S0964	TARTAR SM-2/NTU	7,577	3,200	4,546	5,723	Cont.	Cont.
TOTAL		18,122	10,982	7,392	12,158	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element develops shipboard weapon engagement system improvements needed to counter current and projected anti-ship cruise missile threats at extended ranges. The STANDARD Missile (CG/SM-2) and New Threat Upgrade (NTU) programs are applicable to a total of 41 TERRIER and TARTAR guided missile cruisers and destroyers. The SM-2 Block I modification is a prerequisite for the follow on NTU/SM-2 Block II ships in the TERRIER/TARTAR fleet; there will be 30 NTU/SM-2 Block II and 8 SM-2 Block I ships at program completion. Significant improvements include modifications to weapons direction systems (WDS), guided missile fire control systems (GMFCS), guided missile launching systems (GMLS) and communications tracking sets (CTS) in various ship classes.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604372N Budget Activity: 4
Program Element Title: TERRIER SM-2 NEW THREAT UPGRADE
Project Number: S0188 Project Title: TERRIER SM-2/NTU



POPULAR NAME: TERRIER NTU

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	IOC				
Engineering Milestones					
T&E Milestones	DT/OT IIIA				
Contract Milestones			Phase 1	Phases 2, 3	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	6,823	3,037	1,141	3,282	Continuing
Support Contract	1,400	1,832	683	1,539	Continuing
In-House Support	2,322	2,913	1,022	1,614	Continuing
GFE/ Other					
Total	10,545	7,782	2,846	6,435	Continuing

Program Element: 0604372N Budget Activity: 4
Program Element Title: TERRIER SM-2 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 to the TERRIER weapon engagement system in 28 ships.

This effort includes continuation of development and production of CG/SM-2 and NTU computer programs and related system documentation started in FY 1986 and prior, for integration into combat systems in TERRIER ships. The project supports post NTU TERRIER weapon engagement system modifications needed to engage emerging threats with STANDARD extended range missiles (SM-1 (ER) BLOCK V; SM-2 (ER) BLOCK I/II/III). The CG/SM-2 program, is applicable to the CG 16, CG 26 and DDG 37 classes and CGN's 9, 25, and 35. The follow-on NTU program, is applicable to CG 16 and CG 26 classes, CGN 9, and DDG 42 (the NTU OPEVAL ship).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Completed adaptation of computer programs and related system documentation for shipboard integration of combat systems in baseline TERRIER NTU ships.

b. (U) Continued engineering design/development in support of the TERRIER

(1) (U) Continued engineering design/development of minimum SM-2 Block III compatibility modifications (Phase 1).

(2) (U) Continued engineering design/development of NTU modifications to fully exploit the SM-2 Block III and provide for supportability of the NTU Weapon System through remaining ships service life (Phase 2).

c. (U) Continued engineering design/development of modifications in support of cooperative engagements with other elements of the Battle Group.

d. (U) Completed NTU TEMP 547 DT/OT-IIIA testing aboard USS BIDDLE (CG-34).

e. (U) Initiated engineering design/development of modifications to correct deficiencies and lessons learned identified in NTU DT/OT-IIIA testing and from fleet operations.

2. (U) FY 1989 Program:

a. (U) Continue adaptation of computer programs and related system documentation for shipboard integration of NTU combat systems in TERRIER ships.

b. (U) Continue engineering design/development support of the TERRIER

(1) (U) Continue development of (Phase 1).

(2) (U) Continue development of (Phase 2).

c. (U) Continue engineering design/development of modifications in support of cooperative engagements with other elements of the Battle Group.

d. (U) Continue engineering design/development of modifications to correct deficiencies and lessons learned identified in NTU DT/OT-IIIA testing and from fleet operations.

Program Element: 0604372N Budget Activity: 4
Program Element Title: TERRIER SM-2 NEW THREAT UPGRADE
Project Number: S0188 Project Title: TERRIER SM-2/NTU

3. (U) FY 1990 Plans:
a. (U) Continue engineering design/development in support of the TERRIER[ ].
(1) (U) Complete development of[ ](Phase 1).
(2) (U) Continue development of[ ](Phase 2).
b. (U) Continue engineering design/development of modifications in support of cooperative engagements with other elements of the Battle Group.
c. (U) Continue engineering design/development of modifications to correct deficiencies and lessons learned identified from fleet operations.

4. (U) FY 1991 Plans:
a. (U) Continue engineering design/development in support of the TERRIER[ ]'Phase 2).
b. (U) Continue engineering design/development of modifications in support of cooperative engagements with other elements of the Battle Group.
c. (U) Continue engineering design/development of modifications to correct deficiencies and lessons learned identified in from fleet operations.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Fleet Combat Directions System 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	Delayed	-6,275

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The -6,275 budget reduction stretches out the Terrier,

Program Element: 0604372N Budget Activity: 4
Program Element Title: TERRIER SM-2 NEW THREAT UPGRADE
Project Number: S0188 Project Title: TERRIER SM-2/NTU

F. (U) PROGRAM DOCUMENTATION:

TEMP 547	APR 87
Navy Training Plan (Engagement System)	MAY 86
Integrated Logistic Support Plan (084-4/5)	AUG 83
Integrated Logistic Support Plan (0558-40)	NOV 82
NDCP	FEB 81

G. (U) RELATED ACTIVITIES: Program Element 0604366N (Standard Missile Improvements) supports development of Standard Missile-2 Block II/IIIA round improvements. Program Element 0603382N (Battle Group AAW Coordination) develops improved Battle Force AAW coordination using AEGIS capabilities which includes SM-2/NTU ships. Program Element 0204229Q (SM-2 (ER) and SM-2 (MR)) procures Block II/III Missiles fired by NTU ships.

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

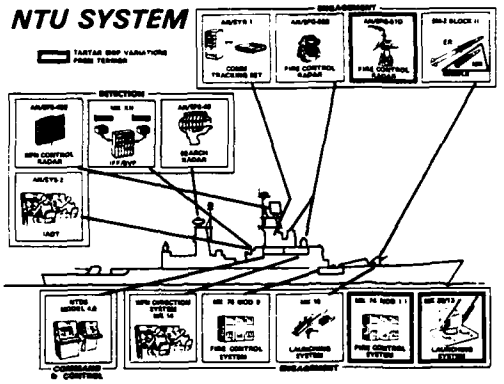
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN #225(523200) TERRIER SUPPORT EQUIPMENT (includes TERRIER CG/SM-2, TERRIER New Threat Upgrade and post-NTU improvements)	48,535	42,265	27,574	16,671	Cont.	Cont.

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



POPULAR NAME: TARTAR SM-2/NEW THREAT UPGRADE

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					
Engineering Milestones	WDS PDR FCS CDR	WDS CDR			
T&E Milestones	DT-IIID	OT-IIIB	DT-IIIE	DT-IIIF	
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	7,029	3,000	3,043	4,050	Continuing
Support Contract					Continuing
In-House Support	548	200	1,503	1,673	Continuing
GFE/ Other					
Total	7,577	3,200	4,546	5,723	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 CAPATILITIES:
This project develops modifications to the TARTAR weapon engagement system to provide a large increase in anti-air warfare engagement system capability. The system will increase engagement system capability by exploiting the already developed STANDARD Missile-2 Block I. The TARTAR CGN/New Threat Upgrade engagement system will further increase capabilities to meet an expanding threat by exploiting the already developed 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 also 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 missile cruisers and destroyers (CGN 36-41 and DDG 993-996). This project supports modification of the AAW engagement system to provide compatibility betweeen the NTU detection system and the SM-2 Block III Missile to enhance performance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Program Accomplishments:
a. (U) Completed combat system integration testing of the CGN/NTU Combat system.
b. (U) Commenced DT/OT-IIIC testing of CGN/NTU In USS SCOTT (DDG 995).
c. (U) Continued engineering design/development of modifications to the TARTAR weapon system to provide improved performance and to provide compatibility with the SM-2 Block III Missile.
d. (U) Completed effort in developing modifications to correct deficiencies identified in CGN/SM-2 Block I DT/OT testing and testing at Mare Island.

2. (U) FY 1989 Program:
a. (U) Complete DT/OT IIIC Testing of CGN/NTU in USS SCOTT (DDG 995).
b. (U) Initiate effort in developing modifications to correct deficiencies identified in CGN/NTU DT/OT IIIC in USS SCOTT (DDG 995).
c. (U) Continue 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.

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0964 Project Title: TARTAR SM-2/NTU

3. (U) FY 1990 Plans:

a. (U) Initiate contractor Integration Tests and DT-IIIE Landbased Testing of TARTAR Weapon System (CGN 36/NTU), which provides improved performance against and provides compatibility with the SM-2 Block III Missile.

b. (U) Complete effort in developing modifications to correct deficiencies identified in CGN/NTU DT/OT-IIIC in USS SCOTT (DDG 995).

4. (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).

5. (U) Program to Completion: This is a continuing program to maintain a TARTAR Weapon Engagement System capable of countering the advancing threat and provide for:

a. (U) Adaptation of computer programs and related systems' documentation to exploit SM-2 Block III Missile performance.

b. (U) Adaptation of the TARTAR system to integrate into the Battle Group.

c. (U) Development of TARTAR Weapons System improvements to correct deficiencies identified during Developmental and Operational testing of each ship class.

D. (U) WORK PERFORMED BY: IN-HOUSE: Fleet Combat Direction System 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	+2,154

Program Element: 0604372N Budget Activity: 4
Program Element Title: NEW THREAT UPGRADE
Project Number: S0964 Project Title: TARTAR SM-2/NTU

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The $2,154 budget increase supports the CGN 36/NTU test program.

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 (0554-4B)	NOV 88
NDCP	FEB 81

G.(U) RELATED ACTIVITIES: Program Element 0604366N (Standard Missile Improvements) supports development of Standard Missile-2 Block II/III round improvements. Program Element 0603382N (Battle Group AAW Coordination) develops improved Battle Force AAW coordination using AEGIS capabilities which includes SM-2/NTU ships. Program Element 0204229Q (SM-2 (ER) Block II/III and SM-2 (MR) Block II/III), procures Block II/III Missiles fired by NTU ships.

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

FY 1988 Actual	FY 1989 Estimate	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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0742	Submarine Integrated Antenna System	1,981	3,658	7,641	10,385	Continuing	Continuing
S1411	Attack Submarine Integrated Comms.	1,295	298	719	1,660	Continuing	Continuing
TOTAL		3,276	3,956	8,360	12,045	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1990/1991 BIENNIAL 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 System

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0742	Submarine Integrated Antenna System	1,981	3,658	7,641	10,385	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEMS CAPABILITIES:
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. This can be accomplished only by providing submarines with a mix of antenna systems which cover a wide range of frequencies and impose minimum restrictions on the submarine's operational capabilities.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Issued contract for improved AN/BRA-34 ADM.
b. (U) Issued report on meteor burst and JTIDS requirements.
c. (U) Developed an omnidirectional VLF modification to the OE-315 (V)/BRC.
d. (U) Evaluated new materials for buoyant cables.
e. (U) Determined Electromagnetic Pulse (EMP) requirements for the AN/BRR-6 and OE-315 (V)/BRC.

2. (U) FY 1989 Program:
a. (U) Start development of the Arctic Buoy.
b. (U) Start development of the two-way tethered buoy.
c. (U) Issue contract for AN/BST-1 improvements.
d. (U) Complete modeling of the Towed Buoy Antenna System.
e. (U) Start development of AN/BRA-34 DAMA modifications.

3. (U) FY 1990 Plans:
a. (U) Start development of a high speed floating wire antenna.
b. (U) Issue contract for Arctic Buoy Engineering Development Models (EDMs).
c. (U) Determine EMP requirements for SSBN mast-mounted antennas.
d. (U) Complete development of DAMA modifications to the AN/BRA-34.

4. (U) FY 1991 Plans:
a. (U) Start development of an EHF antenna.
b. (U) Complete development of AN/BST-1 improvements.
c. (U) Continue development of the Arctic Buoy.
d. (U) Issue contract for two-way tethered buoy EDMs.
e. (U) Continue development of the high speed floating wire.

FY 1990/1991 BIENNIAL 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 System

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

D. (U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT; Naval Ship Systems Engineering Station, Philadelphia, PA; Contractors: Spears Associates, Inc., Norwood, MA; Hazeltine Corporation, Braintree, MA; Granite State Machine Co., Manchester, NH.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIES	IMPACT ON SCHEDULE	IMPACT ON FY 1990 COST
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	CANCELLED TWO ANTENNA UPGRADES	DELAYED ARCTIC BUOY	-2,650

NARRATIVE DESCRIPTION OF CHANGES

1. TECHNOLOGY: None
2. SCHEDULE: None
3. COST: The reduction of (-2,650) resulted in the cancellation of the OE-305 Towed Buoy Antenna Block Upgrade and the HFAJ mods to the AN/BRA-34 Antenna, and reduced efforts for the Arctic Buoy.

F. (U) PROGRAM DOCUMENTATION:

Submarine Arctic Communications	OR	6/86
UHF Arctic Communications	OR	12/86

G. (U) RELATED ACTIVITIES: None

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN #138 (3130)	11,662	11,315	5,733	10,163	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
a. (U) Completed specifications for the Interconnection Subsystem.
b. (U) Evaluated Interconnection candidate systems.
c. (U) Completed specifications for the Antenna Distribution Subsystem.
d. (U) Begin testing a candidate Interconnection Subsystem to further refine specification.
2. (U) FY 1989 Program:
a. (U) Evaluate Antenna Distribution Subsystem candidates
b. (U) Develop specification for Message Processing System.
c. (U) Identify alternative Interconnection Subsystem candidates for SSN 688 Class.
3. (U) FY 1990 Plans:
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.
4. (U) FY 1991 Plans:
a. (U) Conduct concept evaluation of Programmable Tactical Data Interface.
5. (U) Program to Completion: This is a continuing program.

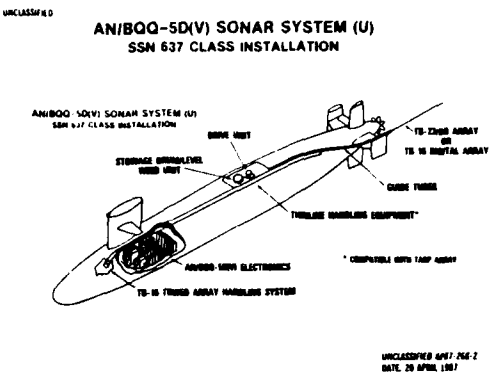
E. (U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT (Lead Laboratory); Naval Ocean Systems Center, San Diego, CA; and Naval Electronic Systems Command Systems Security Engineering Center, Washington, DC; Contractor: Submarine Signal Division, Portsmouth, RI; Rockwell International, 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)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN (313000)	11,662	11,315	5,733	10,163	Cont.	Cont.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL RDT&F, NAVY DESCRIPTIVE SUMMARY
Program Element: 0604503N Budget Activity: 4 - Tactical Programs
Program Element Title: Submarine Sonar Improvements (Engineering)
Project Number: S0219 Project Title: Submarine Sonar Improvements



POPULAR NAME: Submarine Sonar System (Engineering)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	Q-5D IIIC 12/88	III 4/89			
	Q-5E/ ARB 7/88	II 11/88	IIIA 11/89	IIIB 11/90	IIIC 11/91
	TB-12X ARRAY				
	BQS-( )		II 1/90		
Engineering Milestones	Q-5D SDCT 4/88				
	Q-5E				SCDT 1Q/92
	TB 12X ARRAY	Final Specifications 2Q/89			
T&E Milestones	Q-5D TECHEVAL 5/88	OPEVAL 11/88			Q-5E/TB-12X EDM Sea Test 4Q/92
	Q-5E				
	TB-12X ARRAY	Sea Test 8/89			TECHEVAL 1Q/93
					OPEVAL 2Q/93
Contract Milestones	Q-5E/	Award FSD 2Q/89			
	TB-12X ARRAY		Award FSD 2Q/90		
	BQS-( )		Award FSD 2Q/90		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program-Total Program To Complete
Major Contract	10,667	17,885	13,260	28,001	Continuing
Support Contract	1,745	1,810	2,000	1,500	Continuing
In-House Support	20,452	15,784	11,919	13,820	Continuing
GFE/Other	0	0	0	0	0
Total	32,864	35,479	27,179	43,321	Continuing

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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 capability. 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 and localization and significantly enhance the defensive capability of TRIDENT SSBNs. The AN/BQS-() will signficantly improve the minehunting and under ice navigation capabilities of SSN 688 and TRIDENT class submarines.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1.(U) FY 1988 Accomplishments:
- a.(U) Started TECH/OPEVAL for AN/BQQ-5D system.
- b.(U) Continued TB-12X array development.
- c.(U) Continued development of TB-12X integration into the AN/BQQ-5 Sonar.
- d.(U) Completed SSN 637 Thin Line Handling Equipment(TLHE) development.
- e.(U) Drafted BQS-( ) specifications.

2.(U) FY 1989 Program:
- a.(U) Continue development of TB-12X integration, conduct sea-test of development TB-12X array.
- b.(U) Start upgrade of acoustic measurement equipment.
- c.(U) Continue development of operational guidelines.
- d.(U) Complete TECH/OPEVAL for AN/BQQ-5D system.
- e.(U) Finalize BQS-( ) specifications.

3.(U) FY 1990 Plans:
- a.(U) Continue development of TB-12X integration into the BQQ-5 Sonar.
- b.(U) Continue upgrade of acoutic measurement equipment.
- c.(U) Start development of AN/BQS ().
- d.(U) Continue development of operational guidelines.
- e.(U) Continue TB-12X array development.

4.(U) FY 1991 Plans:
- a.(U) Continue development of TB-12X integration into the BQQ-5 Sonar.
- b.(U) Start development of the AN/BQQ-5(E) Block Change
- c.(U) Continue development of AN/BQS ().

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

D. (U) WORK PERFORMED BY: Contractors: International Business Machines Corp., 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; Illinois Tool Works, Chicago, IL. In-house: NAVSEASYSCOM, Washington, DC; NUSC, New London, CT; Naval Weapons Support Center, Crane, IN; COMOPTEVFOR, Norfolk, VA; and NOSC, San Diego, CA.

Program Element: 0604503N Budget Activity: 4-Tactical Programs
Program Element Title: Submarine Sonar Improvements (Engineering)
Project Number: S0219 Project Title: Submarine Sonar Improvements
E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIFS	IMPACT SCHEDULE	IMPACT ON FY 90 COST
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	NONE	-7,845

NARRATIVE DESCRIPTION OF CHANGES

1. *TECHNOLOGY:* None
2. SCHEDULE: None
3. COST: The -$7,845 decrease resulted from the restructuring of the AN/BQQ-5E program into two phases. Initial development remains unchanged from the previous schedules and reflects the integration of the TB-12X capability and related improvements into the AN/BQQ-5 sonar system.

F. (U) PROGRAM DOCUMENTATION:

NDCP S0219-as approved	01/86
TEMP 137-07	06/87
Acquisition Plan 424-87	03/88
TEMP 137-8	11/88

G. (U) RELATED ACTIVITIES:

P.E.	Title
0604524N	Submarine Combat System Development
0604561N	SSN-21

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

APPN/P-1 (U) PROCUREMENT	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
AN/BQQ-5 Sonar System						
OPN #60						
OPN BA 2: (312145)	26,361	82,369	95,697	115,237	Cont.	Cont.
Quantities	(0)	(9)	(6)	(6)		
TB-16 Towed Arrays						
OPN #61						
OPN BA 2:(312146)	3,142	5,584				
Quantities	(14)	(14)				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) TEST AND EVALUATION DATA:

Q-5D: TECHEVAL completed OCT 88
OPEVAL commences NOV 88
Q-5E: Early Operational Assessment scheduled for 4Q FY 89
TB-12X Array: Early Operational Assessment scheduled 4Q FY 89

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0933	Carrier Air Traffic Cont.	4,652	3,135	2,535	7,326	Cont.	Cont.
W1579	LPH/LHA Air Traffic Cont.	690	0	600	0	0	12,600
W1680	Multi-Mode Receiver	7,464	14,255	10,514	3,480	Cont.	Cont.
X0718	Marine Air Traffic Cont. & Landing Syst.	3,691	1,648	3,299	3,611	Cont.	Cont.
X1657	ATC Impr.	0	0	3,198	7,219	Cont.	Cont.
TOTAL		16,497	19,038	20,146	21,636	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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, and Low Probability of Intercept radiated electromagnetic energy from ATC radars. The new systems are required to replace obsolete ATC and approach/landing equipments on aircraft, aircraft carriers, amphibious ships, Naval Air Stations, and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: W0933 Project Title: CARRIER AIR TRAFFIC CONTROL

C. (U) PROJECT DESCRIPTION: Shipboard Air Traffic Control Centers identify, marshall 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 Intercept (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 approved for Phase II of the AN/SPN-46(V) development, ILM and LPI in FY 1987.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Engineering Development Model (EDM) at NATC, Pax River and Service Test Model (STM) on CV-67 upgraded and changes verified.
   b. (U) Studies and analyses of power supplies used in system conducted by Naval Avionics Center and Applied Physics Laboratory (APL).
   c. (U) Three limited production systems delivered for CVN-72/73 and CV-63.

2. (U) FY 1989 Program:
   a. (U) Conduct TECHEVAL of AN/SPN-46(V) Phase I.
   b. (U) Obtain Approval for Limited Production.

3. (U) FY 1990 Plans:
   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.

4. (U) FY 1991 Plans: FSD continues for AN/SPN-46 shorebased.

5. (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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#108	0	0	15,237	7,500	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: W1579 Project Title: LPH/LHA AIR TRAFFIC CONTROL

C. (U) PROJECT 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. 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 1988 Accomplishments:

a. (U) Received Engineering Development Model (EDM).
b. (U) Evaluated EDM.

2. (U) FY 1989 Program:

a. (U) Conducted DT-IIA.
b. (U) Obtain Approval for Limited Production (ALP) for three systems.

3. (U) FY 1990 Plans: Obtain Approval for Full Production (AFP).

4. (U) FY 1991 Plans: Not Applicable.

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

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) EATON Corp., Farmingdale, NY.

F. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#107	0	0	7,735	7,593	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: W1680 Project Title: MULTI-MODE RECEIVER

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Multi-Mode Receiver	7,464	14,255	10,514	3,480	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

   a. (U) Monitored preproduction contract.
   b. (U) Conducted Preliminary and Critical Design Reviews.
   c. (U) Reviewed/approved technical data deliverables.

2. (U) FY 1989 Program:

   a. (U) Monitor preproduction contract.
   b. (U) Begin F/A-18 MMR integration efforts.
   c. (U) Initiate CH-46/MMR integration efforts.

3. (U) FY 1990 Plans:

   a. (U) Begin TECHEVAL.
   b. (U) Initiate MMR test program set development for CASS.
   c. (U) Commence and complete MMR integration efforts on V-22.
   d. (U) Complete integration efforts on F/A-18 and CH-46.

4. (U) FY 1991 Planned Program:

   a. (U) Complete TECHEVAL.
   b. (U) Commence and complete OPEVAL.
   c. (U) Milestone III production decision.

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

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: W1680 Project Title: MULTI-MODE RECEIVER

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN. CONTRACTOR: Singer Electronic Systems, Wayne, NJ.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	Delay LPI airborne development effort.	-9,619

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The reduction of -9,619 will delay Development of Low Probability of Intercept (LPI).

F. (U) PROGRAM DOCUMENTATION:

OR	9/83
TEMP	12/85 (being updated)
AP	8/86

G. (U) MILESTONE SCHEDULE:

Award preproduction contract	4Q/FY87
TECHEVAL	3Q/FY90 - 1Q/FY91
OPEVAL	1Q/FY91 - 2Q/FY91
Milestone IIIA	3Q/FY91
IOC	3Q/FY92

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: W1680 Project Title: MULTI-MODE RECEIVER

H. (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.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#107, 108		Not Applicable			Cont.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: X0718 Project Title: MARINE AIR TRAFFIC CONTROL AND LANDING SYSTEM (MATCALS)

C. (U) PROJECT DESCRIPTION: The Marine Air Traffic Control and Landing System (MATCALS) is an integrated, automated, landing and terminal Air Traffic Control System which will provide the capability for safe all-weather operations at Marine Expeditionary Airfields.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued DT of MATCALS operational capabilities, and safety-of-flight testing.
   b. (U) Completed at-sea testing of (SMRAALS).
   c. (U) Conducted flight testing of Global Positioning System (GPS).

2. (U) FY 1989 Programs:
   a. (U) Continue DT of MATCALS operational capabilities, initiate software changes, and safety-of-flight testing for Mode I.
   b. (U) Continue qualification testing of fleet aircraft against AN/TPN-30 (MRAALS and SMRAALS) offsets.

3. (U) FY 1990 Plans:
   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.

4. (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.

5. (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: Singer Electronic Systems, Wayne, NJ; UNISYS Corp., Great Neck, NY; UNISYS Corp., St. Paul, MN.

F. (U) RELATED ACTIVITIES: Development in the MATCALS and SMRAALS projects has been coordinated with the Naval Air Systems Command.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
OPN/#106	21,606	9,918	15,385	13,355	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604504N Budget Activity: 4
Program Element Title: AIR CONTROL (ENGINEERING)
Project Number: W1657 Project Title: ATC IMPROVEMENTS

C. (U) PROJECT 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 must be modified to (1) allow afloat aviation forces to train as they will fight and (2) to ensure continued interoperability with the National Airspace System (NAS).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Programs: Not Applicable.

3. (U) FY 1990 Plans: Develop and adapt systems specifications to address safety of flight deficiencies; improve system performance, tracking capabilities, countermeasures, extended range/detection; and develop a low-cost air station surveillance system to support low density traffic areas.

4. (U) FY 1991 Plans: Procure, test, and evaluate (1) real-time ship-board/shorebased ATC systems; (2) ATC communications systems; (3) air navigational aids and landing systems; and (4) airspace management systems to determine their applicability to satisfy Navy's all weather flight capability, to significantly enhance flight safety, and to allow aviation forces to train as they will fight.

5. (U) Program to Completion: Continue test and evaluation efforts. Continue to analyze and adapt pertinent subsystem components to satisfy ship/shorebased application.

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: TBD.

F. (U) RELATED ACTIVITIES: Not Applicable.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604506N Budget Activity: 4
Program Element Title: CHEMICAL WARFARE COUNTERMEASURES

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0410	BR/CW Countermeasures	5,626	6,448	7,511	8,254	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Develop chemical, biological and radiological (CBR) defensive systems, protective clothing compatible with naval operations, citadel areas for collective protection ashore and on ships, point detectors and monitors to locate and identify CBR contamination, and contamination control procedures, materials and equipment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Approved production of collective protection systems (CPS), ashore simulant disperser system.
2. (U) FY 1989 Program:
   a. (U) Approve production of Machinery Space CPS, Chemical Agent Monitor.
3. (U) FY 1990 Plans:
   a. (U) Conduct operational demonstration of contamination control techniques and procedures.
   b. (U) Publish operational guidelines for decontamination and contamination control.
4. (U) FY 1991 Plans:
   a. (U) Continue development of improved point detection system.
   b. (U) Conduct testing of improved permeable protective clothing.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dalhgren, VA; DTRC, Bethesda, MD; NCTRF, Natick, MA; NCEL, Port Hueneme, CA; NAEC, Lakehurst, NJ; CONTRACTORS: Garrett Research Corp, Los Angeles, CA; Nuclear Research Corp, Philadelphia, PA; Rosenblatt & Sons, Arlington, VA; J. McMullen, Washington, DC; Battelle, Columbus, OH.

E. (U) RELATED ACTIVITIES: Program Element 0604264N Aviation Life Support System, 0603514N Ship Combat Survivability, 0602233N Mission Support Technology.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) (098900) OPN#36	14,400	14,400	19,400	23,800	Cont.	Cont.

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

FY 1989 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1440	Enhanced Modular Signal Processor (EMSP)	58,854	47,362	24,428	16,838	Cont.	Cont.
S1990	ASP Common Operational Support System (ACOS)	3,318	2,904	3,787	3,199	0	16,690
	Total	62,172	50,266	28,215	20,037	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: EMSP (AN/UYS-2) will provide increased signal processing capability to help maintain 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) 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 Trident Noise Monitoring System. The ADE includes an extensive set of software tools for development and maintenance of code, including a multitasking operating system with scheduler, complete set of SPGN algorithms, a graphics editor, an event-time simulator, compiler, libraries and interactive software debugger. ACOS is developing advanced software tools to improve the Advanced Signal Processor (ASP) AN/UYS-1.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604507N Budget Activity: 4
Program Element Title: Navy Standard Signal Processor (NSSP)
Project Number: S1440 Project Title: Enhanced Modular Signal Processor

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
EMSP	58,854	47,362	24,428	16,838	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Enhanced Modular Signal Processor (EMSP) will provide increased signal processing capability to help maintain 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. EMSP 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 the aircraft operational weight-limited requirements. The application development environment offers an order of magnitude increase in computer program productivity because it requires little knowledge of the machine design and permits natural expression of signal processing problems. It is designed to accommodate technologic and functional element upgrades for incorporation of VHSIC and enhanced parallel processing capabilities in future block configurations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Delivered Laboratory Development Equipment (LDE).
b. (U) Conducted Acceptance Test of Laboratory Development Equipment with Floating Point Arithmetic Processor.
c. (U) Began transition to ADA.
d. (U) Began functional module repackaging.
e. (U) Continued full scale development of Floating Point Arithmetic Processor.

2. (U) FY 1989 Program:

a. (U) Deliver Development Test Equipment (DTE) with Input Signal Conditioner.
b. (U) Begin SEM B limited production long lead orders.
c. (U) Continue full scale development to Floating Point Arithmetic Processor.
d. (U) Continue functional module repackaging and ADA transition.
e. (U) Begin Advanced Development Model phase for the Matrix Array Processor Functional Element.
f. (U) Conduct DT IIC TECHEVAL on the SEM B variant.
g. (U) Release RFP for module procurement.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604507N Budget Activity: 4
Program Element Title: Navy Standard Signal Processor (NSSP)
Project Number: S1440 Project Title: Enhanced Modular Signal Processor

3. (U) FY 1990 Plans:

a. (U) Continue delivery of Development Test Equipment.
b. (U) Begin Full Scale Engineering Development phase for the Matrix Array Processor Functional Element.
c. (U) Continue functional module repackaging and ADA transition.
d. (U) Begin SEM B limited production.

4. (U) FY 1991 Plans:

a. (U) Continue Matrix Array Processor development.
b. (U) Deliver repackaged Service Test Model to P-3C Update IV Program.
c. (U) Conduct DT III SEM E test.

5. (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.
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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	+1,003

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604507N Budget Activity: 4
Program Element Title: Navy Standard Signal Processor (NSSP)
Project Number: S1440 Project Title: Enhanced Modular Signal Processor

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: NONE

2. (U) SCHEDULE CHANGES: NONE

3. (U) COST CHANGES: Departmental and Navy adjustments resulted in funding increase of $1,003K to cover R&D cost growth.

F. (U) PROGRAM DOCUMENTATION:

NDCP #S-1440 dated August 1983
TEMP #880 (Rev 1) dated June 1987

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 0603784N, 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
OPN (332975)	4,816	11,477	12,184	7,653	Cont.	Cont.
EMSP Facilitization for In-service support	(1,984)	(9,306)	(6,580)	(5,514)	Cont.	Cont.
EMSP Second Source	(2,000)	(2,000)	(2,900)	(1,600)	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE:

Sponsor Program Review 2 (Authorized fabrication of Laboratory Development Equipment, authorized procurement of long lead for Development Test Equipment).	4Q/FY86
Very High Speed Integrated Circuit Milestone II (Authorized Full Scale Engineering Development of the Very High Speed Integrated Circuit, Floating Point Arithmetic Processor).	4Q/FY86
Milestone IIIA (Authorized fabrication for first production buy; follows TECHEVAL).	3Q/FY89

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604507N Budget Activity: 4
Program Element Title: Navy Standard Signal Processor
Project Number: S1990 Project Title: ASP Common Operational Support System (ACOS)

C. (U) PROJECT DESCRIPTION: Project is to develop ACOS software tools to reduce coding and maintenance costs. ACOS is a programming methodology by which acoustic engineers can implement signal processing graphs into Advanced Signal Processor (ASP) code without extensive computer training. ACOS will enable the ASP to be programmed using Signal Processing Graph Notation (SPGN) methods successfully demonstrated in EMSP Common Operating System (ECOS) efforts.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments:
   a. (U) Implemented ACOS Phase I SPGN applications development tools.
   b. (U) Produced Bench Mark Analysis Test Application (BMTA) design and developed DOD-STD-2167 documentation.
   c. (U) Defined and designed Phase I products.
2. (U) FY 1989 Program:
   a. (U) Code, test and deliver Phase I ACOS and BMTA products.
   b. (U) Complete BMTA code testing and analysis.
   c. (U) Decision to proceed to and start Phase II design.
3. (U) FY 1990 Plans:
   a. (U) Design and code Phase II products.
   b. (U) Start incorporation plans for ACOS into P-3 Update III.
4. (U) FY 1991 Plans:
   a. (U) Test and deliver Phase II products.
   b. (U) Final contractor acceptance tests.
5. (U) Program to Completion:
   a. (U) None. Program to be completed in FY 1991.

E. (U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA. Contractor: Hughes Aircraft CO., Fullerton, California.

F. (U) RELATED ACTIVITIES: P-3 Modernization (PE 0604221N/W1152); S-3 Weapon System Improvement Program (PE 0604217N/W0489); LAMPS (PE 0604212N/W1707); Submarine Advanced Combat System (PE 0604252N/X1347); AN/SQS-53C (PE 0604575N/S1451); SURTASS (PE 0204313N/X0758); Surface ASW Systems Improvement (PE 0604713N/0234/S1916); and Acoustic Search Sensors (Engineering) (PE 0604261N/W0478/W0489/W1624). SEM cards supplied by Standard Embedded Computer Resources Program (PE 0604574N/S1353).

G. (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 #126 (32975)		Not Applicable			6,067	6,067

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604508N Budget Activity: 4
Program Element Title: RADAR SURVEILLANCE EQUIPMENT

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0166	SPS Improvements	7,123	6,171	6,002	7,724	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops and tests upgrades to fleet surveillance radars that improve their performance and reliability. These upgrades are required due to the increasing age of fleet radar systems and ever more challenging threat. The program also develops Integrated Automatic Detection and Tracking (IADT) Systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments:
   a. (U) Commenced FSED of the AN/SPS-49 Solid State Transmitter.
   b. (U) Continued development of AN/SYS-2(V)2 IADT for FFG-7 Class.
2. (U) FY 1989 Program:
   a. (U) Continue FSED of the AN/SPS-49 Solid State Transmitter.
   b. (U) Complete development of AN/SYS-2(V)2 for FFG-7 class ships.
   c. (U) Initiate feasibility study for test of B-1B radar at sea.
3. (U) FY 1990 Plans:
   a. (U) Continue FSED of the AN/SPS-49 Solid State Transmitter.
   b. (U) Start development of signal processing modifications and a phased array antenna for the AN/SPS-49 radar.
   c. (U) Start development of AN/SPS-48 signal processing upgrades.
4. (U) FY 1991 Plans:
   a. (U) Complete development of the AN/SPS-49 Solid State Transmitter.
   b. (U) Continue FSED for AN/SPS-49 signal processing modifications and AN/SPS-49 improved antenna development.
   c. (U) Continue AN/SPS-48 signal processing modifications.
5. (U) Program to Completion: Complete AN/SPS-48 and AN/SPS-49 signal processing modifications, new AN/SPS-49 antenna. This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSEACOMBATSYSENGSTA Norfolk, VA; NSWSES, Port Hueneme, CA; NSWC, Dahlgren, VA; NRL, Washington, DC. CONTRACTORS: Raytheon, Wayland, MA; JHU/APL, Laurel, MD; ITT-Gilfillan, Inc., Van Nuys, CA; Westinghouse, Baltimore, MD; Norden Systems, Melville, NY; EG&G, Inc., Arlington, VA.

E. (U) RELATED ACTIVITIES: PE 0604307N, Aegis Combat Systems Engineering; PE 0604372N, New Threat Upgrade; PE 0603319N, NATO AAW Systems; PE 0604211N, IFF System Development.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
OPN #51,52,53,54, 55,57	105,500	90,550	34,672	37,577	Cont.

G. (U) INTERNATIONAL AGREEMENTS: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0755	SSSP	6,339	15,341	31,379	36,506	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Develops improved Electronic Support Measures (ESM) techniques, components, equipment, and ESM 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 radar detection vulnerability. These improvements are necessary for submarines to operate effectively in an increasingly dense and sophisticated electronic environment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Program:
a. (U) Continued repackaging and quieting SEA NYMPH for SSN-21 Class.
b. (U) Completed upgrade to SEA NYMPH data processing, signal processing, and data storage system.
c. (U) Evaluated new varieties of Radar Cross Section Reduction (RCSR) material.
d. (U) Provided minimal engineering support for the AN/WLR-8 and AN/WLR-1H IFM and frequency extension developments.

2. (U) FY 1989 Program:
a. (U) Continue repackaging and quieting of SEA NYMPH for SSN 21 Class.
b. (U) Begin development of the AN/WLQ-( ) ESM system that will replace existing ESM and DF systems on attack submarines beginning in 1997.
c. (U) Begin development on a new radome for the AN/BRD-7 that lowers detectability and extends life of RCSR materials.
d. (U) Continue to evaluate new RCSR materials.
e. (U) Continue minimal engineering support for AN/WLR-1H and AN/WLR-8 IFM and frequency extension developments.

3. (U) FY 1990 Plans:
a. (U) Complete repackaging and quieting of SEA NYMPH for SSN-21 Class.
b. (U) Continue development of AN/WLQ-() ESM System.
c. (U) Complete development of improved radome for the AN/BRD-7 antenna.
d. (U) Continue to evaluate new RCSR materials.
e. (U) Begin development of an integrated antenna mast for submarine ESM systems.

FY 1990/1991 BIENNIAL 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

f. (U) Begin development of an integrated antenna mast for submarine ESM systems.
g. (U) Begin development of techniques for condensing and displaying larger quantities of data.
h. (U) Begin development of reliability and maintainability improvements for submarine ESM systems.

4. (U) FY 1991 Plans:

a. (U) Continue development of AN/WLQ-() ESM System.
b. (U) Continue to evaluate new RCSR materials.
c. (U) Continue development of AN/WLR-1H and AN/WLR-8 IFM.
d. (U) Continue development of an integrated antenna mast for submarine ESM systems.
e. (U) Continue development of techniques for condensing and displaying larger quantities of data.
f. (U) Continue development of reliability and maintability improvements for submarine ESM systems.

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

D. (U) WORK PERFORMED BY: David Taylor Research Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI; Naval Sea Systems Engineering Station, Philadelphia, PA; Naval Electronic Systems T&E Detechment, St. Idigoes, MD; Naval Research Laboratory, Washington, DC. CONTRACTOR: GTE, Government Systems, Mountain View, CA: SANDERS Associates, Mahusa, NH; Litton AMECON, College Park, MD; ARGO Systems, Sunnyvale, CA; Brunswick, Marion, VA;

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	AN/WLQ-4(V)1 will not interface with SSN-21 combat system.	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	+9,300

FY 1990/1991 BIENNIAL 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

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY: Requirement eliminated for SSN-21 Combat System/TADICS interfaces with AN/WLQ-4(V)1 Interim ESM System.
2. (U) SCHEDULE: None
3. (U) COST CHANGES: The FY 1990 increase of (+9,300) was added to maintain the AN/WLQ () IOC.

F. (U) PROGRAM DOCUMENTATION: AN/WLQ-4(V): OPNAVINST C9010 SEA 02/5C384451 of 13 Dec 1985.

G. (U) RELATED ACTIVITIES: (U) This program dovetails with the Program Element 0603522N, Advanced Submarine Surveillance Support Program. It also supports Program Element 0604561N, Project S1946, SSN-21 Development. Close monitoring of other defense and federal agencies is conducted to take advantage of all available technology and to prevent duplication of effort.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
OPN #90	0	12,598	7,430	29,900	Cont.	Cont.
OPN #92	0	0	992	3,427	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1828	Ship Surv. Eng.	7,267	6,031	1,805	1,639	Cont.	Cont.
S2054	DC/FF	0	0	5,179	4,481	Cont.	Cont.
TOTAL		7,267	6,031	6,984	6,120	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports the full scale development of systems and components to provide protection against weapons effects from hostile actions, and to enable continued, effective combat missions. This program also supports the engineering development of improved damage control, fire protection and firefighting systems and equipments for the rapid control and suppression of damage and fire.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project supports the full scale development of systems and components to provide protection from weapons effects, and to enable continued combat missions.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed basic upgrade of Full Scale Fire Test Facility (ex SHADWELL) initiated full scale Test and Evaluation for Smoke Ejection System (SES).

b. (U) Fabricated MK-32 Surface Ship Torpedo Tube (SSTT) Prototype armor ORDALT completed jettison ORDALT and conducted evaluation.

c. (U) Awarded Engineering Development contract for Destroyer/Frigate Wire Free Communications System.

2. (U) FY 1989 Program:

a. (U) Complete development of MK-32 SSTT Armor System ORDALT.

b. (U) Complete testing of Shipboard Fire Detection System, Destroyer/Frigate Wire Free Communication System, Liferaft Desalinator.

c. (U) Complete development and test of fire retardant intumescent paint coatings.

3. (U) FY 1990 Plans: Complete cost/feasibility study on multi-class application of SES.

4. (U) FY 1991 Plans: Submit final SES update to General Specifications, Heating Ventilation Air Conditioning Manual, Navy Standard Technical Manual, and Shipboard Damage Control Book.

5. (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; RCA Corp., Camden, NJ; Recovery Engineering, Minneapolis, MN; JJMA, Arlington, VA

F. (U) RELATED ACTIVITIES: P.E. 0603514N, (Ship Combat Survivability).

G. (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						
004 MK32 (OPN) #238	0	0	500	600	3,675	Cont.
091000 OPN #19	34,811	16,288	0	0	Cont.	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604516N Budget Activity: 4
Program Element Title: SHIP SURVIVABILITY ENGR.
Project Number: S2054 Project Title: SHIP DAMAGE CONTROL ENGINEERING

C. (U) PROJECT 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 1988 Accomplishments: Not Applicable.
2. (U) FY 1989 Program: Not Applicable.
3. (U) FY 1990 Plans:

a. (U) Obtain Initial Operational Capability for Shipboard Fire Detection System, Liferaft Reverse Osmosis Desalinator.

b. (U) Commence engineering development of Damage Control Portable Pumping and Power System, and hands-free Firefighters Thermal Imager.

c. (U) Complete modifications to Full Scale Fire Test Facility to permit conduct of tests for interior ship conflagration control.

d. (U) Complete test and evaluation of selected damage control/firefighting non-development item candidates.

e. (U) Obtain production approval for wire free communications.

4. (U) FY 1991 Plans:

a. (U) Commence engineering development of Damage Control Ultrasonic Hull Communications System and Damage Control Management System.

b. (U) Complete specifications for Lightweight Structural Fire Insulation for new construction.

c. (U) Complete test and evaluation of selected damage control/fire-fighting non-development item candidates.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; 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, Conshohocken, PA; English Electric Valve United Kingdom.

F. (U) RELATED ACTIVITIES: P.E. 0603514N, Project S1565 (Damage Control) for advanced development efforts.

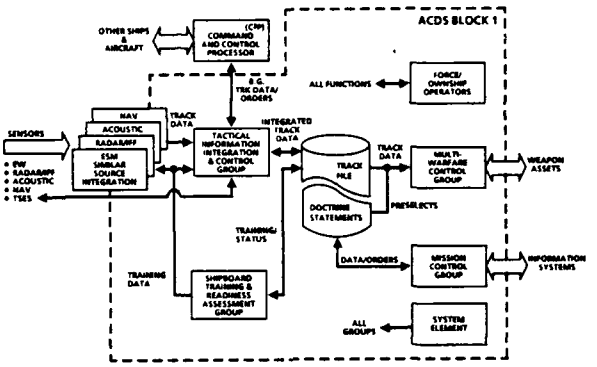
G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT (091000)OPN #19	0	0	74,387	99,701	Cont.	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604518N Budget Activity: 4
Program Element Title: CIC Conversion
Project Number: S1604 Project Title: CIC Conversion



POPULAR NAME: Advanced Combat Direction System (ACDS) Block 1

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS II			MS III
Engineering Milestones			CDR TRR (CAT)		FQR
T&E Milestones		OT I			OT II
Contract Milestones			CDR AWARD FEE		Navy Acceptance

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	7,000	12,000	15,700	17,100	Cont.
Support Contract	377	913	1,200	1,300	Cont.
In-House Support	964	521	1,000	1,339	Cont.
GFE/ Other	1,600	5,000	6,454	8,787	Cont.
Total	9,941	18,434	24,354	28,526	Cont. Cont.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604518N Budget Activity: 4
Program Element Title: CIC Conversion
Project Number: S1604 Project Title: CIC Conversion

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) This program element develops software that replaces 1960's 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 future threats, operational deficiencies, and new and existing 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 used for the evaluation of surveillance data and for control of aircraft and weapon systems, and provide integration between sensor/weapons systems which are organic to the battle force, and those equipments providing this information gained from outside the battle force. Included in this program are improvements to CV/CVN, CG/CGN, DDG 993 class, LHD, LCC and LHA. This program provides for significant Combat Direction System (CDS) 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), Shipboard Gridlock (SGS)/Automatic Correlation (AC) and Command and Control Processor (C^2P).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed Advanced Combat Direction System (ACDS) Block 1 Computer Program top level design.

b. (U) Continued ACDS Block 1 computer program detailed design.

c. (U) Planned tests for evaluating performance of initial segments of Block 1 program.

d. (U) Commenced code/debug following system core program functional development: Data Base Manager, Picture Construction System, Display Processor and Doctrine Processor.

e. (U) Completed installation and adaption of AEGIS Tactical Executive System (ATES) Software development tools.

2. (U) FY 1989 Program:

a. (U) Continue ACDS Block 1 Computer Program detailed design.

b. (U) Conduct OT I to test initial program coding/design to ensure performance goals of throughput and flexibility are met.

c. (U) Commence code and debug of remaining elements of ACDS Block 1 computer program.

d. (U) Continue Combat Direction System (CDS) Standard Simulation System development in support of ACDS Block 1 operational shore site testing.

3. (U) FY 1990 Plans:

a. (U) Complete detailed design of ACDS Block 1 computer program and conduct Critical Design Review (CDR).

b. (U) Continue coding/testing of ACDS Block 1 program.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604518N Budget Activity: 4
Program Element Title: CIC Conversion
Project Number: S1604 Project Title: CIC Conversion

c. (U) Complete Test Requirements Review (TRR) for contractor acceptance tests (CAT) and system acceptance tests (SAT).

d. (U) Integration of Command and Control Processor (C2P) with the Advanced Combat Direction System on CG-16/26 cruisers.

4. (U) FY 1991 Plans:

a. (U) Complete coding of ACDS Block 1 Program.

b. (U) Complete CAT and program acceptance tests (PAT).

c. (U) Commence System Acceptance Test.

d. (U) Complete CDS Standard Simulation System development in support of ACDS Block 1 operational shore site tests.

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

D. (U) WORK PERFORMED BY:

(U) IN HOUSE: Naval Ocean Systems Center, San Diego, CA; Fleet Combat Direction Systems Support Activity, San Diego, CA; Integrated Combat System Test Facility, San Diego, CA; and Puget Sound Naval Shipyard, Bremerton, WA. CONTRACTORS: Hughes Aircraft Co., San Diego, CA; Raytheon Services Corporation, Arlington, VA; American Defense Systems Inc., San Diego, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	Removed weapon system interfaces and reduced the number of platforms	5 month slip	-$10,730

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: The -$10,730 reduction resulted in IOC slip of 5 months, removal from the program of 16 and 26 class cruisers, deferral of software design for CG/CGN and DD993 and cessation of weapons systems interfaces for all ACDS Block 1 platforms.

F. (U) PROGRAM DOCUMENTATION:

(U) NDCP - 22 Dec 86

(U) TEMP #935 - Approved 12 Jun 87

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604518N Budget Activity: 4
Program Element Title: CIC Conversion
Project Number: S1604 Project Title: CIC Conversion

G. (U) RELATED ACTIVITIES:

(U) CV ASW Module, PE 0603228N
(U) Combat System Integration, PE 0603582N
(U) JTIDS, PE 06025604N
(U) C^2P, PE 0603717N

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604524N Budget Activity: 4 - Tactical Program
Program Element Title: Submarine Combat Systems (Development)

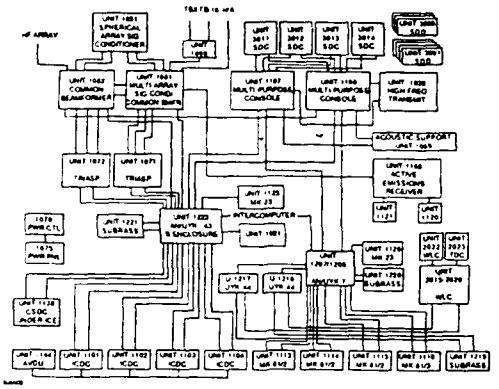
A. (U) RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1347	AN/BSY-1	130,960	87,297	24,664	2,039	0	958,311
S1941	AN/BSY-2	186,828	284,032	336,474	387,022	571,185	1,777,585
Total		317,788	371,329	361,138	389,061	571,185	2,735,896

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT:
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 [redacted]. AN/BSY-1 replaces the AN/BQQ-5 Sonar and CCS MK1 Combat System and provides capabilities for detection, classification, tracking, target motion 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 [redacted] SSN 688 Class submarines. The AN/BSY-2 Submarine Combat System (SCS) 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), Long Thin Line Towed Array, and TB - 16 Towed Array.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 604524N Budget Activity: 4 - Tactical Programs
Program Element Title: Submarine Combat Systems (Development)
Project Number: S1347 Project Title: AN/BSY-1



POPULAR NAME: AN/BSY-1

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			III 9/90		
Engineering Milestones					
T&E Milestones	System Design Certification Test 9/88		TECHEVAL 1Q/90 OPEVAL 2Q/90		
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Total Program To Complete
Major Contract	103,445	77,200	12,863	1,032	761,521
Support Contract	5,597	1,769	9,760	1,007	36,543
In-House Support	15,126	8,328	2,041	0	69,016
GFE/Other	6,792	0	0	0	91,231
Total	130,960	87,297	24,664	2,039	958,311 0

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0604524N Budget Activity: 4
Program Element Title: Submarine Combat Systems (Development)
Project Number: S1347 Project Title: AN/BSY-1

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) The AN/BSY-1 Combat Control and Acoustic (CC/A) Subsystem will be installed in new construction SSN 688 Class submarines beginning with the AN/BSY-1 replaces the AN/BQQ-5 Sonar and CCS MK1 Combat System. AN/BSY-1 will provide capabilities for detection, classification, tracking, target motion analysis, and onboard training. It will provide 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 FY83-FY90 SSN 688 Class submarines.

(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 water.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed System Design Certification Testing (ship deployment configuration).
   b. (U) Completed Land Based test Site testing.
   c. (U) Completed software development for ship deployment configuration.
   d. (U) Delivered two ship systems for SSN 752 and 754.
   e. (U) Continued team trainer/WLSOT development.
   f. (U) Continued crew training.
2. (U) FY 1989 Program:
   a. (U) Complete the full scale development of Submarine Combat System AN/BSY-1 configuration.
   b. (U) Deliver four ship systems to SSN 753,755-757.
   c. (U) Complete land based test site testing.
   d. (U) Complete the full scale development of submarine combat system AN/BSY-1 configuration.
3. (U) FY 1990 Plans:
   a. (U) Conduct full technical evaluation and operational evaluation
   b. (U) Deliver five ship systems to SSN 758, 759-762.
4. (U) FY 1991 Plans:
   a. (U) Correct deficiencies found during testing.
   b. (U) Deliver six ship systems to SSN 763-769.
5. (U) Program to Completion:
   a. (U) Program complete.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604524N Budget Activity: 4
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 at Newport, RI, and New London, CT (Lead Laboratory and Technical Development Agent); Naval Weapons Support Center, Crane, IN (Production Readiness); Naval Sea Systems Combat Systems Engineering Station, Norfolk, VA; (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	NONE

NARRATIVE DESCRIPTION OF CHANGES

1. (U) Technology: None.
2. (U) Schedule: None.
3. (U) Cost: None.

F. (U) PROGRAM DOCUMENTATION:

OR	4/17/80
MENS	11/28/80
DCP	6/15/87
TEMP	3/24/88

G. (U) RELATED ACTIVITIES: Acoustic systems concepts completing advanced development in Program Element 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 Program Element 0604562N, Submarine Tactical Warfare Systems (Engineering), Project S0236. The Submarine Combat System also interfaces with: SSN 688 Class Vertical Launch System (Program Element 0604370N); MK48 Advanced Capabilities Torpedo (Program Element 0604675N); TOMAHAWK (Program Element 0604367N); Submarine Sonar Development (Engineering) (Program Element 0604503N); Navigation Systems (all projects) (Program Element 06040514N); Submarine Surveillance Equipment (Program Element 0604515N); Over-the-Horizon Targeting (Program Element 0603530N Project X0798); Submarine Hull Array Development (Advanced) (Program Element 0603560N); and Submarine Communications (Program Element 0604502N).

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604524N Budget Activity: 4

Program Element Title: Submarine Combat Systems (Development)

Project Number: S1347 Project Title: AN/BSY-1

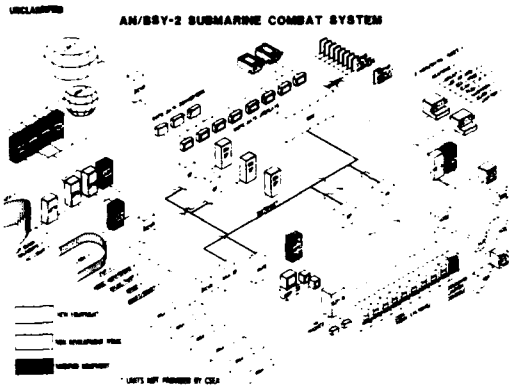
H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

APPN/P-I	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
SCN #201	303,210	220,796	222,743	0	0	0
Quantities	3	2	2	0	0	24
OPN #221	14,331	3,626	0	92,148	240,899	478,913
OPN #221	14,331	3,626	0	0	10,145	41,656
OPN #902	5,913	8,413	4,277	5,806	4,693	32,256

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) TEST AND EVALUATION DATA: See Congressional Data sheet for SSN 688.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0604524N Budget Activity: 4 - Tactical Program
Program Element Title: Submarine Combat Systems (Development)
Project Number: S1941 Project Title: AN/BSY-2



POPULAR NAME: AN/BSY-2 Submarine Combat System

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS II 2/88		Program Review 10/89		Program Review 10/91 MS III
Engineering Milestones	SRR 3/88	PDR 5/89 CDR 9/89	TRR 7/90 CDR 10/89	MT PDR 2/91 TTPDR 11/90	FCA 4Q/93 PCA 1Q/93
T&E Milestones	LSDC Shock 1/89 (Ongoing)	Crit. item Testing (Ongoing)	Crit. item Testing	EQT 3/91 (Ongoing)	OPEVAL 2Q/95 TECHEVAL 4Q/94
Contract Milestones	Award FSD Option	Award TT 10/89	FSD Option 12/89	FSD Option 12/91	Award FY 92/93 PRD contract complete FSD

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	109,590	241,400	258,400	238,700	1,156,176
Support Contract	7,361	6,393	6,990	9,145	74,696
In-House Support	41,679	31,939	28,184	31,646	286,451
GFE/ Other	25,700 2,498	2,800 1,500	1,800 41,100	 107,531	38,197 202,385
Total	186,828	284,032	336,474	387,022	1,757,905 577,185

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0604524N Budget Activity: 4 - Tactical Program
Program Element Title: Submarine Combat Systems (Development)
Project Number: S1941 Project Title: AN/BSY-2

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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. SEAWOLF, with the AN/BSY-2 Submarine Combat System, will restore our submarine superiority over the Soviets.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Issued modification to request for proposals (10/87).
   b. (U) Received best and final offers (11/87).
   c. (U) Awarded sustaining engineering contract (12/87).
   d. (U) Completed system design definition (SDD) (12/87).
   e. (U) Obtained Milestone II decision (2/88) approval.
   f. (U) Exercised options for full scale development/limited production (3/88).
   g. (U) Conducted software requirements review (3/88).
   h. (U) Conducted software design review (8/88).
   i. (U) Continued algorithm development.

2. (U) FY 1989 Program:
   a. (U) Conduct software specification review (11/88).
   b. (U) Conduct critical design review (8/89), production readiness review (7/89), preliminary design review (3/89).
   c. (U) Continue full scale development.
   d. (U) Award trainer contracts.
   e. (U) Continue bow array tests.
   f. (U) Continue algorithm development.

3. (U) FY 1990 Plans:
   a. (U) Conduct trainer design review.
   b. (U) Award FSD/LP options for AN/BSY-2 and AN/BQG-5.
   c. (U) Continue array testing.
   d. (U) Evaluate proposals for FY 1991 options.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0604524N Budget Activity: 4 - Tactical Program
Program Element Title: Submarine Combat Systems (Development)
Project Number: S1941 Project Title: AN/BSY-2

4. (U) FY 1991 Plans:
   a. (U) Conduct MT Preliminary Design Review.
   b. (U) Issue follow-on production request for proposals.
   c. (U) Conduct trainer preliminary and critical design reviews.
   d. (U) Complete array testing.
   e. (U) Deliver AN/BQG-5 spare parts.

5. (U) Program to Completion: FSED completes in FY 1992.

D. (U) WORK 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 Surface Weapons Center, White Oak, MD; 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: Singer 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; Raytheon Submarine Signal Division, Portsmouth, RI; Charles Stark Draper Laboratories, Cambridge, MA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NA	NA	NA
SCHD	NA	NA	NA
COST	NA	NA	NA

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NONE
2. (U) SCHEDULE CHANGES: NONE
3. (U) COST CHANGES: NONE

F. (U) PROGRAM DOCUMENTATION:

OR	3/86
DCP	9/87
TEMP	6/87

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY
Program Element: 0604524N Budget Activity: 4 - Tactical Program
Program Element Title: Submarine Combat Systems (Development)
Project Number: S1941 Project Title: AN/BSY-2

G. (U) RELATED ACTIVITIES: Acoustic systems concepts completing advanced development in Program Element 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 programs is continuing in Submarine Tactical Warfare Systems (Engineering) (Program Element 0604562N, Project S0236). The Submarine Combat system also interfaces with: Anti-Submarine Warfare Standoff Weapon (Program Element 0604309N); MK 48 Advanced Capability Torpedo (Program Element 0604675N); TOMAHAWK (Program Element 0604367N); Submarine Launched Mobile Mine (Program Element 0604601N); Submarine Sonar Development (Engineering) (Program Element 0604503N); Enhanced Modular Signal Processor (Program Element 0604507N); Submarine Surveillance Equipment (Program Element 0604515N); Over-the-Horizon Targeting (Program Element 0603530N Project X0798); Submarine Tactical Warfare Systems (Engineering) (All Projects) (Program Element 0604562N); and Submarine Communications (Program Element 0604502N).

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

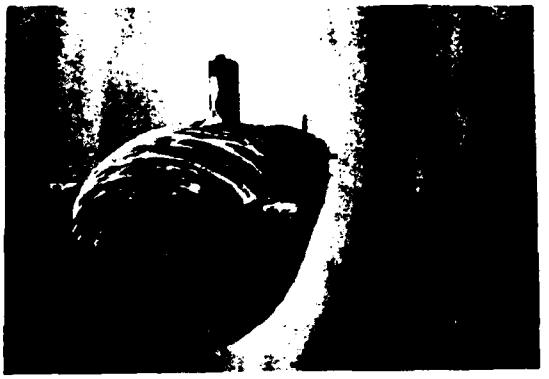
APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT (SCN)						
SCN #6	204,700	0	371,400	4,506,00	5,737,163	
QUANTITIES	1	0	2	119,600	30	
SSN 688 (AN/BQG-5)	84,802	80,400	73,900	0	161,201	
QUANTITIES	2	2	2		4	
BA 2 (OPN)		150.4	157.2		305.8	

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NONE

J. (U) TEST AND EVALUATION DATA: See Congressional Data sheet for SSN-21 SEAWOLF.

FY 1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604561N Budget Activity: 4-Tactical Programs
Program Element Title: SSN-21 Development
Project Number: S1946 Project Title: SSN-21 Development



POPULAR NAME: SEAWOLF

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	III 6/88				
Engineering Milestones	Detail Design Continued	Lead Ship Construc-tion	Follow-on Ships Long Lead	Follow-on Ships	Follow-on Ships
T&E Milestones	DT-II OT-II Components	DT-II OT-II Components	DT-II OT-II Components	DT-II OT-II Components	Ship Trials DT-III OT-III
Contract Milestones	Competitive Lead Ship Contract			Competitive Follow-on Ship Contracts	Competitive Follow-on Ship Contracts

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Major Contract	72,070	63,198	65,353	60,869	194,522
Support Contract	5,578	5,482	5,766	5,371	17,163
In-House Support	123,290	111,159	111,238	103,018	331,832
GFE/Other	10,562	8,174	9,612	8,951	28,608
Total	211,500	188,013	191,969	178,209	1,853,000

Program Element: 0604561N Budget Activity: 4
Program Element Title: SSN-21 Development
Project Number: S1946 Project Title: SSN-21 Development

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The principal challenge to the U.S. Navy is the extensive and continually improving Soviet submarine and surface force. 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 SSN 21 Class attack submarine, and directly supports the SSN 21 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:

(U) FY 1988 Accomplishments:

a. (U) Continued development of installation procedures, and measurement systems.

b. (U) Completed [ ]design and testing. Completed design and fabrication of prototype torpedo tube. Completed torpedo tube and Internal Auxialiary Launcher (IAL) test facility.

c. (U) Continued development of high-payoff cost reduction items and [ ] Continued other major development efforts

d. (U) Began preparations for at-sea OPEVAL of [ ] Completed at-sea operational test and evaluation (OT&E) of gas management system and obtained full production authority.

e. (U) Completed design guidance for INCONEL sea water components. Completed fabrication and initiated testing of main shaft and housing.

f. (U) [ ]

2. (U) FY 1989 Program:

a. (U)

b. (U) Continue hydrodynamic model tests to update maneuvering estimates for the final [ ]design. Conduct hydrodynamic model tests to determine effect of dry deck shelter on SSN 21 hull.

c. (U)

d. (U) Complete OPEVAL of [ ] Complete fabrication of SSN 21 advanced air conditioning plant. Expand/validate design guidance for water/self-lubricated external bearings.

e. (U) Prepare preliminary procurement specifications. Complete dockside testing of [ ]

f. (U) Continue prototype torpedo tube test/upgrade. Continue [ ]ejection system testing. Complete IAL and test facility.

Program Element: 0604561N Budget Activity: 4
Program Element Title: SSN-21 Development
Project Number: S1946 Project Title: SSN-21 Development

g. (U) Provide general fire and toxicity specification for habitability materials, and specifications for battery well fire protection system. Continue full scale mock-up fire tests.

h. (U) Conduct long term at-sea evaluations of [ ] prototype equipments and features. Continue acoustical evaluation of design effort.

i. (U) Complete evaluation of [ ] Provide final propulsor design for SSN 21. Continue LSV propulsor testing. Complete model shock tests.

3. (U) FY 1990 Plans:

a. (U) Complete manufacture, qualification and groom 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 SSN 699 shock testing to be most susceptible to failure under shock on the SSTV, A/B-1, Full Scale Section #5 (FSS-5) and FSS-8. Continue propulsor qualification analysis and evaluation.

c. (U) Complete large scale fire testing of SEAWOLF configurations/ materials. Validate fire performance of HM&E systems. Conduct battery well fire tests.

d. (U) [ ]

e. (U) Complete [ ] development and continue testing on SSN 637 Class. Finalize [ ] scheme. Conduct [ ] at-sea tests and analyze results.

f. (U) Conduct hull stress analysis evaluation. Conduct NDE to support lead ship use of advanced materials. Conduct foundation acoustic design evaluation/validation. Analyze electromagnetic systems.

g. (U) Conduct assessment of [ ] Lab test prototype power conditioners. Fabricate and evaluate inherently quiet hydraulic pumps. Verify SEAWOLF sonar response model.

h. (U) Commence Ship Control System (SCS) first article testing and hardware and software integration testing. Validate submerged operating envelope of design. Complete SCS prototypye fabrication.

i. (U) Complete R-114 qualification tests. Complete OPEVAL, receive AFP, and fabricate 2nd source unit of SPE Oxygen Generator. Fabricate Advanced Submarine Battery II and III 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.

4. (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 SSN 699 shock testing to be most susceptible to failure under shock on the SSTV, A/B-1, FSS-5, and FSS-8.

c. (U) Conduct battery well fire tests. Complete smoke removal system specs.

d. (U) Conduct [ ] testing. Manufacture [ ]

e. (U) Conduct and analyze [ ] at-sea tests. Complete analysis of SSN 637 Class [ ] test. Conduct major cost reduction program.

f. (U) Conduct trials and pre-trial evaluation of R&D components.

g. (U) Conduct NDE to support lead ship use of advanced materials. Conduct foundation acoustic design evaluation/validation.

Program Element: 0604561N Budget Activity: 4
Program Element Title: SSN-21 Development
Project Number: S1946 Project Title: SSN-21 Development

h. (U) T&E Commence development of duct acoustic treatment. Conduct quiet bearings qualifications.

i. (U) Complete and deliver SCS production hardware.

j. (U) Fabricate and test Automatic Battery Monitor and approve for production.

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

D. (U) WORK PERFORMED BY: In-house: DTRC Bethesda, MD; NUSC, Newport, RI; NRL, Washington, DC; NSSES, Philadelphia, PA; NCSC, Panama City, FL; NOSC, San Diego, CA; SUPSHIP, San Francisco, CA; NSWC, Dahlgren, VA; MINSY Vallego, CA; PSNSY, Bremerton, WA; PNSY, KITTERY,ME ONR, Arlington, VA. Contractors: GD,Electric Boat Division, Groton, CT; NNS, Newport News, VA; UNISYS, Great Neck, NY; Westinghouse Electric Corporation, Pittsburgh, PA; United Technologies, Hartford, CT; GE, Lynn, MA; Fitchburg, MA; Binghamton, NY; and Schenectady, NY.

E. (U) COMPARISON WITH FY 1988 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-4,447

IMPACT OF CHANGES

1. (U) TECHNOLOGY: None
2. (U) SCHEDULE: None
3. (U) COST: The -4,447 reduction reflects anticipated saving to the program due to the SSN 699 shock testing in 1988.

F. (U) PROGRAM DOCUMENTATION:
TLR 12/85 DCP 6/86 TEMP 6/86

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)

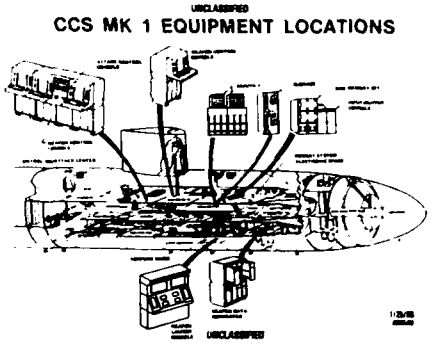
APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
SCN #6	257,600	1,488,000	817,000	3,100,100	Continuing	Continuing

I. INTERNATIONAL COOPERATIVE AGREEMENTS: None

J. TEST AND EVALUATION: This information is contained in FY 1990/1991 Congressional Data Sheets.

FY 1990/1991 BIENNIAL 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:

SCHEDULE		FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	C4.1		II 2/89			RTF 3Q/93 (MK 2 Mod 0,1,3)
	MK.2	II 10/88				
	C4.2	II 4/88		RTF 2/91		1Q/94 (MK 2 Mod 2)
Engineering Milestones	C4.1	CERT 2/88				CERT 3Q/92 (MK 2 Mod 0/1)
	MK.2					CERT 3Q/93 (MK 2 Mod 2/3)
T&E Milestones	C4.1	TECH/OPEVAL 9/88				
	C4.2		FAT 12/89	OPEVAL 10/90		MK 2 TECHEVAL 1Q/93,
	MK.2					MK 2 OPEVAL 2Q/93
Contract Milestones	MK.2	Award 10/88				
	C4.2	Award 4/88				

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total
Major Contract	21,415	27,631	49,157	50,522	Continuing
Support Contract	1,400	2,771	3,100	2,900	Continuing
In-House Support	7,127	12,007	22,400	18,266	Continuing
GFE/Other	12,071	966	2,684	2,014	Continuing
Total	42,013	43,375	77,341	73,702	Continuing

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604562N Budget Activity: 4-Tactical Program
Program Element Title: Submarine Tactical Warfare System (Engineering)
Project Number: S0236 Project Title: Attack Submarine Combat Control System Improvement Program (CCSIP)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Soviet attack submarines projected into the 1990's are expected to incorporate improvements which will make their detection and destruction more difficult. This program improves the Navy's warfighting capability by providing for engineering development to integrate improved weapons, sensor and capabilities with the submarine Combat Control System (CCS) MK 1, MK 2, AN/BSY-1 (Combat Control (CC)), MK 117 Fire Control System and Defensive Weapon System (DWS) MK 118 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 to 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), and DWS MK 118 improvements; integrate the Data Link Communications System and Over The Horizon Targeting with Combat Control System MK 1, MK 2 and AN/BSY-1 (CC); develop and upgrade simulation hardware and software to support combat control system development and testing; complete development of and integrate products that emerge from advanced development; provide CCS MK 1 as a baseline for AN/BSY-1; incorporate those AN/BSY-1 developments which maximize operational and logistics commonality between CCS MK 1 and AN/BSY-1; integrate AN/BSY-1 into CCS MK 1 and MK 2 and integrate DWS MK 118 into CCS MK 2.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued testing of improvements in all programs.
   b. (U) Continued development and completed successful TECHEVAL of CCS MK 1 Program C4.1.
   c. (U) Awarded contract for Program C4.2.
   d. (U) Began development of Program C4.2 (AN/UYK-43 for AN/BSY-1 (CC) and TOMAHAWK Block 1 for CCS MK 1).
   e. (U) Continued integration of program C4.1 into AN/BSY-1 (CC).
   f. (U) Supported MK 48 ADCAP OPEVAL.
   g. (U) Supported Vertical Launch System Technical and Operational Evaluation.
   h. (U) Awarded contract for CCS Mk 2
2. (U) FY 1989 Program:
   a. (U) Continue testing of improvements in all programs.
   b. (U) Complete testing of CCS MK 1 Program C4.1.
   c. (U) Continue development of Program C4.2.
   d. (U) Begin development of CCS Mk 2 Software Program D.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604562N Budget Activity: 4-Tactical Program
Program Element Title: Submarine Tactical Warfare System (Engineering)
Project Number: S0236 Project Title: Attack Submarine Combat Control System Improvement Program (CCSIP)

3. (U) FY 1990 Plans:
   a. (U) Continue testing of all programs.
   b. (U) Complete FAT/CERT/SDCT for Program C4.2.
   c. (U) Support TECHEVAL and OPEVAL of Program C4.2.
   d. (U) Monitor performance of CCS MK 2 Program D prime contractor.
4. (U) FY 1991 Plans:
   a. (U) Support FAT preparations of CCS MK 2, Program D.
   b. (U) Prepare CCS MK 2, Program D1 specifications and related acquisition documentation to support competitive procurement.
   c. (U) Release Program C4.2 to the Fleet.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: Contractors: UNISYS, St. Paul, MN; Raytheon, Portsmouth, RI; IBM, Manassas, VA.; Lockheed, Austin, TX In-house: NAVSEASYSCOM,Washington, DC; COMOPTEVFOR Norfolk, VA; NUSC, Newport, RI.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

TYPE OF CHANGE	IMPACT ON SYSTEM CAPABILITIES	IMPACT ON SCHEDULE	IMPACT ON FY 1990 COST
TECH	None	None	None
SCHED	None	None	None
COST	Various	None	+25,251

IMPACT OF CHANGES
1. TECHNOLOGY: None
2. SCHEDULE: None
3. COST: The $25,251 increase will be used for development of the CCS MK 2 software program D for installation aboard the SSN 688 class, AN/BSY-1 platforms and Trident SSBN's; continue development of program C4.2 for concurrent use of the Advanced Capability MK 48 torpedo and vertical launch Tomahawk cruise missiles aboard SSN 688/Improved SSN 688 class submarines equipped with vertical launch systems; develop a parallel data processor to operate in conjunction with the AN/UYK-44; and develop a new Tactical Weapons Simulator to replace both the MK 22 and MK 75 weapon simulators.

F. (U) PROGRAM DOCUMENTATION:

NDCP (C4-D3) (S0236-05)	9-88 (CCS Mk 2)
AP-111-87 (Chg 1)	6-88
TEMP 234-9	9-88 (CCS Mk 2)

G. (U) RELATED ACTIVITIES:
1.(U) WEAPONS: Program Element 0604367N, TOMAHAWK Cruise Missile; Program Element 0604675N, MK 48 Advanced Capability Torpedo; Program Element 0604601N, Submarine Launched Mobile Mine; and Program Element 0604370N, SSN 688 Class Vertical Launch System.
2. (U) SENSORS: Program Element 0604707N, Over the Horizon Targeting; Program Element 0603708N, Acoustic Performance Prediction; Program Element 0604503N, Submarine Sonar Improvement; Program Element 0604502N, Submarine Tactical Communications System; Program Element 0603504N, Submarine Sonar Development.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604562N Budget Activity: 4-Tactical Program
Program Element Title: Submarine Tactical Warfare System (Engineering)
Project Number: S0236 Project Title: Attack Submarine Combat Control System Improvement Program (CCSIP)

3. (U) OTHER: Program Element 0604524N, AN/BSY-1; to minimize duplicative work and maximize operational and logistic commonality (CCS MK 1 is used in the Combat Control Subsystem in the AN/BSY-1).

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

APPN701	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN #236 All Digital Attack systems	54,955	61,616	49,896	62,457	Continuing	Continuing

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604567N Budget Activity: 4
Program Element Title: SHIP SUBSYSTEMS DEVELOPMENT LBTS

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0857	Ship Subsystems Dev./LBTS	14,652	16,667	5,029	0	Cont.	Cont.
S1803	Ship Contract Design	34,236	39,685	38,071	43,882	Cont.	Cont.
S2037	NFR 90	0	0	9,593	3,611	Cont.	Cont.
TOTAL		48,888	56,352	52,693	47,493	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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).

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604567N Budget Activity: 4
Program Element Title: SHIP SUBSYSTEM DEVELOPMENT/ LBTS
Project Number: S0857 Project Title: Ship Subsystems Dev./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 1988 Program:

a. (U) Continued LSD-41 propulsion land-based testing.
b. (U) Continued DDG-51 machinery control system development and testing.

2. (U) FY 1989 Program:

a. (U) Complete LSD-41 propulsion system land-based testing.
b. (U) Continue DDG-51 machinery control system development and testing.

3. (U) FY 1990 Plans:

a. (U) Complete DDG-51 machinery control system development and propulsion system integrated testing.

4. (U) FY 1991 Plans: Not Applicable.

5. (U) Program to Completion: Program will resume in out years to support CGXX and DDGXX.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ship Systems Engineering Station, Philadelphia, PA; Naval Surface Weapons System Engineering Station, Port Hueneme, CA; Philadelphia Naval Shipyard, Philadelphia, PA; David Taylor Research Center, Bethesda, MD. CONTRACTORS: Gibbs and Cox, New York, NY; M. Rosenblatt and Sons, Incorporated, New York, NY; General Electric, Schenectady, NY; Bath Iron Works, Bath, ME.

F. (U) RELATED ACTIVITIES: Program Element 0603508N (Ship Propulsion Systems (Advanced)); Program Element 0603573N (Electric Drive); Program Element 0603513N (Shipboard Auxiliary Systems Support).

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604567N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (ENGINEERING)
Project Number: S1803 Project Title: Ship Contract Design

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Ship Contract Design	34,236	39,685	38,071	43,882	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 a 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. In response to recent Congressional actions which resulted in inconsistencies between the ship design research and development budgets and the authorized shipbuilding programs, decisions have been made to use repeat buy instead of new design acquisition strategies; to use buy out ship class early, delay future ships acquisition strategies; and to change the method of contract documentation from a Navy provided Ship Contract Design Data Package to a Navy provided Circular of Requirements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments:
   a. (U) Continued DDG-51 Flight II design and development.
   b. (U) Continued CV-64 (SLEP) contract design work.
   c. (U) Completed MHC lead ship contract design, issued contract packages to lead shipbuilder and initiated design work for follow ships.
   d. (U) Began contract design of T-AGOS 23, T-AGOS 19 and AGOR.
   e. (U) Begin T-AGX (MIZAR) contract design.
2. (U) FY 1989 Program:
   a. (U) Continue contract design of T-AGS (MIZAR), LHD-5.
   b. (U) Complete CV-64 (SLEP) and continue CV 67 (SLEP) design.
   c. (U) Begin MHC-52, TAGS(O) and AGOR contract design.
   d. (U) Continue DDG-51 Flight II Class design and development.
   e. (U) Resume Specification Improvement Program.
   f. (U) Continue NFR-90 development.
3. (U) FY 1990 Plans:
   a. (U) Continue Common Hull (SWATH) contract design.
   b. (U) Resume SSN-21 contract design for follow-ship.
   c. (U) Complete T-AGS (MIZAR) contract design.
   d. (U) Continue T-AGS (O) and AGOR contract design.
   e. (U) Begin T-AGS(ICE), T-AGS(O), AOE 6, LCAC contract design.
   f. (U) Continue MHC-52, CV (SLEP), LHD-5 and DDG-51 contract design work.
   g. (U) Continue Specification Improvement Program efforts.

Program Element: 0604567N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (ENGINEERING)
Project Number: S1803 Project Title: Ship Contract Design

4. (U) FY 1991 Plans:
a. (U) Continue contract design efforts for AE 36, CV (SLEP), DDG-51, LHD-5, MHC-52, SSN-21, AOE 6, T-AGS (ICE), LCAC, and TAGS (O).
b. (U) Continue Specification Improvement Program efforts.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Naval Air Systems Command, Naval Space and Warfare Command, Naval Ship Systems Engineering Station, Philadelphia, PA; David Taylor Research Center, Bethesda, MD; and others. CONTRACTORS: Gibbs and Cox, New York, NY; Bath Iron Works, Bath, ME; John J. McMullen Associates, Inc., Arlington, VA; Designers and Planners, Incorporated, Arlington, VA; Advanced Marine Enterprises, Arlington, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHD	None	None	None
COST	None	None	-28,895

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Cost change reflects Navy resource adjustmen for higher priority efforts allowed by changes in the SCN plan.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) MILESTONE SCHEDULE:

SHIP	FISCAL YEAR OF CONTRACT AWARD
AGOR 23	88
AO 177 (J) Fuel Variant	88
LSD 41 (CV)	88
T-AGS 51	88
AOE 6 Follow	89
LCAC Follow	89
MHC 51 Follow	89
AGOR 24	90

Program Element: 0604567N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (ENGINEERING)
Project Number: S1803 Project Title: Ship Contract Design

T-AGS (MIZAR)	90
A-TGS (0)	90
CV (SLEP)	91
AE 36	92
DDG 51 Flight II	92
LHD 5	92
T-AGS (ICE)	92
SSN-21	95

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
1. NATO cooperative development on Interface Control for Modular Installations.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604567N Budget Activity: 4
Program Element Title: SHIP DEVELOPMENT (ENGINEERING)
Project Number: S2037 Project Title: NFR-90

C. (U) PROJECT DESCRIPTION: This project is presently performed within the Ship Contract Design Program. 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 eight nations participating in this frigate development effort. Due to the international agreement to develop this ship class, a separate project line will be 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. The United States version of the NFR-90 will provide an escort frigate with a robust AAW system.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: (From Project S1803)
a. (U) Entered NFR-90 project definition (contract design equivalent) with the International Consortium, referred to as the International Joint Venture Company (IJVC).
2. (U) FY 1989 Program: (From Project S1803)
a. (U) Continue NFR-90 project definition.
3. (U) FY 1990 Plans:
a. (U) Continue NFR-90 project definition.
4. (U) FY 1991 Plans:
a. (U) Continue NFR-90 project definition.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Sea Systems Command, Naval Air Systems Command, Naval Space and Warfare Command, David Taylor Research Center. CONTRACTOR: U.S. Participant in the IJVC is Westinghouse as prime with Designers and Planners, Inc., Arlington, VA; M. Rosenblatt & Son, New York, NY.

F. (U) RELATED ACTIVITIES: Not applicable.

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

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
1. NFR 90:
o A collaborative program for the design of a replacement frigate for the 1990's.
o The program has been in existence since 1981.
o Countries involved are Canada, France, West Germany, Italy, Netherlands, Spain, United Kingdom, and United States with each country equally sharing international costs.

FUNDING PROFILE AS FOLLOWS:

	84	85	86	87	88	89	90	91
DON 0603564N	0.9	2.0	-	-	-	-	-	-
DON 0604567N	-	-	1.0	0.4	3.8	10.0	9.6	3.7
NUNN 0603790N	-	-	3.2	3.2	1.0	-	-	-

* Funded in project S1803 prior to FY 1990.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1353	Standard Hardware System	8,276	12,108	12,595	11,080	Cont.	Cont.
X0911	Computer Security	0	0	1,387	2,020	Cont.	Cont.
X1976	Next Generation Computer	1,068	4,771	12,208	13,967	Cont.	Cont.
W0845	AYK-14	(4,402)*	(4,535)*	2,988	6,572	Cont.	Cont.
S0872	ADA Language System/Navy	11,159**					
	TOTAL	9,635	16,879	29,178	33,639	Cont.	Cont.

* Funded in FY 1988 and FY 1989 in Program Element 0604203N
** Funded in FY 1989 and beyond under PE 0603728F.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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, sensors, and C^3I systems. By requiring these large systems to all 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; computer security; development of the next generation computer family; and incorporation of VHSIC technology into the Navy's standard airborne computer, the AN/AYK-14.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: S1353 Project Title: Standard Hardware Systems

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Standard Hardware Systems	8,276	12,108	12,595	11,080	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: To meet evolving needs for higher performance embedded computer resources, current computers and display system need to be improved. New peripherals need to be developed. Specifically, product improvements for the AN/UYK-43 and AN/UYK-44 must be implemented; the AN/UYQ-21 display system requires color capabilities for its monitors; and the Acoustic Video Processor (AVP) continues development. A new family of mass memory storage devices and magnetic tape units needs to be developed to replace currently obsolete or near-obsolete units. Virtually all Navy platforms except aircraft use some or all of these equipments and require these enhancements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) For AVP, Critical Design Phase and review completed; FSED commenced.
b. (U) For MMSD, released initial RFP. Commenced source selection.

2. (U) FY 1989 Program:

a. (U) For AVP, complete FSED.
b. (U) Conduct Operational Suitability Testing (OST) of AVP in SQQ-89 ASW System.
c. (U) Commence product improvements for AN/UYK-43 and AN/UYK-44.
d. (U) Conduct design phase and award contract for MMSD.

3. (U) FY 1990 Plans:

a. (U) For AVP, production decision; transition to production; complete qualification testing of follower EDM, and follow-on operational suitability testing.
b. (U) For AN/UYK-43, continue development of high performance central processing unit (CPU) and the time-critical co-processor.
c. (U) For AN/UYK-44, continue development of high performance CPU, high bandwidth memory and fiber optic interfaces.
d. (U) For AN/UYQ-21 color capability, develop color display specifications.
e. (U) For Mass Memory Storage Device, continue development efforts.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: S1353 Project Title: Standard Hardware Systems

4. (U) FY 1991 Plans:

a. (U) For AVP, complete follower transition to production, complete follow-on testing; and complete RDT&E.
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 capability, initiate NDI competitive - solicitation.
e. (U) For Mass Memory Storage Device, deliver EDMs.
f. (U) For replacement magnetic tape units, develop and release RFP.

5. (U) Program to Completion:

a. (U) These are continuing programs.

D. (U) WORK PERFORMED BY: In-House: NUSC, Newport, RI; NSWC, Dahlgren, VA; FCDSSA, Dam Neck, VA; FCDSSA, San Diego, CA; NOSC, San Diego, CA. Contractors: JHU/APL, Laurel, MD; Unisys Corp., St. Paul, MN and Clearwater, FL; Diagnostic Retrieval Systems, Oakland, NJ.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	-+7,695

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The +7,695 increase will be used to include UYK-44 product improvements and acceleerate MMSD development.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: S1353 Project Title: Standard Hardware Systems

F. (U) PROGRAM DOCUMENTATION:

AVP	- OR (6/7/88).
AN/UYK-43	- NTP S-80-8401 (2/27/85).
	- TEMP 806-1, Rev. 2 (9/29/86).
	- OR - originated within SECR Master Plan (APR 82).
AN/UYK-44	- NTP S-80-8302 (12/20/83).
	- TEMP 806-2, (9/29/86).
	- OR - originated within SECR Master Plan (APR 82).
MMSD	- Program Endorsement Memorandum on Acquisition Planning for MMSD No. 391-87.

G. (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 and other service projects.

H. (U) OTHER APPROPRIATION FUNDS:

APPN	FY 1989	FY 1989	FY 1990	FY 1991	TO COMPLETE
OPN #59	Procurement justification material does not contain this level of detail.				

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

1. MMSD:

Milestone I	JUN 89
Milestone IIIA (ALP)	AUG 90
Milestone III (AFP)	MAY 91

2. AVP:

Milestone III	AUG 89

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: X0911 Project Title: Computer Security

C. (U) PROJECT DESCRIPTION: This project provides research to develop the necessary technology to establish secure computer environments in Navy programs and provide technical policy standards to software and operating system developers. It will develop products to satisfy generalized Navy computer security requirements such as: sanitization and transfer of intelligence information to command and control (SI to GENSER); system monitoring and detection of unauthorized use or intrusion into computer systems; and multi-level security for access control for computers and decision aid systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable.

2. (U) FY 1989 Program: Not applicable.

3. (U) FY 1990 Plans:
   a. (U) Begin development of software run-time security kernel.
   b. (U) Development of multi-level secure operating system for Navy's desk top computer (DTC).
   c. (U) Begin development of a methodology for evaluating multi-level secure application systems.

4. (U) FY 1991 Plans:
   a. (U) Begin development of software for automatic sanitization of formatted and textual messages between systems with different levels of data security.
   b. (U) Demonstrate security kernel for secure run-time environment.

5. (U) Program to Completion:
   a. (U) Complete run-time operating system security kernel development.
   b. (U) Complete multi-level secure operating system for Navy's desk top computer (DTC).
   c. (U) Complete sanitization software.
   d. (U) Continue development of evaluation/inspection methodology.
   e. (U) This is a continuing program.

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.

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: 0604574N Budget Activity: 4

Program Element Title: Standard Embedded Computer Resources

Project Number: X1976 Project Title: Next Generation Computer Resources

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
NGCR	1,068	4,771	12,208	13,967	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Next Generation Computer Resources (NGCR) program establishes the computing system architecture, functional interface standards and acquisition methods that will provide a family of computing resources covering the majority of the Navy's needs for a twenty year period starting in the year 1996. NGCR shall provide:

* Real-Time Parallel Processing
* Artificial Intelligence
* High Performance LAN
* Very High Speed Integrated Circuitry
* Fiber Optic Technology
* Network Operating System
* Graphics
* Multiple Target Tracking
* Signal Processing
* Security
* Backplane Bus
* High Performance Backplane Bus
* Database Management System
* Standardized Software - ADA

The backplane bus is the central component of this architecture and is an openly published set of internal interfaces and an Instruction Set Architecture that are non-proprietary. This encourages open-market competition for any vendor designs meeting the backplane bus specification. Product acquisition will use a certification process supported by a Navy certification facility.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Began Engineering Studies: NGCR standardization levels, technology and applications base.

b. (U) Prepared program documents: Program Management, Acquisition and ILS Plans.

c. (U) Began developing standards for SAFENET I Local Area Network and the Backplane Bus.

d. (U) Began test groups to define logistics and bus interface standards certification process.

e. (U) Issued NGCR Operational Requirement

2. (U) FY 1989 Program:

a. (U) Continue engineering studies and standards certification development.

b. (U) Continue developing interface standards for SAFENET I and backplane bus. Begin Network Operating System SAFENET Contracts.

c. (U) Publish SAFENET I interface standard; issue backplane prototype contracts.

d. (U) Begin development and definition of a "ruggedized" MIL-SPEC.

e. (U) Continue and update program documents: Program Management, Acquisition and ILS Plans.

f. (U) Complete Milestone I.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: X1976 Project Title: Next Generation Computer Resources

3. (U) FY 1990 Plans:
a. (U) Continue development and definition of a "ruggedized" MIL-SPEC.
b. (U) Continue development of interface standards for SAFENET I, backplane bus and Network Operating System.
c. (U) Publish interim backplane bus interface standard.
d. (U) Continue backplane bus/functional modules prototype.
e. (U) Begin Network Operating System Prototype.
f. (U) Begin Certification Facility development/operation.
g. (U) Continue and update required program documentation.
h. (U) Continue Development of Navy Certification Methodology.

4. (U) FY 1991 Plans:
a. (U) Continue Working Groups to define and to publish interface standards.
b. (U) Begin backplane bus cabinets/power supply prototypes.
c. (U) Complete backplane bus/functional module prototypes.
d. (U) Continue Network Operating System prototypes.
e. (U) Continue to define certification methodology and facility development.
f. (U) Continue and update program documentation.
g. (U) Complete definition of a "Ruggedized" MIL-SPEC.
h. (U) Publish SAFENET II standard.
i. (U) Begin definition of the Interim Certification Process.

5. (U) Program to Completion:
a. (U) Continue Working Groups to publish interface standards.
b. (U) Continue Certification Facility development/certification process.
c. (U) Continue program update and documentation.
d. (U) Publish following standards: backplane bus; high performance backplane bus; high performance LAN; Network Operating System; database management system; and programming support environment.
e. (U) Complete certification methodology development.
f. (U) Complete prototypes for backplane bus cabinets/power supply; Network Operating System for use on the UYK-43/44 and AYK-14 computer successors in future weapon systems.
g. (U) Issue contracts for architecture/test bed certification equipment.
h. (U) Complete development of all interface standards and certification equipment.
i. (U) This is a continuing program which will migrate toward standard hardware projects.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; Naval Surface Weapons Center, Dahlgren, VA; Naval Air Test Center, Patuxent River, MD; Naval Weapons Center,

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: X1976 Project Title: Next Generation Computer Resources

China Lake, CA; Naval Underwater Systems Center, Newport, RI; Naval Weapons Support Center, Crane, IN. MAJOR CONTRACTOR: Numerous contractors participating in the working groups will be participating in prototype developments for the advanced computer project.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

	IMPACT OF CHANGES		
TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COSTS CHANGES: None

F. (U) PROGRAM DOCUMENTATION:
OR 08/88

G. (U) RELATED ACTIVITIES: The following Program Elements fund the development of broadbase 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:

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	TO COMPLETE
OPN #126		Not Applicable			Continuing

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

Acquisition Plan	2QFY89
Program Plan	2QFY89
Milestone I	2QFY89
RFP	2QFY89
Initiate backplane prototype contract award	4QFY89
Initiate Network OS prototype contract award	3QFY90
Initiate Full Enclosure prototype contract award	3QFY91
Publish backplane Standard - Milestone II	4QFY92
Milestone III	2QFY96

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4

Program Element Title: Standard Embedded Computer Resources

Project Number: W0845 Project Title: AN/AYK-14(V)

C. (U) PROJECT DESCRIPTION: Navy Standard Airborne Computer (AN/AYK-14) project provides for airborne digital computer requirements. The objective is the reduction of 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 was funded by the DOD VHSIC Program Office. VHSIC will provide an ADA machine with 4+ MIP capability. The AN/AYK-14(V) is supplied as GFE to Navy weapon systems including the F/A-18, F-14D, A-6G, V-22, AV-8B, E-2C, EA-6B, SH-60B, EP-3, ACLS, MK-50 torpedo, CV-FTAS, VP-FTAS and Army JSTARS.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded under 0604203N.)

a. (U) Continued testing product improvement hardware including Programmable Memory Module (PMM). Delivered preproduction product improvement hardware.

b. (U) Delivered first VHSIC test chip.

c. (U) Awarded competitive contract for basic configuration AYK-14 for remainder of buy.

d. (U) Received Milestone III approval for product improvement varient.

e. (U) VHSIC processor module production requirements identified for F/A-18, EA-6B, V-22 and F-14D.

2. (U) FY 1989 Program: (Funded under 0604203N.)

a. (U) Deliver and begin test of first VHSIC module.

b. (U) Complete analysis of candidate VHSIC insertion upgrades for AN/AYK-14(V) users.

3. (U) FY 1990 Plans:

a. (U) Continue VHSIC development efforts.

b. (U) Start delivery of VHSIC pre-production units.

4. (U) FY 1991 Plans:

a. (U) Complete VHSIC development.

b. (U) Start production VHSIC deliveries.

c. (U) Continue follow-on development of state-of-the-art technology infusion for AN/AYK-14(V) users.

d. (U) Start developing modified, higher speed 32-bit data bus backplane and global memory modules.

5. (U) Program to Completion:

a. (U) This is a continuing program.

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: Standard Embedded Computer Resources (SECR) assures standards development and coordination. AYK-14 transferred to SECR sponsorship, PE 0604574N, for FY-90 and out-years.

G. (U) OTHER APPROPRIATION FUNDS:

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	TO COMPLETE
APN/4,7,9,11,23	Procurement justification material does not contain this level of detail.				

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604574N Budget Activity: 4
Program Element Title: Standard Embedded Computer Resources
Project Number: S0872 Project Title: Ada Language System/Navy (ALS/N)

C. (U) PROJECT DESCRIPTION: This project, in coordination with the DoD Ada Joint Program Office (AJPO), implements Ada on the Navy's standard embedded computers (AN/UYK-43, AN/UYK-44 and AN/AYK-14). Support software tools being developed include compilers, runtime executives, runtime support libraries, debuggers, linkers, exporters and others.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed FSED of ALS/N retargets for the single/dual CPU AN/UYK-43, single CPU AN/UYK-44, and Product Improvement (PI) single/dual CPU AN/AYK-14. Completed Ada Compiler Validation Capability (ACVC) for AN/AYK-14, AN/UYK-44, and AN/UYK-43 compilers as required by the AJPO.

c. (U) Started work on Ada run-time environment for dual CPU AN/UYK-43 and AN-UYK-44 and AN/AYK-14.

2. (U) FY 1989 Program:

a. (U) Ada Language System - Navy transferred to DoD Ada Language PE 0603728F.

E. (U) WORK PERFORMED BY: No longer applicable.

F. (U) RELATED ACTIVITIES: No longer applicable.

G. (U) OTHER APPROPRIATION FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0267	Mine Improvements	3,678	4,719	5,072	5,318	Cont.	Cont.
S0272	QUICKSTRIKE	3,121	5,465	6,591	6,792	Cont.	Cont.
Total		6,799	10,184	11,663	12,110	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 and quality/reliability. Efforts on-going or planned include elements such as: [redacted] and training systems. The Mine Systems Development Project (S0272) is for development of major subsystems of mines. Current specific elements are the Target Detection Device MK 71 and the Safing and Arming Device MK 75.

Program Element: 0604601N Budget Activity: 4
Program Element Title: Mine Development (Engineering)
Project Number: S0267 Project Title: Mine Improvements

C. (U) PROJECT 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. On-going or planned efforts are: mine subsystem improvements in [redacted] for existing and developmental mines.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Complete the Technical Evaluation of the MK 16 Flight Gear.
   b. (U) Continue evaluation of [redacted]
   c. (U) Continue Data Acquisition Range Improvements.
   d. (U) Continue development of computer models for minefield planning.
   e. (U) Continue to expand the Versatile Exercise Mine System capabilities.
   f. (U) Continue improvements for Mine Detection Sensors, propulsion and control mechanisms.
2. (U) FY 1989 Program:
   a. (U) Complete the Operational Evaluation of the MK 16 Flight Gear.
   b. (U) Continue improvements in sensors, delivery, power sources, software/logic, minefield planning and operational capability.
   c. (U) Continue improvements to [redacted] and performance envelope.
3. (U) FY 1990 Plans:
   a. (U) Continue improvements in [redacted] and operational capability.
4. (U) FY 1991 Plans:
   a. (U) Continue improvements in sensors, delivery, power sources, software/logic, minefield planning and operational capability.
5. (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: Lockley Manufacturing Co., New Castle, PA and GTE, Boston, MA.
F. (U) RELATED ACTIVITIES: None
G. (U) OTHER APPROPRIATION FUNDS: This is a non-acquistion program.
H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

Program Element: 0604601N Budget Activity: 4
Program Element Title: Mine Development
Project Number: S0272 Project Title: QUICKSTRIKE

C. (U) PROJECT DESCRIPTION: QUICKSTRIKE series mines are a family of modern mines adapted from 500/1000/2000LB general purpose bombs and a new 2,000 lb MK 65 mine coupled with Associated Safing and Arming (S/A) Devices, Flight Gear, and New Target Detecting Device (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. This program develops three TDDs for QUICKSTRIKE mines: TDD MK-57, TDDs MK-58 and MK-71. The mines are capable of delivery from a wide variety of aircraft over the full range of their bomb delivery speed/altitude envelopes. Also included are test equipment, and a system for high volume launching of mines from surface ships.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Complete Technical Evaluation of the
   b. (U) Continued Engineering Development on the
2. (U) FY 1989 Program:
   a. (U) Complete OPEVAL and obtain approval for production (AFP) of the
   b. (U) Continue Engineering Development of the
3. (U) FY 1990 Plans:
   a. (U) Continue Engineering development and begin TECHEVAL of the QUICKSTRIKE Mod 3 System
4. (U) FY 1991 Plans:
   a. (U) Conduct TECHEVAL, conduct OPEVAL and obtain AFP of the QUICKSTRIKE Mod 3 System
5. (U) Program to Completion:
   a. (U) Develop the High Volume Surface Launch System.
   b. (U) Develop High-Speed/Low-Altitude flight gear for the MK 65 mine.
   c. (U) Develop an advanced Target Detecting Device.
   d. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: Naval Surface Weapons Center, White Oak, MD and Naval Warfare Engineering Activity, Yorktown, VA. Contractors: F.E.L. Newark, NJ; I.S.C. Landcaster, PA.

F. (U) RELATED ACTIVITIES: None

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U) PROCUREMENT (OPN) #251	13,129	22,736	19,291	10,633	Cont.	Cont.

H. INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0178	Gun Fire Control System Improvements	2,335	797	3,816	3,801	Cont.	Cont.
S1706	Ballistic Gun Ammo Improv.	2,320	1,448	4,129	3,777	Cont.	Cont.
S1894	16" Naval Gun Improv.	5,741	5,526	7,930	8,943	Cont.	Cont.
TOTAL		10,396	7,721	15,875	16,521	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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604602N Budget Activity: 4
Program Element Title: NAVAL GUNNERY IMPROVEMENT
Project Number: S0178 Project Title: Gun Fire Control System Improvement

C. (U) PROJECT DESCRIPTION: MK 86 Gunfire Control System (GFCS) provides a high performance, digitally controlled system to control 5"/54 gun mounts on destroyers, amphibious ships, and guided missile cruisers. Also provides guidance to SM 1&2 on destroyers and nuclear powered cruisers. Improvements will enable MK 86 to more effectively engage present and future targets.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed development and initiated fabrication, test, and evaluation of EDM Moving Target Indicator/Low Noise Front End (MTI/LNFE) modification for AN/SPQ-9A.

b. (U) Completed development, T&E of survivability ORDALTs for air and surface track radars and provided approved ECPs/ORDALTs for production.

c. (U) Developed "Quick Fix" against high speed maneuvering surface targets in response to Middle East Force emergent requirement.

d. (U) Commenced revision to TEMP 172 for approval.

2. (U) FY 1989 Program:

a. (U) Continue development, fabrication, and test of sidelobe canceller for AN/SPG-60 Air Track Radar in response to recent problems experienced by fleet.

b. (U) Complete revision of TEMP and submit for approval.

3. (U) FY 1990 Planned Program:

a. (U) Develop and test product improvement for AN/SPQ-9A to increase detection capability against small radar cross section targets. Deficiency identified by MIDEASTFOR deployers.

b. (U) Develop product improvement for AN/SPG-60 to increase effectiveness against sea-skimming missiles.

c. (U) Develop product improvement to add Continuous Wave Illuminator (CWI) to AN/SPG-60 to provide second channel illuminator/ tracker capability to NATO Sea Sparrow Missile System (NSSMS).

4. (U) FY 1991 Planned Program:

a. (U) Complete development and test SPG-60 product improvement.

b. (U) Complete development and test product improvement to add second track/illumination channel NSSMS.

c. (U) Develop product improvement to GFCS MK 86 Video Processor MK 2 to provide false alarm filtering, adaptable video thresholds, capability to track 10 or more targets, and provide full range Low Altitude Detection/Acquisition (LAD/A) coverage.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWSES Port Hueneme, CA

F. (U) RELATED ACTIVITIES: Not applicable.

G. (U) OTHER APPROPRIATION FUNDS: OPN BA-4, BCI, GFCS Equipment.

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
OPN/#222 BA-4	12.9	6.7	9.2	17.2	Continuing

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604602N Budget Activity: 4
Program Element Title: NAVAL GUNNERY IMPROVEMENT
Project Number: S1706 Project Title: Ballistic Gun Ammo Improvements

C. (U) PROJECT 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 spall, 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 1988 Accomplishments:
   a. (U) Continued fabrication of 76mm experimental Low Vulnerability Ammunition (LOVA) propelling charges, pre-baseline tests and effort to demonstrate feasibility of using 76mm spiral wrap cases.
   b. (U) Fabricated 5"/54 LOVA super propelling charges for baseline tests.
2. (U) FY 1989 Program:
   a. (U) Conduct 76mm LOVA Design Verification Test (DVT), complete 5"/54 super charge baseline tests and initiate DVT.
3. (U) FY 1990 Plans:
   a. (U) Conduct 76mm LOVA technical evaluation.
   b. (U) Complete 5"/54 LOVA super charge DVT.
   c. (U) Fabricate 5"/54 super charges.
   d. (U) Initiate technical evaluation.
4. (U) FY 1991 Plans:
   a. (U) Complete 5"/54 LOVA super charge technical evaluation and obtain approval for production of 76mm and 5"/54 LOVA charges.
   b. (U) Initiate engineering development of the Multi Function Fuze (MFF).
5. (U) Program to Completion:
   a. (U) Initiate production and deliver initial operational quantities of 76mm LOVA rounds and 5"/54 charges in FY 93/2Q.
   b. (U) Continue engineering development of MFF - conduct of development testing DT-IIA and DT-IIB.
   c. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NAVORDSTA Indian Head, MD NAVSURWARCEN Dahlgren, VA. NAVSURWARCEN White Oak, MD, NAVSURWARCEN Dahlgren, VA Contractor: Kisco Co., St. Louise, MO.

F. (U) RELATED ACTIVITIES: Not Applicable.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604602N Budget Activity: 4
Program Element Title: NAVAL GUNNERY IMPROVEMENTS
Project Number: S1894 Project Title: 16" Naval Gun Improvements

C. (U) PROJECT DESCRIPTION: This project provides development of longer range, more effective ammunition, and supporting improvements to the fire control system to increase effectiveness and lethality of the 16"/50 gun systems. A 13" saboted projectile will be developed to deliver dual purpose submunitions to ranges as great as [ ] Other submunition loads such as the Army developed SADARM, anti-armor, and anti-personnel mines will be evaluated as will chaff and battlefield obscuration smoke. Compatibility of the FCS with extended range ordnance will be assured by a digital upgrade.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed projectile component designs and procured components for development engineering tests.
   b. (U) Continued procurement of fire control (FC) hardware.
   c. (U) Initiated computer program development specifications.
   d. (U) Completed system requirements/specifications.
2. (U) FY 1989 Program:
   a. (U) Conduct propellant charge evaluation, projectile performance and shipboard compatibility tests.
   b. (U) Continue procurement of FC hardware and computer program development/documentation.
   c. (U) Conduct Preliminary design review.
3. (U) FY 1990 Planned Program:
   a. (U) Complete initial projectile performance and shipboard compatibility tests.
   b. (U) Contract for projectiles to be used in final Development Testing and for Technical Evaluation.
   c. (U) Continue computer program development/documentation and FCS drawings/documentation.
   d. (U) Conduct Critical Design Review.
4. (U) FY 1991 Planned Program:
   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 tests.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA; NOS, Louisville, KY

F. (U) RELATED ACTIVITIES: Not Applicable.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
OPN/84TU BA-4 #222		Not Applicable			Continuing

OPN BA-4/BCI Ammunition Procurement.

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

FY 1990/1991 BIENNIAL 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	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1341	Airborne Guns and Ordnance	1,690	2,005	9,402	9,632	Cont.	Cont.
W1844	BDU and A/C Interface	0	0	3,608	4,273	Cont.	Cont.
Total		1,690	2,005	13,010	13,905	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 launcher and warhead improvements which will become part of the projected Advanced Rocket. All accomplishments and plans are justified by the current OR 194-05-88. This project also responds to fleet requirements for improving airborne gun systems. Project W1844 develops and integrates the bomb dummy unit (BDU) 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, contractor and service laboratory testing, design of production representative items, initial production planning, and B90 aircraft integration effects.

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: Ongoing effort to modernize air launched weapons. Program consists of 2.75 inch rocket motor, warhead and launcher improvements.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Obtained improved 20MM ammunition Approval for Full Production.
   b. (U) Completed the 20MM OV-10 gun Turret.
   c. (U) Continued the 2.75 inch rocket M261/267 submunition program.
   d. (U) Began the Foreign Weapons Evaluation (FWE) high impulse 2.75-inch rocket motor and NATO Cooperative Test (NCT) anti-ship and anti-material warheads.
2. (U) FY 1989 Program:
   a. (U) Continue 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.
   b. (U) Begin chaff warhead.
3. (U) FY 1990 Plans:
   a. (U) Begin the smoke screening, smoke marking, multi-mode and anti-armor flechette warheads and Advanced Rocket System improved launcher.
   b. (U) OPEVAL the NCT anti-ship and anti-material warheads and FWE high impulse 2.75-inch rocket motor.
4. (U) FY 1991 Plans:
   a. (U) Complete smoke screening, multi-mode, anti-armor flechette and chaff warheads and Advanced Rocket System improved launcher.
   b. (U) Commence TECHEVAL on IM configuration of the high impulse 2.75-inch rocket motor.
5. (U) Program to Completion: This is a continuing program.

E. (U) WORK PERFORMED BY: IN-HOUSE: NWC, China Lake, CA; NSWC, Dahlgren, VA; PMTC, Point Mugu, CA; NOS, Indian Head, MD; NWSC, Crane, IN; NATC, Patuxent River, MD; CONTRACTORS: BEI Defense Systems; 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)

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
P-1#192 Machine Gun Ammo	14,035	12,867	13,364	13,591	Cont.
P-1#189 Zuni Rocket	24,479	0	0	0	
P-1#190 2.75-in Rocket	20,985	9,240	18,849	19,153	Cont.
Advance Rocket System *	0	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. - American Research; Warhead - Norway - Raufos Co.

FY 1990/1991 BIENNIAL 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) which electrically, mechanically, and ballistically simulates the B90 Nuclear Depth/Strike Bomb NDSB). The project also provides aircraft integration of the BDU (and thus the B90). The Navy uses the BDU for verification and certification of nuclear delivery aircraft and the training of weapons loading personnel and strike integration, bomb ballistics testing, and safety certification. This effort is essential to support CNO decision which directs development of the B90 NDSB.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans:
   a. (U) Begin design of a BDU to electrically, mechanically and ballistically simulate the NDSB.
   b. (U) Build three advanced development models for design verification and testing.

4. (U) FY 1991 Plans:
   a. (U) Test advanced development models.
   b. (U) Procure 150 engineering development models.
   c. (U) Begin aircraft integration effort.

5. (U) Program to Completion:
   a. (U) Continue NDSB aircraft integration and BDU testing.
   b. (U) Qualify BDU for production.
   c. (U) Verify NDSB compatibility on 3 strike aircraft and 3 ASW aircraft.

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 OK; Naval Avionics Center, Indianapolis, IN.

F. (U) RELATED ACTIVITIES: The Department of Energy develops the actual NDSB weapon concurrently with BDU development.

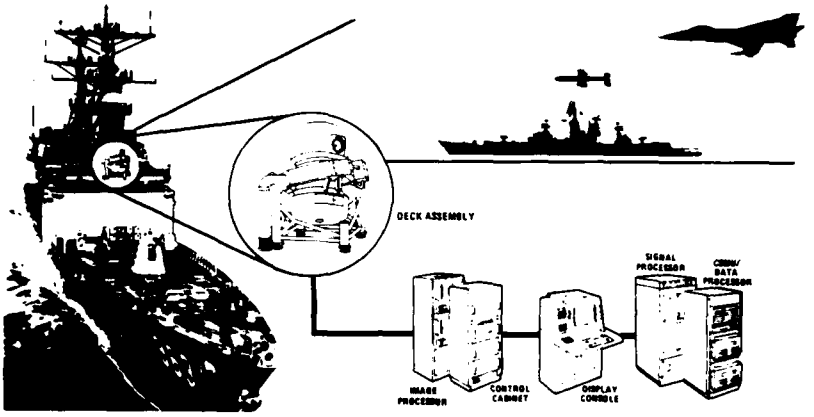
G. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#193			0	0	40,000

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search & Target Designation System



POPULAR NAME: IRSTD, AN/SAR-8

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones				MS III	
Engineering Milestones		FCA/PCA PRDR	PRR		PPPI
T&E Milestones		LBT	TAS INTEG	DT/OT-II	
Contract Milestones		EDM #1 Del	EDM #2 DEL		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	11,754	2,608	11,758	4,290	Continuing
Support Contract	678	738	738	741	Continuing
In-House Support	1,666	2,227	2,201	1,905	Continuing
GFE/ Other	785	150	2,333	3,520	Continuing
Total	14,883	5,723	17,030	10,456	Continuing

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search & Target Designation System

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The sophistication and diversity of threats facing naval surface combatants are increasing.

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 ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued engineering development fabrication of the AN/SAR-8.
   b. (U) Commenced government verification and validation of software.
   c. (U) Completed majority of fabrication and assembly of subsystems.
   d. (U) Completed functional configuration audits of subsystems.
   e. (U) Commenced integration and test of below-decks equipment.

2. (U) FY 1989 Program:
   a. (U) Conduct functional and physical configuration audit of system.
   b. (U) Integrate standard tactical display.
   c. (U) Initiate environmental test of AN/SAR-8 EDM units.
   d. (U) Integrate sensor with below-decks equipment.
   e. (U) Complete planning for land based tests.
   f. (U) Conduct production readiness design review.
   g. (U) Deliver EDM #1 to LBT site at the end of September.

3. (U) FY 1990 Plans:
   a. (U) Commence and complete land based test system installation and check-out.
   b. (U) Continue land based test of EDM #1.
   c. (U) Commence combat system (TAS) integration, installation and check-out.
   d. (U) Continue production readiness planning and reviews.
   e. (U) Deliver EDM #2 to ship installation site.

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search & Target Designation System

4. (U) FY 1991 Plans:

a. (U) Conduct joint USN-Canadian land based TAS integration testing.
b. (U) Install EDM unit aboard test ship.
c. (U) Conduct TECHEVAL/OPEVAL.
d. (U) Achieve MS III decision.

5. (U) Program to Completion:

a. (U) Commence PPPI program.
b. (U) Conduct block upgrades.
c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NSWC, Dahlgren, VA; NSWSES, Port Hueneme, CA. CONTRACTORS: Canadian Commercial Corporation (CCC), Ottawa, Ontario (Canadian Government Contracting Agency); SPAR Aerospace, Toronto; General Electric Company, Syracuse, NY; Scientific-Atlanta, Atlanta, CA; Computing Devices Company, Ottawa, Ontario.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Not Applicable	Not Applicable	Not Applicable
SCHED	Not Applicable	Not Applicable	Not Applicable
COST	Not Applicable	Restructure	+12,383

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The increase of +12,383 was necessary to restructure the prime contract with SPAR Aerospace of Toronto, Ontario, Canada. As a condition of the restructuring, the contractor instituted automated cost controls that are managed on a real time basis and implemented strict controls over work authorizations and implementations. Program costs have been validated by an independent NAVSEA cost estimate.

Program Element: 0604608N Budget Activity: 4
Program Element Title: SURFACE ELECTRO-OPTIC SYSTEMS
Project Number: S0665 Project Title: Infrared Search & Target Designation System

F. (U) PROGRAM DOCUMENTATION:

OR AA-10; 5/75
NDCP; In staffing at OPNAV

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)

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
OPN (#202900)		Not applicable			Cont.	Cont

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- oThis is the largest project under the Defense Development Sharing Agreement between U.S. and Canada.
- oFSED Project Agreement signed 20 Jan 83.
- oProject agreement calls for prime contract cost sharing U.S. 67%, Canada 33%.
- oFSED commenced August 1984.

J. (U) TEST AND EVALUATION DATA: TECHEVAL and OPEVAL are scheduled for FY91.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604609N Budget Activity: 4
Program Element Title: BOMB-FUZE IMPROVEMENTS

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1512	Bomb-Fuze Imp.	7,330	9,916	0	0	0	0

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program responds to operational requirements which reflect the need to either introduce major improvements to existing munitions or develop new armaments to satisfy the Service's combat needs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Conducted engineering development demonstration phase of Inertially Aided Munitions (IAM).
   b. (U) Prepared Development Options Paper and conducted logistics studies for the Advanced Bomb Family (ABF).
   c. (U) Continued development of DSU-30 fuze.

2. (U) FY 1989 Planned Program:
   a. (U) Obtain Navy Operational Requirement for ABF. Continuing effort on ABF/IAM.
   b. (U) Develop computer module to demonstrate ballistics stability of ABF all-up-round (AUR) concept.
   c. (U) Conduct development and OPEVAL on DSU-30.

3. (U) FY 1990 Plans: None.

4. (U) FY 1991 Plans: None.

5. (U) Program to Completion: None.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA; Lawrence Livermore National Laboratory, DOE, Livermore, CA; Pacific Missile Test Center, Point Mugu, CA. CONTRACTORS: Boeing Military Aircraft Co., Huntsville, AL; Northrop Precision Products, Norwood, MA. OTHERS: Headquarters Air Armament Division, Eglin Air Force Base, FL.

E. (U) RELATED ACTIVITIES: Not Applicable.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 OPN/#185	0	0	7,500	6,960	Cont.

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

FY 1990/1991 BIENNIAL 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)

POPULAR NAME: MK-50 Torpedo

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		M/S IIIA- 2/89		M/S IIIB- Q1/91	
Engineering Milestones	CDR - 5/88 Deliver Final Soft- ware - 10/88	Drawings 12/89			
T&E Milestones	OT-IIA COMP 11/88	TECHEVAL COMP 8/89	OPEVAL COMP 7/90		
Contract Milestones	D&V Award - 08/79 FSD Award - 09/83				

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total Complete
Major Contract	96,112	89,000	29,373	6,715	894,911
Support Contract	486	378	256	108	15,987
In-House Support	42,210	46,395	33,574	4,586	527,486
GFE/Other	1,261	620	435	0	11,233
Total	140,069	136,393	63,638	11,409	1,449,617 0

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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This program element will develop a new torpedo capable of countering the Soviet submarine threat. Improvements in Soviet submarine performance characteristics necessitate this development as a replacement for the MK-46 Torpedo as soon as possible. The MK-50 Torpedo will have superior performance characteristics[.] The improvements in Soviet submarine design and performance (speed, hull strength, maneuverability, depth, smaller active acoustic target size, and lower radiated noise) and countermeasures capability[. This lightweight homing torpedo is the'

The MK-50 Torpedo will also be used in submarines as an anti-submarine warfare standoff weapon (SEA LANCE) payload.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Completed critical design review (May 1988).
   b. (U) Commenced OT-IIA in preparation for Milestone IIIA.
   c. (U) Started fabrication of support and test equipment required to support OPEVAL.
   d. (U) Began Afterbody turnaround at NUWES.
   e. (U) Received final delivery of 200A Series (Prototype model torpedoes).
   f. (U) Continued Leader/Follower technical data transfer.

2. (U) FY 1989 Program:
   a. (U) Commence delivery of 200B (OPEVAL lot) torpedoes.
   b. (U) Begin production line fabrication of evaluation lot (200B) torpedoes.
   c. (U) Complete in-water testing (DT II) of prototype lot torpedoes.
   d. (U) Award Westinghouse a contract to build qualification torpedoes.
   e. (U) Begin in-water tactical logic evaluation of prototype lot (200B) torpedoes.
   f. (U) Install, and make fully operational, all Automatic Test Equipment (ATE) and Support and Test Equipment (S&TE) at OPEVAL Intermediate Maintenance Activity (IMA).
   g. (U) Complete training of IMA and combatant crews on weapon use and turnaround.
   h. (U) Complete, validate and conduct tests of fully operational tactical computer code required for OPEVAL.
   i. (U) Conduct in-water evaluation of signal processing and tactics for complex attack scenarios launched from all planned combatant classes.
   j. (U) Conduct Physical Configuration Audit.
   k. (U) Purchase long lead material for first and second Low Rate Initial Production phases.
   l. (U) Complete OT-IIA.

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)

m. (U) Conduct TECHEVAL (50 test runs plus data analysis with 200B Series torpedoes).
n. (U) Conduct second source qualification (Westinghouse).
o. (U) Complete MS IIIA

3. (U) FY 1990 Plans:
a. (U) Deliver and proof final 200B Series torpedoes (24).
b. (U) Conduct OPEVAL (166 test runs plus data analysis).
c. (U) Prepare for second LRIP decision based on TECHEVAL results.
d. (U) Receive final Level III drawing package.

4. (U) [redacted] Plans:
a. (U) Prepare for Milestone IIIB Decision.
b. (U) [redacted]

5. (U) Program to Completion: Not Applicable.

D. (U) WORK PERFORMED BY: In-house: NOSC, San Diego, CA (technical direction agent and lead laboratory); NSWC, White Oak, MD (warhead and exploder); NUSC, Newport, RI (Advanced Mobile Acoustic Torpedo Target); 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 Divison, Tempe, AZ (subcontractor); Rockwell International, Anaheim CA (prime contractor for the Advanced Mobile Acoustic Torpedo Target).

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHD	N/A	N/A	N/A
COST	N/A	N/A	+$63,638

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The Department/Navy adjustment of +$63,638 reflects accommodation of increased requirements due to program restructure.

F. (U) PROGRAM DOCUMENTATION:

JMSNS/RD	9/80
DCP-173	7/84
SDDM	3/84
DT-1 Report	6/85
TEMP 225 (Rev 6)	7/88

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)

DT-IIA Report	5/86
ILSP 133-3 FSD(Rev2)	6/86
ILSP Production	6/88

G. (U) RELATED ACTIVITIES:

a. (U) Program Element 0603610N (Advanced Warhead Development) provides for research into possible future improvements to the MK-50 Torpedo to ensure the torpedo retains an advantage over the rapidly evolving submarine threat.

b. (U) Program Element 0603562N (Submarine Tactical Warfare Systems - (Advanced)) provides research into improvements to enhance submarine-launched torpedoes.

c. (U) Program 0602314N (Anti-Submarine Warfare Technology) provides for development to significantly increase lethality.

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) MK-50 Torp WPN #44, #45	108,402	198,547	269,964	331,111	4,197,333	5,171,254
(U) Initial Spares WPN #69	7,464	262	3,200	5,200	161,857	177,983
(U) MILCON	---	3,400	---	---	---	11

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

J. (U) TEST AND EVALUATION DATA: Contained in MK-50 Congressional Data Sheet.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0080	Mine Warfare Combat (Engineering)	*	*	1,765	876	Continue	Continue
C1967	Mine Clearing (Advanced)	*	**	0	2,920	Continue	Continue
C1969	Mine Neutralization Equipment	**	**	2,559	3,011	Continue	Continue
C1970	Surf Zone Mine Clearing	*	*	24,731	27,526	30,324	151,190
PROGRAM ELEMENT TOTAL		0	0	29,055	34,333	Continue	Continue

* Funded in Program Element 0604717M.

** Funded in Program Element 0603729M.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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. While effectiveness against all types of mines is desirable, the achievement of such a feat has proven itself to be an elusive goal. 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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project develops amphibious and overland mine countermeasures systems for Marine Corps use during amphibious assaults. Currently monitoring USA efforts in Remote Cable Release (RCR) for M58/59/68/69 Linear Demolition Charges and joint effort with USA on Vehicle Magnetic Signature Duplicator (VEMASID) to include AAV/LAV USMC unique variants.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: (Funded in 0604717M)

a. (U) Monitored US Army efforts for RCR.

b. (U) Completed design/fabrication/verification with US Army for VEMASID.

c. (U) Tested and evaluated non-developmental item interim metallic portable mine detector (PMD).

2. (U) FY 1989 Program: (Funded in 0604717M)

a. (U) Complete TDP on RCR/enhance design of inert.

b. (U) Conduct Engineering Design Test by Contractor (EDT-C) and DT/OT II for VEMASID.

3. (U) FY 1990 Plans:

a. (U) Continue improvements on M58/68 line charge.

b. (U) Complete DT/OT II for VEMASID.

4. (U) FY 1991 Plans: Continue improvements on M58/68 line charge. Milestone III decision on VEMASID. DT/OT I on Wide Area Mines (WAM).

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

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA. Contractors: BRDEC, Fort Belvoir, VA; NCSC, Panama City, FL; NWSC, Crane, IN.

F. (U) RELATED ACTIVITIES: US Army VEMASID; Program Element 0604808A; Mine/Countermines.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project provides Advanced Development of an advanced linear demolition charge and associated equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: Planned development includes a new delivery system (untethered) and a new trailer.

1. (U) FY 1988 Accomplishments: None.

2. (U) FY 1989 Program: (Funded in Program Element 0603729M) Initiate Advanced Technology Demonstration program on Advanced Line Charge capable of neutralizing more sophisticated mine threats.

3. (U) FY 1990 Plans: None.

4. (U) FY 1991 Plans: Transition of Advanced Line Charge to Engineering Development. Award System Development contract. Finalize design.

5. (U) Program to Completion: Complete the Engineering Development of the Advanced Line Charge.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; NCSC, Panama City, FL; NWC, China Lake, CA. Contractors: TBD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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) PROJECT 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: Development of Anti-Personnel Obstacle Breaching System (APOBS), completion of Amphibious Assault Vehicle (AAV) mine plow and development of mine neutralization vehicle.

1. (U) FY 1988 Accomplishments: (Funded in 0603729M) APOBS development schedule revamped.

2. (U) FY 1989 Program:

a. (U) Continue development of APOBS, DT/OT planning.

b. (U) Release RFP proposal evaluation/plan DT/OT II for AAV mine plow.

3. (U) FY 1990 Plans:

a. (U) Initiate DT/OT I for APOBS.

b. (U) Initiate DT/OT II for AAV mine plow.

4. (U) FY 1991 Plans:

a. (U) Complete DT/OT I for APOBS.

b. (U) Milestone II/III for AAV mine plow.

c. (U) Initiate development on mine neutralization vehicle.

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

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA. Contractors: NCSC, Panama City, FL; NSWC, White Oak, MD; NOS, Indian Head, MD.

F. (U) RELATED ACTIVITIES: None.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MCPDM 4th Qtr				
Engineering Milestones		RD IDR 2nd Qtr	SYS PDR 2nd Qtr RD PDR 3rd Qtr	SYS CDR 1st Qtr RD CDR 2nd Qtr	
T&E Milestones					
Contract Milestones		RD Award 1st Qtr	SYS Award 1st Qtr		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract			9,000 9,345	10,247 10,000	Continuing
Support Contract			400	450	Continuing
In-House Support			5,986	6,829	Continuing
GFE/ Other			0	0	0
Total	*	*	24,731	27,526	Continuing 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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project will provide a shoot-on-the-move capability to clear lanes through mine obstacles in the surf zone and beyond the highwater mark. It will utilize emerging fuel-air explosive technology with multiple detonation. The system is rack mounted with a slide-in and slide-out capability for the Assault Amphibious Vehicle.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: (Funded under 0604717M)

a. (U) Completed Development Testing - I (DT-I).

b. (U) Marine Corps Program Decision Meeting (MCPDM) II Decision.

2. (U) FY 1989 Program: (Funded under 0604717M)

a. (U) Initiate Full Scale Development (FSD) of CATFAE Projectile System.

b. (U) Award Round contract.

c. (U) Initial Design Review (IDR) on the CATFAE Projectile.

d. (U) Conduct detailed design and fabrication of CATFAE Projectile (FSD Hardware).

e. (U) Issue Request for Proposal (RFP) on System.

3. (U) FY 1990 Plans:

a. (U) Award System contract.

b. (U) Award contract on CATFAE Shipping container.

c. (U) Preliminary Design Reviews (PDR) on the CATFAE Projectile and System.

d. (U) Delivery of 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)

4. (U) FY 1991 Plans:

a. (U) Contractor testing of CATFAE FSD System.

b. (U) Critical Design Reviews (CDR) on the CATFAE Projectile and System.

c. (U) Delivery of CATFAE Shipping containers for FSD Projectiles.

5. (U) Program to Completion:

a. (U) Delivery of CATFAE Projectiles and Systems for DT-II testing.

b. (U) DT-II testing.

c. (U) Operational Testing - II (OT-II).

d. (U) MCPDM III Decision.

e. (U) Exercise option clauses for Low Rate Initial Production (LRIP) and begin Projectile and System production.

f. (U) Achieve Initial Operational Capability (IOC).

D. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; NCSC, Panama City, FL; NWC, China Lake, CA; NSWC, Silver Springs, MD; NWSC, Crane, IN; Naval Weapons Handling Station, Colts Neck, NJ; US Army TECOM, APG, MD. Contractors: TBD.

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)

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	N/A	N/A
COST	N/A	N/A	+9,816

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy/Department adjustments of +9,816 resulted from underestimation of cost of the program.

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 (MCCDC-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); Vehicle Magnetic Signature Duplicator (C0080C).

H. (U) OTHER APPROPRIATION FUNDS: None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604654N Budget Activity: 4
Program Element Title: Joint Service Explosive Ordnance Disposal Development (Engineering)
Project Number: S1829 Project Title: Explosive Ordnance Disposal Procedures

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1829	Explosive Ordnance Disposal Procedures	5,221	5,296	5,706	5,873	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: A Joint Service Program. DOD assigned development responsibility for Explosive Ordnance Disposal procedures and equipment to the Navy in support of the Joint Services. Develops the Explosive Ordnance Disposal techniques required for all known domestic and foreign conventional and nuclear ordnance, and Improvised Nuclear Devices.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Developed approximately 132 new procedures and provided approximately 425 technical updates of existing procedures.
b. (U)
c. (U)

2. (U) FY 1989 Program: Acquire and develop procedures for new, sophisticated threat weapons.

3. (U) FY 1990 Plans: Continue on going programs.
4. (U) FY 1991 Plans: Continue on going programs.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Explosive Ordnance Disposal Technology Center, Indian Head, MD. CONTRACTORS: EG&G, Las Vegas, NV.

E. (U) RELATED ACTIVITIES: All conventional or nuclear ordnance related developments, both domestic and foreign,

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

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1960	LAV-AD	17,916	19,935	*	*	*	*
C2031	LAV-AG	7,038	0	19,500	19,176	7,629	Continue
PROGRAM ELEMENT TOTAL		24,954	19,935	19,500	19,176	7,629	Continue

* Funded in Program Element 0206623M.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element supports full scale engineering development of Marine Corps assault vehicles. The Light Armored Vehicle-Assault Gun (LAV-AG) development seeks to integrate a major caliber gun on the baseline LAV chassis. The LAV-AG will work with the LAV - Anti Tank variant to provide an anti-armor capability in those situations where main battle tanks are not available. In an anti-material role, the LAV-AG will be used to support infantry by destroying bunkers, breaching reinforced concrete walls, and knocking out sniper positions in urban areas. The LAV-AG is an economy of force weapon which frees the limited numbers of Marine Air Ground Task Force main battle tanks to perform those missions which only tanks can and must perform. The Marine Corps have been actively involved in the development of an AG system since 1973. Recently, the 75mm gun and ammunition development has been the prime AG candidate; however, the 105mm and 90mm guns have been demonstrated on the LAV chassis and are viable candidates also.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: (LAV-AG)

a. (U) Developed 75mm cannon and ammunition (partially in conjunction with the US Army).

b. (U) Safety certification of the 75mm cannon and kinetic energy round granted.

c. (U) Evaluation of a foreign 90mm gun and lightweight, short-recoil 105mm gun developed in the US.

d. (U) Continued development of the XM274 75mm cannon and ammunition and the EX-35 105mm lightweight cannon. Conducted a live fire demonstration of the 75mm air defense round. Procured four LAV chassis to be provided to the full scale development (FSD) contractors as government furnished equipment.

FY 1990/1991 BIENNIAL 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)

2. (U) FY 1989 Program: (LAV-AG) None.

3. (U) FY 1990 Plans: (LAV-AG)

a. (U) During the first quarter select two contractors to build two prototypes each for the program FSD phase.

b. (U) Conduct developmental and operational test planning. Commence DT II during September.

4. (U) FY 1991 Plans: (LAV-AG)

a. (U) Complete LAV-AG prototype build.

b. (U) Complete DT II during March 1991.

c. (U) Conduct OT II during April through June.

d. (U) Milestone III scheduled for August.

5. (U) Program to Completion:

a. (U) Commence production during FY 1992 with the procurement of long lead items for the selected cannon.

b. (U) Rate production of LAV-AG system commences during FY 1993 and continues through FY 1995. Acquisition objective of 154 systems.

D. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; PM-LAV, Tank Automotive Command, Warren, MI; Naval Surface Warfare Command, Dahlgren, VA; Watervliet Arsenal/Benet Labs, Albany, NY. Contractors: Advanced Technologies, Inc., Reston, VA; FSD contractors TBD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: There are no significant changes to be discussed.

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) Required Operational Capability	May 1985
b. (U) TEMP	August 1988

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: None.

FY 1990/1991 BIENNIAL 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)

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

		DATE
a.	(U) FSD RFP	March 1989
b.	(U) Source Selection	June - August 1989
c.	(U) FSD Contracts Awarded	November 1989
d.	(U) DT II	September 1990 - March 1991
e.	(U) OT II	April - June 1991
f.	(U) MCPDM III	August 1991
g.	(U) Production Contract Award	March 1992
h.	(U) Rate Production	FY 1993 - 1995
i.	(U) First Unit Equipped	2nd Qtr FY 1994

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1699	RPV*	0	0	199	199	0	398

* In FY 1988 funds transferred to Program Element 0305141D per the DoD Joint Unmanned Aerial Vehicle (UAV) Master Plan in accordance with Congressional direction.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Provides for testing of Marine Corps support systems for the RPV System for reconnaissance, surveillance and target acquisition/designation and radio relay.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: None.

2. (U) FY 1989 Program: None.

3. (U) FY 1990 Plans: Unique USMC integrated logistics support and testing per the DoD Joint UAV Program Master Plan.

4. (U) FY 1991 Plans: Unique USMC integrated logistics support and testing per the DoD Joint UAV Program Master Plan.

5. (U) Program to Completion: None.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604704N Budget Activity: 4-Tactical Program
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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R1740	ASW Oceanographic Survey Systems	1,108	1,226	1,265	1,347	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1988 Accomplishments:
   a. Conducted local and Arctic T and E of ice penetration probes.
   b. Completed bathyphotometer design and evaluation.

2. (U) FY 1989 Program:
   a. Initiate fleet version of the Airborne Ice Thickness System.
   b. Initiate fleet version of Air/Sea A-size 3-month buoys.
   c. Complete the ice penetration probes.

3. (U) FY 1990 Plans:
   a. Initiate sensor packaging for ice penetrator.
   b. Initiate fleet version of tail A-size 3-month buoys
   c. Complete Ice Thickness Measurement System.

4. (U) FY 1991 Plans:
   a. Initiate deep and complete shallow temperature tail drifters.
   b. Initiate towed instrumented chain for survey use.
   c. Complete sensors for ice penetration package.

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

D. (U) WORK PERFORMED BY: IN HOUSE: None. CONTRACTORS: Sparton Electronics, Jackson, MI; U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, Hanover, NH.

E. (U) RELATED ACTIVITIES: PE 0603704N, ASW Oceanography.

F. (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						
1. OPN/BLI	0	394	650	810	Cont.	Cont.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604707N Budget Activity: 4
Program Element Title: OVER-THE-HORIZON TARGETING
Project Number: X0798 Project Title: OVER-THE-HORIZON TARGETING

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W1784	TMPC	23,172	14,625	*	*	*	*
W0798	OTH-T	4,573	2,644	3,221	4,023	Cont.	Cont.
TOTAL FOR PROGRAM ELEMENT:		27,745	17,269	3,221	4,023	Cont.	Cont.

* Project W1784 transferred to PE 0604367N effective FY90.

B. (U) BRIEF DESCRIPTION OF ELEMENT: OTH-T is a non-acquisition program designed to explore and identify the best methods of providing targeting quality information in support of extended range weapons, such as TOMAHAWK and HARPOON cruise missiles. The OTH-T program assesses existing and planned sensor, communication, navigation, command and control and weapons systems. The results of these efforts are used as the basis for OTH-T improvements to various related systems within the Navy Command and Control System.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Produced the OTH-T Detection Classification and Targeting (OTH DC&T) baseline architecture document.
   b. (U) Conducted OTH-T major system evaluation (K-310 Phase II Pac).
2. (U) FY 1989 Program:
   a. (U) Validate the OTH-T architecture on a test-bed.
   b. (U) Develop and field equipment and procedures to correct deficiencies noted in 1.b above.
   c. (U) Provide on-site Fleet OTH-T configuration/integration support.
3. (U) FY-90 Plans:
   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) Support, analyze, and evaluate Fleet Operational Test Launch (OTL) exercises in OTH scenarios to evaluate OTH-T system performance.
4. (U) FY-91 Plans
   a. (U) Maintain configuration control over OTH-T system.
   b. (U) Support, analyze, and evaluate Fleet OTH-T exercises to evaluate performance of improvements made to the OTH-T system.
   c. (U) Provide on-site Fleet OTH-T system engineering support for exercise development and analysis.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; CONTRACTORS: JHU/APL, Laurel, MD; TIBURON Systems, San Jose, CA.

E. (U) RELATED ACTIVITIES: P.E. 0603763N, Warfare Systems Architecture and Engineering; P.E. 0604231N, Tactical Command Systems; P.E. 0605804D, Development Test and Evaluation; P.E. 0204229N, Surface Combined Ordnance/Missile Tomahawk.

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

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0371	Energy Conser.(ENG)	4,229	4,722	3,311	3,786	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 1988 Accomplishments: Ships - monitored performance of advanced anti-fouling paint; tested a high efficiency air conditioning plant for the DDG-51 class. Aircraft - installed Closed Loop Environmental Control on P-3 for flight demonstration; completed T&E of Flight Performance Advisory System for F/A-18. Facilities - evaluated single building controller.

2. (U) FY 1989 Program: Ships - expand qualified products list of improved anti-fouling paint; complete development of battery energy storage system for DDG-58 (and following); develop high efficiency air conditioning systems. Aircraft - develop fuel use management aids for current inventory aircraft. Facilities - test small cogeneration systems; develop energy security technologies.

3. (U) FY 1990 Plans: Ships - demonstrate advanced single screw air conditioning plant; qualify battery energy storage system for DDG-58. 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.

4. (U) FY 1991 Plans: 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.

5. (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 International, 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: Not Applicable.

G. (U) INTERNATIONAL AGREEMENTS: Not Applicable.

FY 1990/1991 BIENNIAL 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

POPULAR NAME: AN/SQQ-89 IMPROVED

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		None	MS II 1/90	DAB Rev 4Q/91	MS III Block (1),(2),(3) 4Q/94 to 3Q/96
Engineering Milestones	None	None	CDR BLK (1)or(2) 9/90(FFG)	CDR BLK (1),(3)3Q/91 (BGE)	BLK (1),(2), (3) 4Q/94 to 1Q/96 FCA 1Q/95 to 3Q/95
T&E Milestones	GLOVER PH II 8/88	GLOVER PH III 9/89	GLOVER PH IV 9/90		BLK (1),(2) (3) TECH 1Q/94 to 4Q/95 OPEVAL 4Q/94 to 2Q/96
Contract Milestones	Award Design Def.Con. 2/88	None	Award BLKs (1),(2)FSED (1),(3)CDR 6/90		Awd. Prod. Contract BLKs (1),(2),(3) 1Q/95 to 1Q/96

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Cont.	(11,800)	(20,000)	43,500	67,000	746,686
Sup. Cont.	(1,250)	(1,750)	1,900	2,900	27,939
In-House Spt.	(5,132)	(10,027)	11,150	12,282	61,814
GFE/Other	(1,208)	(9,147)	15,592	35,700	91,358
Total	(19,390)*	(40,924)*	72,142	117,882	927,797 640,333

* (U) Funded under PE0603553N/S1704 (Surface ASW (ASW Advanced Development)) in FY88 and FY89

FY 1990/1991 BIENNIAL 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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 satify the performance requirements set forth in OR 062-03-86. Radiated noise levels necessary for passive detection and classification of current and future Soviet submarines are projected to be significantly reduced. Accordingly, improved systems will be developed. will be installed for the transmit system and a towed array will be used for reception. A capable system will be developed for FFG 7 Class ships. A more robust capable system will be developed for Battle Group Escort (BGE) Class ships (CG 47/DDG 51/DDG 993/DD 963). Improved signal processing techniques will be developed to support active classification and expanded target handling in both systems. The new subsystem will build upon the architectural foundation of the existing AN/SQQ-89 in order to minimize investment in new equipment and will be achieved through a series of block upgrades. Block (1) for BGE Class ships consists of upgrades that are based on mature computer algorithms that have been well tested in advanced development and, in some cases, submarine or air ASW operational systems. Block (1) for FFG 7 Class ships will provide all improvements necessary to satisfy the OR, except the active upgrade. Blocks (2) and (3) will provide the added long range active performance specified in the ORs for FFG 7 and BGE Class ships, respectively.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: (Funded under PE 0603553N)
   a. (U) Awarded competitive contracts to commence the Design Definition effort for AN/SQQ-89(I).
   b. (U) Performed tests at Lake Seneca on the array which will be installed in USS GLOVER and completed installation of in USS GLOVER bow dome. Performed Phase II tests in USS GLOVER using bow mounted and Started detailed analysis of ship impact associated with proposed AN/SQQ-89(I) system design approaches.
   c. (U) Prepared program and contract documentation necessary to support a Milestone II decision.

2. (U) FY 1989 Program: (Funded under PE 0603553N)
   a. (U) Install test tool aboard USS GLOVER and perform Phase III tests using bow mounted Objective is to demonstrate the ability to meet the active performance specified in OR 062-03-86 prior to Milestone II.

b. (U) Complete competitive Design Definition phase and start formal process for a Milestone II Defense Acquisition Board (DAB) review during second quarter of FY90. Perform evaluations of prime contractors' FFG technical proposals and complete contract documentation for Milestone II approval.

c. (U) Start procurement of long lead Navy standard equipment required to support the FY90 start of Full Scale Engineering Development (FSED).

3. (U) FY 1990 Plans:

a. (U) Conduct Milestone II DAB review. Decisions to be considered are: 1) FFG 7, to proceed into FSED with a selected prime contractor team (Leader) and a subcontractor team (Follower) for development of the FFG 7 Class ship system; and 2) BGE, to continue with the competitive Critical Design Phase of FSED only for Blocks 1 and 3.

b. (U) Continue procurement of long lead Navy standard equipment to support FSED.

c. (U) Continue USS GLOVER sea tests and critical item tests in support of Block 3 Critical Design technical tradeoff analyses.

4. (U) FY 1991 Plans:

a. (U) Issue RFP for FSED (Development and Test) for BGE ships.

b. (U) Conduct DAB major program review for FSED (Development and Test) approval decision. Decision to be considered is to proceed with the FSED Development and Test phase with a selected prime contractor team (Leader) and subcontractor team (Follower) for development of the BGE Class ship system: Block 1 only, Block 3 which includes the [redacted] or Block 1 for retrofit and Block 3 for new construction ships.

c. (U) Select FSED contractor teams and award contract.

d. (U) Continue procurement of long lead Navy standard equipment to support BGE FSED.

5. (U) Program to Completion:

a. (U) Complete major procurements of long lead Navy standard equipment.

b. (U) Deliver first FFG Class system for TECH/OPEVAL (2nd Quarter, FY93).

c. (U) Complete TECH/OPEVAL for FFG Class system (Milestone III; 1st Quarter, FY94).

d. (U) Deliver Block 3 EDM for TECH/OPEVAL and commence shipboard installation (1st Quarter, FY95).

e. (U) Complete development and TECH/OPEVAL of Block 1 (1st Quarter, FY96) and Block 3 (2nd Quarter, FY96) for BGE ships and start Block production deliveries as shown below:

MS III (ALP)	MS III (AFP)	1st Production Delivery
Block 1 (BGE)	----	1st Qtr, FY96
Block 2 (FFG)	----	3rd Qtr, FY97
Block 3 (BGE)	1st Qtr, FY95	3rd Qtr, FY98

FY 1990/1991 BIENNIAL 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

D. (U) WORK PERFORMED BY: In-house: Naval Underwater Systems Center, New London, CT; Naval Ocean Systems Center, 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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	- $35,597

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Department/Navy adjustment of -$35,597 reflects affordability concessions and accommodates transfer of $12,464 worth of effort more appropriately budgeted in PE 0603553N/S1704 (ASW Advanced Development).

F. (U) PROGRAM DOCUMENTATION: TOR 2/85
DOP 11/85
OR 12/85

G. (U) RELATED ACTIVITIES:

(1) (U) PE 0604524N/S1941 (Submarine Combat Systems) will contribute to the AN/SQQ-89(I) design process as a result of use of Navy standard computing and signal processing building blocks and associated processing algorithms.

(2) (U) PE 0604507N (Enhanced Modular Signal Processor) and PE 0604574N (Navy Standard Display Systems). Planned Navy standard equipment upgrades, such as AN/UYS-2 Signal Processor and OJ535/AVP Digital Display, will significantly increase processing resources and are necessary to meet AN/SQQ-89(I) objectives.

(3) (U) PE 0604575N/S1451 (AN/SQS-53C) is specified as part of the AN/SQQ-89(I) system.

(4) (U) PE 0603553N (Surface Anti-submarine Warfare) directly supports surface ship ASW combat systems upgrades and improvements.

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

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: 0604715N Budget Activity: 4
Program Element Title: Surface Warfare Training

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S1140	Tactical Advanced Combat Direction Electronic Warfare Modification	5,300	2,466	999	0	0	34,425
S1427	Surface Tactical Team Trainer	7,259	11,113	7,395	10,856	15,549	75,663
S1436	Surface Warfare Training Analysis	215	1,440	0	0	0	3,124
S1834	Landing Craft Air Cushion (LCAC) Operator Trainer	3,735	3,599	9,293	1,304	0	23,904
Total		16,509	18,618	17,687	12,160	15,549	137,116

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604715N Budget Activity: 4
Program Element Title: Surface Warfare Training
Project Number: S1140 Project Title: Tactical Advanced Combat Direction Electronic Warfare (TACDEW) Modifications

C. (U) PROJECT DESCRIPTION: The Tactical Advanced Combat Direction System and Electronic Warfare Training complexes are vital links in integrated combat system team training. Continued expansion of the complexes, coupled with obsolescence of the computer system, have negated the potential for further growth to accommodate training for emerging combat system capabilities. Phase II of this project replaces the computer system; redesigns the Master Simulation Program; and substitutes the Generic Radar Display System subsystem to provide a state-of-the-art problem control and evaluation subsystem. The modified system will support combat system operational training at all required levels through the year 2000.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Coded, tested, and integrated the warfare functions software; and procured and integrated major items of hardware.

2. (U) FY 1989 Program:
   - o (U) Complete Phase II development.
   - o (U) Complete installation and delivery of the trainer (August 1989).

3. (U) FY 1990 Plans:
   - o (U) Achieve initial operating capability (November 1989).
   - o (U) Complete logistics support package.

4. (U) FY 1991 Planned Program: N/A

5. (U) Program to Completion: Program completed FY 1990.

E. (U) WORK PERFORMED BY: In-House: NTSC, Orlando, FL. Contractor: Unisys, Reston, VA.

F. (U) RELATED ACTIVITIES: Not applicable.

G. (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 (U) OPN (BA-7)/#291	0	10,085	3,704	11,897	1,253	26,939

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Surface Tactical Team Trainer	7,259	11,113	7,395	10,856	15,549	75,663

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 team 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 providing multiple platforms/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 in coordinated ASW Battle Group operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued 14A12 development; procured and integrated hardware.
   b. (U) Coded, conducted module test, integrated, and conducted system test.

2. (U) FY 1989 Program:
   a. (U) Contractor Software/System testing to be completed, delivered and installed July 1989. Device 14A12 completes R&D prototype.
   b. (U) Commence development of the 20A66.

3. (U) FY 1990 Plans: Continue developmental of 20A66 with procurement of preliminary Lot I hardware and software for FLEASWTRACENPAC, San Diego.

4. (U) FY 1991 Plans
   a. (U) Continue 20A66 Lot I development with emphasis on software development and initial hardware interfacing.
   b. (U) Complete Device 20A66 Critical Design Review in early 1991.

Program Element: 0604715N Title: Surface Warfare Training

5. (U) Program to Completion: Program completes in FY 1993.

D. (U) WORK PERFORMED BY: In-House: NTSC, Orlando, FL. Contractors: Sanders, Nashua, NH; TBD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	3-4 MONTH DELAY IN DELIVERY	-4,266

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: No change.

2. (U) SCHEDULE CHANGES: No change.

3. (U) COST CHANGES: Minimal impact. 3-4 month delay in delivery.

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: N/A

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 (U) OPN (BA-7)/#289	0	16,714	8,616	0	37,023	62,353

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

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:
   a. (U) Completed detailed hardware and software design.
   b. (U) Procured the main computer system.
   c. (U) Continued development of the visual simulation system.
   d. (U) Procured the motion simulation system.
   e. (U) Fabricated the student station, including simulated LCAC cabin.

2. (U) FY 1989 Program:
   a. (U) Continue development of FMT computer programs.
   b. (U) Complete trainer hardware fabrication.
   c. (U) Conduct critical design review.
   d. (U) Achieve contractor acceptance of motion and visual systems.
   e. (U) Install motion and visual systems on FTM.
   f. (U) Conduct hardware/software integration and testing.

3. (U) FY 1990 Plans:
   a. (U) Complete software integration.
   b. (U) Install system.

4. (U) FY 1991 Plans:
   a. (U) Conduct test and evaluation and trainer acceptance.
   b. (U) Program completes.

5. (U) Program to Completion: Program completes FY 1991.

E. (U) WORK PERFORMED BY: In-House: NTSC, Orlando, Fl. Contractor: Unisys, Reston, 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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0079	Combat Service Support (Engineering)	0	757	2,254	3,234	Continue	Continue
C0080	Mine Warfare Combat (Engineering)[a]	3,622	1,774	(1,765)	(876)	Continue	Continue
C1966	Surf Zone Container Handler[b]	(521)	(1,257)	(868)	1,155	Continue	Continue
C1967	Mine Clearing (Advanced)[c]	765	(1,445)	(0)	(2,920)	Continue	Continue
C1968	Mine Detection Systems (Advanced)[d]	2,055	(2,693)	(4,616)	(10,329)	Continue	Continue
C1970	Surf Zone Mine Clearing[a]	4,253	19,565	(24,731)	(27,526)	Continue	Continue
C1983	Tactical Fuel Systems[b]	(481)	(968)	(176)	678	Continue	Continue
PROGRAM ELEMENT TOTAL		10,695	22,096	2,254	5,067	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).

c Funded in FY 1989 in Program Element 0603729M, Marine Corps Combat Services Support (Advanced). Discussed in Program Element 0603612M, Marine Corps Mine/Countermeasures Systems (Advanced). Funded in FY 1991 in Program Element 0604612M, Marine Corps Mine/Countermeasures Systems (Engineering).

d Funded in FY 1989 in Program Element 0603729M, Marine Corps Combat Services Support (Advanced). Funded in FY 1990 through FY 1994 and discussed in Program Element 0603612M, Marine Corps Mine/Countermeasures Systems (Advanced).

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program provides improved bridging systems, state of the art engineer equipment, a high mobility armored combat excavator, and computer aided construction planning, estimating and management.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

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) PROJECT DESCRIPTION: Provides improved bridging systems, engineering equipment, armored combat excavator, and computer aided construction planning. Provides the Fleet Marine Forces improved: combat clothing/equipment; field medical equipment; 25,000 and 40,000 lb helicopter slings; field feeding equipment and mobile electric power distribution systems; bulk fuel storage, water purification, handling and transport equipment; and soft shelters for aircraft maintenance, ground maintenance and supplies.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: None.

2. (U) FY 1989 Program: Complete DT-II and OT-II for TLB. Re-validate combat excavator (CE) requirement. Complete development of expeditionary maintenance shelter for aircraft (CH-53 or V-22). Continue evaluation of CET versus Armored Combat Excavator (ACE).

3. (U) FY 1990 Plans: Complete engineering effort for Amphibious Objective Area Information Management System (AOAIMS). Concept validation and test preparation of CE. Concept design testing of CET/ACE. Continue to monitor other services and participate in joint service programs including: field manual x-ray processor; Deployable Rapid Assembly Surgical Hospital (DRASH); field manual suction device; clothing and equipment and the Combat Field Feeding System. Complete DT/OT of the Medium Shelter Program (MSP) and the Marine Corps Expeditionary Aircraft Maintenance Shelter (MCEAMS).

4. (U) FY 1991 Plans: Initiate competitive source selection testing for CE. Concept validation of CET/ACE. Complete DT/OT of MSP and MCEAMS.

5. (U) Program to Completion: CET hardware testing/Milestone III decision. This is a continuing program.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Quantico, VA; BRDEC, Ft Belvoir, VA; APG, Aberdeen,MD; NCEL, Port Hueneme; NCSC, Panama City, FL. Contractors: Brunswick Corporation, Marion, VA.

F. (U) RELATED ACTIVITIES: AOAIMS, Program Element 0603729M. NCEL Program Element 0602760N. US Army Natick Labs Program Elements 0602623A and 0604713A.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1296	ASIP	13,929	*	*	*	*	*
C1463	Counterintelligence and Security Equipment	1,133	1,052	999	1,147	Continue	Continue
PROGRAM ELEMENT TOTAL		15,062	1,052	999	1,147	Continue	Continue

* Funded in Program Element 0206625M.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Engineering development/testing of Marine Corps counterintelligence equipment to support the operating forces. Requirement is to improve Marine Corps equipment in support of human intelligence collection and Technical Surveillance Countermeasures (TSCM). Supports testing of non-developmental items (NDI) counterintelligence equipment and product improvement program (PIP) of the Counterintelligence Communication System (CCS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Purchased NDI TSCM equipment for OT&E by counterintelligence teams. Initiated the CCS, Phase 2, PIP.

2. (U) FY 1989 Program: Continue to evaluate candidate replacement NDI TSCM equipment. Continue development of the CCS PIP.

3. (U) FY 1990 Plans: Continue FY 1989 Program efforts.

4. (U) FY 1991 Plans: Continue to monitor and purchase NDI TSCM. Completion of CCS Phase 2, PIP.

5. (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: (Procurement) (Dollars in Thousands)

Bud Line Item	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
77	Counterintelligence and Security Equipment						
	RCN (143726)(145246)	1,805	0	411	0	TBD	TBD

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0053	JTIDS	19	11,694	3,304	8,525	Continue	Continue
C1929	ATACC	2,358	14,557	22,770	3,116	Continue	Continue
PROGRAM ELEMENT TOTAL		2,377	26,251	26,074	11,641	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program 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 an air/ground tactical command and control systems integration to the maximum extent possible and oriented toward the amphibious expeditionary environment to meet the unique requirements of the Landing Force Commanders.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: To develop a high capacity, jam resistent, secure digital communications capability that will provide the required standardization and interoperability needed to support command and control operations in the Joint and Combined tactical environment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: None.

2. (U) FY 1989 Program:

a. (U) Support joint integration to ensure interface design compatibility and performance with JTIDS.

b. (U) Participate in planning for JTIDS integration into the Advanced Tactical Air Command Central (ATACC).

3. (U) FY 1990 Plans: Continue to support joint integration to ensure interface design compatibility and performance with JTIDS. Continue to participate in planning for JTIDS integration into the Advanced Tactical Air Command Central (ATACC).

4. (U) FY 1991 Plans: Continue to support joint integration to ensure interface design compatibility and performance with JTIDS. Continue to participate in planning for JTIDS integration into the Advanced Tactical Air Command Central (ATACC).

5. (U) Program to Completion: Continue integration effort into TACM and ATACC Systems to ensure interoperability to support command and control operations in the Joint and Allied environment.

E. (U) WORK PERFORMED BY: In-house: MCRDAC, Rosslyn, VA; MCTSSA, Camp Pendleton, CA; ESD, Hanscom, AFB. Contractors: Singer, ESD, Little Falls, NJ; Litton, DSD, Van Nuys, CA.

F. (U) RELATED ACTIVITIES: This program relates to all tactical command and control systems having JTIDS Interoperability requirements.

G. (U) OTHER APPROPRIATED FUNDS: None.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1929	ATACC	2,358	14,557	22,770	3,116	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program will integrate non-developmental items (NDI) of hardware and software into a replacement system, capable of meeting the current operational deficiencies of the AN/TYQ-1, Tactical Air Command Central and the AN/TYQ-3A, Tactical Data Communications Central. The ATACC will support the Marine Aircraft Wing's Tactical Air Command Center (TACC). This competitive, streamlined program will utilize off-the-shelf hardware and tailored software (utilizing the Ada high order language) to automate and enhance the now manual decision support functions of the TACC. Funds are provided for software development and tailoring, documentation and integration of hardware, and testing (developmental, operational, and intra/interoperability certification).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments:

a. (U) Complete evaluation of proposals from industry.

b. (U) Complete source selection process and evaluation of Best and Final Offers.

2. (U) FY 1989 Program:

a. (U) Award a single, competitive fixed-price R&D contract with fixed-price production options.

b. (U) Order long-lead hardware and commence rapid prototyping phase.

c. (U) Complete hardware and software designs.

d. (U) Complete Preliminary Design Review (PDR).

e. (U) Assembly of the prototype system initiated.

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)

3. (U) FY 1990 Plans:

a. (U) Complete Critical Design Review (CDR) and Test Readiness Review (TRR).

b. (U) Commence software integration coding.

c. (U) Conduct Developmental Testing during third and fourth quarters of the fiscal year.

4. (U) FY 1991 Plans:

a. (U) Conduct Operational Testing during the first and second quarters of the fiscal year.

b. (U) MCPDM III Decision.

5. (U) Program to Completion: The start of the production schedule is first quarter FY 1992. Marine Corps Communications and Electronics School, Twenty-nine Palms, CA will receive the first production system during fourth quarter FY 1993. The three active Marine Aircraft Wings will receive systems in FY 1994.

D. (U) WORK PERFORMED BY: In-house: MCRDAC, Rosslyn, VA. Contractors: TBD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	N/A	N/A	N/A
SCHED	N/A	1st quarter slip	+15,540
COST	N/A	N/A	N/A

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)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: The Navy/Department adjustment of $15,540 is due to the NDI and competitive nature of the program, a significant number of proposals were received which caused an extended source selection process.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

	DATE
a. (U) Required Operational Capability (ROC)	Jun 1985
b. (U) Approved Acquisition Plan (AP)	Mar 1987
c. (U) Concept of Employment (COE)	Jun 1988
d. (U) Integrated Logistics Support Plan (ILSP)	Jul 1988
e. (U) Test and Evaluation Master Plan (TEMP)	Jul 1988

G. (U) RELATED ACTIVITIES: None.

H. (U) OTHER APPROPRIATION FUNDS: None.

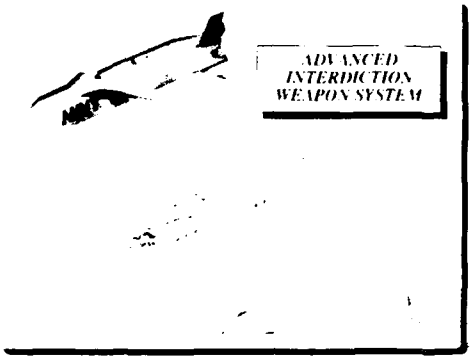
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

	DATE
a. (U) Marine Systems Review Acquisition Council Milestone I	FY 1985
b. (U) Marine Corps Program Decision Meeting (MCPDM)/Milestone II	FY 1986
c. (U) Contract Award	FY 1989
d. (U) Systems Integration/Operation Testing	FY 1991
e. (U) MCPDM/Milestone III	FY 1991
f. (U) Initial Operational Capability (IOC)	FY 1993
g. (U) Full Operational Capability (FOC)	FY 1995

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604727N Budget Activity: 4
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: ADVANCED INTERDICTION WPN SYS (AIWS)



POPULAR NAME: AIWS

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			MS-II Q3/90		MS-IIIA-Q3/93 MS-IIIB-Q3/94
Engineering Milestones				FLTTEST Q3/91	CDR Q2/92
T&E Milestones		DT-I Q2/89	DT-IIA Q3/90	DT-IIB Q1/92	OT-IIA Q2/92 OT-IIB Q4/93 OT-III Q4/94
Contract Milestones		DEM/VAL DEC 88	FSED Q4/90		PRODUCTION Q4/93

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract			16,300	48,700	207,100
Support Contract			400	400	2,200
In-House Support			8,513	11,857	36,800
GFE/ Other					
Total			25,213	60,957	246,100 132,930

Program Element: 0604727N Budget Activity: _
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: ADVANCED INTERDICTION WPN SYS (AIWS)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
This project will provide a weapon to be employed by aircraft to attack targets during day, night, and adverse weather conditions. AIWS will have a launch-and-leave capability and provide several target kills per aircraft sortie. Design of AIWS capitalizes on aircraft sensor capabilties and minimizes sophistication of the weapon. AIWS candidates will utilize low cost, off-the-shelf or other service/industry developed hardware, as feasible. The weapon will be produced at recurring hardware unit costs (exclusive of the warhead) not to exceed $50,000 (FY 1985 dollars). This urgently needed capability will be achieved by taking advantage of recent advances in: guidance and control technologies; low cost, kinematically efficient air vehicles incorproating composite construction; and prior initiatives in signature management. Pre-planned product improvement (P^3I) is a feature of the AIWS program. AIWS will provide a significant increase in strike warfare capability, including: strike warfare weapon effectiveness; reduced aircraft vulnerability; and affordability to permit training expenditures and a strong inventory. Previous work on AIWS has been conducted in PE 0603306N and PE 0604727D.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded in PE 0604727D)

   a. (U) RFP for DEM/VAL released.
   b. (U) Completed source selection.
   c. (U) Prepared MS-I program documentation.

2. (U) FY 1989 Program: (Funded in PE 0604727D)

   a. (U) Preform DEM/VAL.
   b. (U) Conduct DT-I.
   c. (U) Prepare specification and statement of work for FSD.

3. (U) FY 1990 Plans:

   a. (U) Complete DEM/VAL.
   b. (U) Milestone II decision 3Q/FY90.
   c. (U) Conduct development tests (DT IIA).
   d. (U) Begin Platform Integration.

4. (U) FY 1991 Plans:

   a. (U) Continue Full Scale Development.
   b. (U) Complete DT IIIA.
   c. (U) Begin DT IIB testing.
   d. (U) Continue platform integration.

5. (U) Program to Completion:

   a. (U) Conduct CDR (FY 92).

Program Element: 0604727N Budget Activity:
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: ADVANCED INTERDICTION WPN SYS (AIWS)

b. (U) FY-92-94 complete DT IIB and conduct OT-IIA and OT-IIB testing.

c. (U) FY-93 ALP; pilot production.

d. (U) FY-94 AFP; enter competitive/dual-source production.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Weapons Center, China Lake, CA. CONTRACTOR: TBD.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+25,213

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Work previously funded in PE 0603306N and 0604727D. PBD 235 provided FY90 and out funds in PE 0604727N.

F. (U) PROGRAM DOCUMENTATION:

JMSNS	12/85
OR approved	3/88
SCP in staffing	11/88
ACQ Plan signed by COMNAVAIR	7/88
TEMP forwarded to OP-98	12/88

G. (U) RELATED ACTIVITIES: Recoverable test vehicle (RTV), CDI/BTI, Fiber Optic Technology Demonstation.

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

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

J. (U) TEST AND EVALUATION DATA: AIWS has not begun T&E efforts yet. Planned efforts include:

FY 1989-1990	DT-I
FY 1990-1991	DT-IIA

Program Element: 0604727N Budget Activity: _
Program Element Title: JOINT STANDOFF WEAPONS PROGRAM (JSOW)
Project Number: W2068 Project Title: ADVANCED INTERDICTION WPN SYS (AIWS)

FY 1992	DT-IIB
FY 1992-1993	OT-IIA
FY 1993-1994	OT-IIB
FY 1994-1995	OT-III

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0809	E/O Sensor	2,020	2,022	686	970	Cont.	Cont.
T0772	FME	2,637	2,613	1,549	1,504	Cont.	Cont.
Total	Program	4,657	4,635	2,235	2,474	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) The Electro-Optic Sensor project develops unique collection devices capable of obtaining fine-grained intelligence information and scientific and technical data by analysis and exploitation of foreign hardware to develop counter-measures against electro-optical threats.

(U) Foreign Material Acquisition and Exploitation acquires and exploits foreign weapons, sensor systems, and associated manuals to determine potential vulnerabilities and countermeasures.

DECLASSIFIED ON: OADR

FY 1990/1991 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) PROJECT DESCRIPTION: Develops unique collection devices capable of obtaining fine-grained intelligence information and scientific and technical data. Counter-measure systems are developed by analysis and exploitation of foreign electro-optical threats.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Completed CLUSTER MERMAID and CLUSTER LION[ ]development. Continued program of improvements to[ ]which increased performance and system reliability.

2. (U) FY 1989 Program: Continue[ ]to meet changing collection requirements. Initiate development programs for the[

3. (U) FY 1990 Plans:
   a. (U) Continue improvement program for[
   b. (U) Develop programs for[

   Additional information available at a higher classification.

4. (U) FY 1991 Plans:
   a. (U) Continue development programs for[

5. (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 0604792N, Surface Electromagnetic/Optical Systems (Advanced), are ongoing related Advanced and Engineering Development programs.

G. (U) OTHER APPROPRIATIONS FUNDS: This is a non-acquisition program.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604761N Budget Activity: 4
Program Element Title: Intelligence Engineering
Project Number: T0772 Project Title: Foreign Material Acquisition-Exploitation

C. (U) PROJECT DESCRIPTION: The foreign material acquisition and exploitation project involves acquisition of foreign weapons and sensor systems and the subsequent exploitation of those systems for potential vulnerabilities and countermeasures.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued
   b. (U) HY-2G and possible C601 fragments were recovered from the Persian Gulf. Countermeasures were developed and provided to COMIDEASTFOR.
   c. (U) Exploited buoy.
   d. (U) Exploited
   e. (U) Exploited
   f. (U) Exploited threats to determine countermeasures/counterweapons vulnerabilities.
2. (U) FY 1989 Program:
   a. (U) Continue Specific targets include:
      (1). (U) weapon threats.
      (2). (U) deployed missiles.
      (3). (U) Exploit examples of applied military technology (micro-electronics, lasers, computers).
3. (U) FY 1990 Plans:
   a. (U) Continue
4. (U) FY 1991 Plans:
   a. (U) Continue
5. (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: This is a non-acquisition program.
H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0933	Medical/Dental Equipment Development	3,513	3,003	4,284	4,598	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 1988 Accomplishments: Continued the engineering development of the Resuscitation Fluids Production System (REFLUPS) and began test and evaluation of the REFLUPS ashore and aboard ship.
2. (U) FY 1989 Program: Continue engineering development of REFLUPS; continue the test and evaluation of the REFLUPS and begin engineering support capability.
3. (U) FY 1990 Plans: 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.
4. (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.
5. (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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1079	JINTACCS	1,135	1,739	2,019	1,840	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1988 Accomplishments: Participated in interoperability testing of USMC Tactical Data Systems and in configuration management of interoperability standards and Combat Service Support (CSS) Message Text Format (MTF) development. Completed development of MTF Editor Software. Developed Tactical Digital Information Link-J (TADIL-J) test plan for intra-Marine Corps and joint TADIL-J testing. Began developing MTF Computer Aided Instruction (CAI) program.

2. (U) FY 1989 Program: Continue interoperability testing and complete MTF CAI. Develop applications to use the Joint Central Database System (CDBS) for TDS maintenance and incorporate NATO MTFs in USMCTF software and documentation.

3. (U) FY 1990 Plans: Continue interoperability testing and applications to CDBS.

4. (U) FY 1991 Plans: Continue interoperability testing. Complete work applications to CDBS.

5. (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.

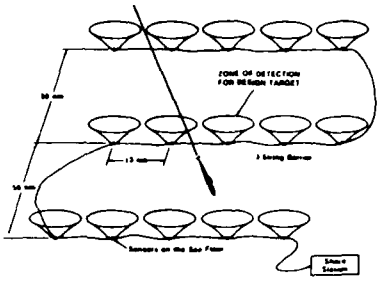
E. (U) RELATED ACTIVITIES: JTIDS, TAOM.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604784N Budget Activity: 4
Program Element Title: Fixed Distributed System
Project Number: X1312 Project Title: Fixed Distributed System



POPULAR NAME: FDS

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

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones					
*MS-II		JUN FY89			
*IOC Full System					2Q FY95
*MS-III					3Q FY96
Engineering Milestones					
*PDR (U/W Segment)		DEC FY89			
*CDR (U/W Segment)			JAN FY90		
*PDR (Shore Segment)				2Q FY91	
*CDR (Shore Segment)					3Q FY92
T&E Milestones					
*DT-1A Jan-Jun 88 (Ph 3)		NOV FY89			
*DT-1B			NOV FY90		
*DT-2A (Phase 1)/(Phase 2)				1Q FY91	
*DT-2B					2Q FY92
Contract Milestones					
*FSD (U/W contract)/(Shore contract)		OCT FY90/MAY FY91			

BUDGET ($K)	FY 1988*	FY 1989*	FY 1990	FY 1991	Prog Total
Major Contract (AT&T)	56,742	89,268	145,784	190,062	Cont.
Support Contract (TRW/TBD)	5,096	6,789	5,812	5,832	Cont.
In-House Support (NOSC/NCEL)	6,722	6,535	7,567	8,358	Cont.
GFE/Other	2,036	1,267	994	306	Cont.
Total	70,596	103,859	160,157	204,558	Cont.

* Program under PE 0603784N, FDS.

Program Element: 0604784N Budget Activity: 4
Program Element Title: Fixed Distribured System (FDS)
Project Number: X1312 Project Title: Fixed Distributed System

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Integrated Undersea Surveillance System (IUSS) provides the

The Fixed Distributed System (FDS) is a

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Continued , fabrication and test; Conducted ; Conducted ; Conducted field testing of

2. (U) FY 1989 Program: Complete Initiate plan for Initiate ; Complete planning for Continue underwater IDM fabrication and test; Initiate acquisition of Special Tools and Test Equipment for Initiate acquisition of long lead material for Prepare report on Measures of Effectiveness (MOEs) for field management and of FDS shore processing segment; Finalize system specifications and release RFP for full scale development; Conduct Leader-Follower analysis and evaluate viability of Follower qualification program as potential second source for Initiate selection of two complete shore segment design contracts; Continue shore processing validation program at test site.

3. (U) FY 1990 Plan: Award Full Scale Development (FSD) contract; Initiate fabrication of Initiate modifications to, Conduct Critical Design Review (CDR) for Award two parallel shore segment competitive design contracts; Initiate shore segment design.

4. (U) FY 1991 Plan: Initiate assembly of Follower develops facilities for producing Prototype

Program Element: 0604784N Budget Activity: 4
Program Element Title: Fixed Distribured System (FDS)
Project Number: X1312 Project Title: Fixed Distributed System

system test; Complete fabrication of
Conduct incremental software testing and evaluation; Conduct

Conduct Preliminary Design Review (PDR) for Award
shore segment Full Scale Development (FSD) contract.

5. (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, D.C.; Contractors: AT&T Technologies, Inc., Greensboro, NC; AT&T/Bell Laboratories, Whippany, NJ; Bolt, Beranek, and Newman, Inc., Cambridge, MA; TRW, Inc., McLean, VA.; Amizon, INC., Falls Church, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	No Change	No Change	No Change
SCHED	No Change	No Change	No Change
COST	No Change		

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: No change.

2. (U) SCHEDULE CHANGES: No change.

3. (U) COST CHANGES:

F. (U) PROGRAM DOCUMENTATION:

Milestone I Decision	13 May 1986
Navy Decision Coordination Paper (NDCP)	13 Mav 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

G. (U) RELATED ACTIVITIES: PE 0204311N, Integrated Undersea Surveillance Systems (IUSS).

Program Element: 0604784N Budget Activity: 4
Program Element Title: Fixed Distribured System (FDS)
Project Number: X1312 Project Title: Fixed Distributed System

H. (U) *OTHER APPROPRIATION FUNDS*:

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. OPN #70			NOT APPLICABLE			Cont.
2. MCON (VARLOCS)	0	0	18,500	1,350	Cont.	Cont.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605803N Budget Activity: 4

Program Element Title: Electromagnetic (EM) Effects and Spectrum Control

Project Number: S0706 Project Title: Electromagnetic Interference (EMI) and Radio Frequency Control

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0706	EMI&RF Control	1,629	2,031	3,438	3,531	Cont.	Cont.
S1573	EMP Surv Nav C^2	294	0	0	0	0	2,344
	Totals	1,923	2,031	3,438	3,531	Cont.	Cont.

B. (U) PROJECT DESCRIPTION: This project develops urgently needed advanced technology to prevent EMI from degrading the combat capability of Navy systems and platforms.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Performed analyses and testing to correct EMI in the AN/SLQ-32, AN/USC-38, and the Mk 15 Close in Weapon Systems.

b. (U) Completed computer program for automated testing of equipment to MIL-STD 461 EMI requirements.

c. (U) Completed evaluation of chemical paint additives to reduce intermodulation interference from ship's corroded metal junctions, and prepared a draft specification for commercial production and procurement.

d. (U) Completed fleet evaluation of a baseline adaptive EM control system (AEMCS) in four DD-963s and transitioned to advanced development.

2. (U) FY 1989 Program:

a. (U) Complete advanced development of the baseline AEMCS for surface ships and prepare for transition to an advanced development project.

b. (U) Start development of chemical agents to reduce the significant corrosion which the marine environment produces in EMI control gaskets in ships, aircraft, and weapons, so as to reduce the frequency and cost of replacing gaskets.

c. (U) Scope and plan an effort to develop self-activating blankers for sensitive combat systems to shield themselves adaptively from degradation by off-ship as well as own ship EMI sources.

d. (U) Conduct a feasibility study and formulate a program plan to use expert systems and advanced signal processing technologies to minimize the effects of EMI on combat system operations.

3. (U) FY 1990 Plans:

a. (U) Continue development of chemicals to reduce corrosion in EMI control gaskets.

b. (U) Start developing self-activating blankers, and start application of expert system and advanced signal processing technology 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) Conduct a feasibility study to develop a capability to monitor own ship's ambient EM environment for use in minimizing EMI among shipboard systems.

4. (U) FY 1991 Plans: Continue developments of the FY 1990 program.

5. (U) Program to Completion: This is a continuing project.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605853N Budget Activity: 4
Program Element Title: Management & Technical Support

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0231	ASW System Support	3,400	2,083	3,801	4,006	Cont.	Cont.
R1767	NWC Strategic Studies Support	1,006	1,200	1,343	1,410	Cont.	Cont.
R0905	Naval Warfare Tactical Analysis	3,464	3,058	4,040	3,935	Cont.	Cont.
T1038	Acoustic & Non-Acoustic Analysis Support	392	309	*			
Total		8,262	6,650	9,184	9,351	Cont.	Cont.

* Project T1038 transfered to PE 0605856N, Strategic Technical Support, after FY 1989.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Provides analytic/management support across entire spectrum of Naval warfare. Provides ASW systems analysis for COMSPAWARSYSCOM. Also supports activities of CNO Strategic Studies Group at Naval War College. Entire 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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605853N Budget Activity: 4
Program Element Title: Management & Technical Support
Project Number: X0231 Project Title: ASW Systems Support

C. (U) PROJECT DESCRIPTION: Develops/reviews Navy's ASW investment strategy. Analyses are conducted to define ASW requirements, appraise ASW program/ performance, and make cost/performance tradeoff among ASW system concepts. Efforts support definition of warfare requirements and development of ASW architectures.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Completed structural and qualitative analysis of current CVBG forces. Developed speed models in support of architectural analysis and effectiveness studies. Performed annual master plan and architectural option analyses and model improvements. Conducted marginal utility and cost effectiveness analysis for the ASW Integrated Assessment Team.

2. (U) FY 1989 Program: Complete structural and qualitative analysis and appraisal of CVBG. Complete first annual update of ASW Master Plan with high fidelity models. Perform annual master plan and architectural option analyses and model improvements. Conduct ASW Force Level Requirement Studies. Conduct ASW appraisal and support the ASW Integrated Assessment Team.

3. (U) FY 1990 Plans: Continue high speed/high fidelity model development. Continue annual analysis of ASW Master Plan. Perform architectural option analyses and model improvements. Complete Area ASW Architecture. Complete development of top level models incorporating C^3/C^3CM models. Incorporate national sensors in campaign level models. Complete cost analysis models for ASW.

4. (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.

5. 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 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 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Analyzes overall Naval strategy and provides recommendations to CNO and fleet commanders for improvements in both strategy and means by which agreed strategy is executed. 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 1988 Accomplishments: Provided support to CNO Strategic Studies Group (SSG) at planned levels and at reduced levels to CNWS. Provided reduced campaign option support and response to CNO and Fleet tasking. Conducted/analyzed annual Global War Game. Conducted reduced bi/multi-lateral studies. Continued at reduced levels intelligence support. Maintained current logistic wargaming capabilities.

2. (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 trends and arms agreements. Commence next five year series of annual Global 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.

3. (U) FY 1990 Plans: Conduct year two of the five year annual Global War Game series. Continue all other FY 1989 activity.

4. (U) FY 1991 Plans: Conduct year three of the five year annual Global War Game series. Continue all other FY 1990 activity.

5. (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 AGGREMENTS: Not applicable.

Program Element: 0605853N Budget Activity: 4
Program Element Title: Management & Technical Support
Project Number: R0905 Project Title: Naval Warfare Tactical Analyses

C. (U) PROJECT DESCRIPTION: Provides analytical and management support to DCNO (Naval Warfare) in role as Warfare Task Sponsor for ASW, AAW, STW, ASUW, C3I, EW, Amphibious, Mine, Chemical, Strategic, Space, and Special Warfare. Conducts continuing analyses of Navy's capabilities and limitations in execution of these missions. Master plans are developed as blueprints for the future. Annual appraisals are conducted to assess progress and problems and define 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 1988 Accomplishments: Completed integration of tactical nuclear wargaming into Navy training system; Continued reduced support to Project OSPREY REINDEER, Electronic Warfare, master planning and tactical modeling at CNA.

2. (U) FY 1989 Program: Expand analytical support for annual appraisals. Conduct major revisions to existing master plans. Continue OSPREY REINDEER at increased funding levels. Adequately fund CNA warfare analyses/tactical modeling. Emphasize cost analysis and warfighting impact as elements of tradeoff decisions.

3. (U) FY 1990 Plans: 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.

4. (U) FY 1991 Plans: Continue all efforts as in FY 1990. Fully integrate CNA tactical modeling into planning process.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: NUSC, Newport, RI; NSWC, White Oak, Silver Spring, MD; NOSC, San Diego, CA; NWC, China Lakes, CA; CONTRACTORS: Center for Naval Analyses, Alexandria, VA; Systems Planning and Analysis, Arlington, VA; Washington Consulting Group,Arlington, VA.

F. (U) RELATED ACTIVITIES: All Navy tactical 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.

Program Element: 0605853N Budget Activity: 4
Program Element Title: Management and Technical Support
Project Number: T1038 Project Title: Acoustic and Non-Acoustic Analysis Support

C. (U) PROJECT DESCRIPTION: Data collection and analysis for exploitation of sensor data in support of sensor and weapons systems developments. Also supports development of new/revised ASW tactics and identification of Program provides analysis, unique hardware and software development for processing sensor data at the Navy Technical Intelligence Center (NTIC).

D (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: NTIC provided over of analytical support to Production of a developmental With the advent of

2. (U) FY 1989 Program: NTIC will continue to provide analytic support to In addition, a developmental will be identified for the NTIC laboratory in order to provide an approximate

3. (U) FY 1990/1991 Plans: Project T1038 transfered to after FY 1989.

4. (U) Program to Completion: This is a continuing program under PE 0605856N.

E. (U) WORK PERFORMED BY: IN-HOUSE: Navy Technical Intelligence Center (NTIC), Suitland, MD.

F. (U) RELATED ACTIVITIES: Effort supports virtually every Anti-Submarine Warfare sensor and weapon system development program and the design and development of new classes of U.S. submarines.

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

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

UNCLASSIFIED

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
T1034	TAC SAT RECON	6,976	6,666	8,054	8,640	Cont.	Cont.
R2007	SPACE MGMT SUP	662	803	1,105	1,158	Cont.	Cont.
X1368	NAV SPACE SYS ACT	276	276	291	304	Cont.	Cont.
	TOTAL	7,914	7,745	9,450	10,102	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: C2 Surveillance/Reconnaissance Support consists of three projects. Project T1034, commonly known as Tactical Exploitation of National Capabilities (TENCAP), is a unique low-cost, high payoff project, established by Congress in 1977,

Project R2007 supports analyses of techniques and technologies to enhance the operation and tactical utility of future space systems. Project X1368 supports the Navy Space Systems Activity, located in Los Angeles, in its role as primary field support activity for the Navy Space Systems Program Office.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605867N Budget Activity: 4

Program Element Title: C2 Surveillance/Reconnaissance Support

Project Number: T1034 Project Title: TAC SAC RECON Office

C. (U) PROJECT DESCRIPTION: Established by Congressional direction to exploit all available National and Service sensor systems for tactical support to fleet operational commanders. Conducts fleet exercises to establish/validate requirements for new systems and modifications to existing systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U)
   b. (U) Refined a new system architecture
   c. (U) Improved tactical commander awareness
   d. (U) Continued developing a new satellite communications system and architecture
2. (U) FY 1989 Program:
   a. (U)
   b. (U)
   c. (U) Concept development
   d. (U) Explore new space-related concepts
   e. (U) Conduct demonstrations
3. (U) FY 1990 Plans:
   a. (U) Provide Navy specific initiatives
   b. (U) Improve tactical commander awareness.
   c. (U) Concept development
   d. (U) Explore new space-related concepts
   e. (U) Conduct demonstrations
4. (U) FY 1991 Plans:
   a. (U) Assist with Navy specific initiatives
   b. (U) Improve tactical commander awareness.
   c. (U) Concept development
   d. (U)
   e. (U) Conduct demonstrations
5. (U) Program to Completion:
   a. (U) Conduct demonstrations
   b. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: Work performed under compartmented contracts.

F. (U) RELATED ACTIVITIES: PE 0603451N, Tactical Space Operations, contains projects that have been developed under initiatives in project T1034.

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: 0605867N Budget Activity: 4
Program Element Title: C2 Surveillance/Reconnaissance Support
Project Number: R2007 Project Title: SPACE MGMT SUPPORT

C. (U) PROJECT 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 1988 Accomplishments:

a. (U) Initiated a project to demonstrate potential jam resistance achievable in UHF satellite communications; a currently unknown factor that may allow more robust Command and Control communications.
b. (U) Initiated feasibility studies to determine potential contributions of space systems support of ASW, ASUW, AAW and Strike Warfare.

2. (U) FY 1989 Program:

a. (U) Exploration of technology in an effort to determine the feasibility of developing [redacted] capabilities as an integral part of naval platforms.

3. (U) FY 1990 Plans:

a. (U) Continue exploration, analysis and quantification of potential [redacted] operations from and for Naval platforms.

4. (U) FY 1991 Plans:

a. (U) Continue the analysis of projecting future Force Enhancement operational space capabilities in the areas of communications, surveillance and targeting, navigation and environmental/oceanographics.

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

E. (U) WORK PERFORMED BY: In House: Naval Research Laboratory, Washington, DC. Contractor: SI Systems Corporation, Vienna, VA; John Hopkins University - Applied Physics Laboratory, Laurel, MD.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605867N Budget Activity: 4
Program Element Title: C^2 Surveillance/Reconnaissance Support
Project Number: X1368 Project Title: NAV SPACE SYS ACT LA

C. (U) PROJECT 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 1988 Accomplishments:

   a. (U) Provided management and security support.
   b. (U) Provided financial systems analysis, computer services, and related administrative efforts to support Navy space and space-related programs.

2. (U) FY 1989 Program:

   a. (U) Continue support to various Navy space and space-related programs.

3. (U) FY 1990 Plans:

   a. (U) Continue support to various Navy space and space-related programs.

4. (U) FY 1991 Plans:

   a. (U) Continue support to various Navy space and space-related programs.

5. (U) Program to Completion:

   a. (U) 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 1110011N Budget Activity: 4
Program Element Title: Special Warfare Force Enhancements

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0416	SEAL Wpn Sys	3,804	5,954	5,041	5,060	Continue	Continue
S0417	SEAL Spt Sys	11,358	14,894	19,565	29,645	Continue	Continue
S1684	Special Warfare Combatant Craft	4,394	8,075	26,163	29,638	Continue	Continue
TOTAL PE		19,556	28,923	50,769	64,343	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Develops weapons, life-support, C³I and mission support equipment, and mobility systems for Navy Special Warfare Forces (SEAL/SDV Teams and Special Boat Squadrons) in order to enhance maritime Special Operations in support of Fleet or Joint Commanders. Tasking may include any of the following tactical missions:

This element includes three projects: (1) SEAL Weapons System: specialized weapons and accessories for attacking; (2) SEAL Support System: equipment for mobility, life support, C³I and mission support; (3) Special Warfare Combatant Craft: a series of special purpose craft and systems for patrol, riverine, clandestine and other Naval Special Warfare Missions.

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft
Project Number: S0416 Project Title: SEAL Weapon System

C. (U) PROJECT DESCRIPTION: Develops unique weapons and ordnance equipment for use by Naval Special Warfare Forces. Weapons are employed during beach obstacle clearance, underwater ship attacks and direct action missions. This system includes firing devices, demolition charges, marker beacons, hand weapons and ammunition, limpet mines, distress signals and individual boat equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Complete evaluation of SEAL Equipment Canister, Sympathetic Firing Device, and Anti-Disturbance Device. Achieve IOC for Swimmer Distress Signals and Improved MK 4 ASW Limpet (MK 7 Limpet). Continue Absolute Time Firing Device.
2. (U) FY 1989 Program: Achieve Milestone III and IOC of SEAL Equipment Canister, Sympathetic firing Device and Anti-Disturbance Device. Initiate underwater demolition weapon.
3. (U) FY 1990 Plans: Achieve Milestone II of Absolute Time Firing Device. Achieve Milestone I of Advanced ASW Limpet. Continue underwater demolition weapon.
4. (U) FY 1991 Plans: Achieve IOC of Absolute Time Firing Device. Achieve Milestone II of Advanced ASW Limpet. Continue underwater demolition weapon.
5. (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: Program Element 1110011N S0417, SEAL Support System; Program Element 1110011N S1684, Special Warfare Combatant Craft.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
1. (U) PROCUREMENT						
OPN (551600) #240	4,096	4,100	2,300	1,700	Continue	Continue
WPN (323300) #55	1,332	1,947	975	1,037	Continue	Continue

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft
Project Number: S0417 Project Title: SEAL Support System

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0417	SEAL Spt Sys	11,358	14,894	19,565	29,645	Continue	Continue

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develops Seal Support items used during the conduct of hydrographic/inland reconnaissance, beach obstacle clearance, underwater ship attack, and direct-action missions. Items include: SEAL Delivery Vehicle (SDV) improvements; Advanced SEAL Delivery System; Diver Active Thermal Protection for cold water combat swimmer missions; Advanced Underwater Breathing Apparatus (UBA) for increased combat swimmer endurance; Full Face Mask improvements; scuba gear extension studies to improve duration of existing dive profiles; biomedical research to examine physiological, medical and human engineering factors to better train/prepare SEALS for improved mission success; Very Shallow Water Mine Countermeasures analysis; studies to establish environmental models to forecast operational conditions; Mission Simulators and Planning Aids.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Continue MK VIII MOD 1 SDV project; begin systems testing. Continue development of Advanced Underwater Breathing Apparatus. Continue development and testing of improved Full Face Mask with C^3I provision for a heads up display. Continue SEAL Medical and Physiological studies. Finish evaluation of Passive At-Sea Navigation System as an NDI project. Deliver Mine Countermeasures threat assessment. Refine design and physiological studies. Deliver interactive Laser-Disc Trainer to fleet for evaluation. Continue mission analysis studies. Continue work on Tactical Video. Initiate a Tactics/Doctrine Support project. Continue R&D on C-2A(R) aircraft upgrade and transition into application of Field Change Kits to Fleet airframes. Completed Advanced SEAL Delivery System (ASDS) DOP.

2. (U) FY 1989 Program: Continue MK VIII Mod 1 SDV project and issue RFP. Continue development and testing of Advanced Underwater Breathing Apparatus. Continue development and begin testing of Diver Active Thermal Protection System. Finish evaluation and deliver improved Full Face Mask. Reach MS-III for Tactical Video, Passive Navigation System.
Introduce Field Change Kits resulting from 6.2 work in Radio Waterproofing Technology. Continue development of NSW mission planners/simulators. Initiate work on improved Mine Countermeasures Equipment package. Continue C-2A (R). Continue ASDS initiatives.

3. (U) FY 1990 Plans: Continue MK VIII MOD 1 SEAL Delivery Vehicle project. Continue evaluation of Advanced Underwater Breathing Apparatus and Diver Active Thermal Protection System. Achieve IOC for Tactical video, Passive Navigation System. Continue work on simulators and mine countermeasures equipment package. Initiate Advanced SEAL Delivery System project.

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft

4. (U) FY 1991 Plans: Continue MK VIII Mod 1 SEAL Delivery Vehicle. Achieve Milestone III of Advanced Underwater Breathing Apparatus and Diver Active Thermal Protection system. Commence various communications and mission support improvement projects. Continue Advanced SEAL Delivery System project.

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

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.

E. (U) COMPARISON WITH AMENDED BY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 90 Cost
TECH	N/A	N/A	N/A
SCHD	N/A	N/A	N/A
COST	(See Below)	Accelerates 6 months	+11439

NARRATIVE DISCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: N/A
2. (U) SCHEDULE CHANGES: ASDS IOC will be achieved earlier.
3. (U) COST CHANGES: Increased funding will allow Advanced Seal Delivery System (ASDS) to be developed through the Demonstration and Validation Phase and achieve early IOC.

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 VIII SDV Upgrade/MOD 1 NAPDD 137-03, OR 159-03-87 4/27/87, Advanced SEAL Delivery System OR 12/01/88, Air Delivery/Recovery (C2A(R)) NAPPD 162-03 3/9/87, Diver Thermal Protection NDCP S-0417-SW, TEMP-098-10 8/22/86, Advance Underwater Breathing Apparatus OR 102-02-87 6/16/86, Full Face Mask OR 102-02-87 6/16/86, Survivable Comms NAPDD 160-03 4/7/87, C^3I 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)

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
PROCUREMENT						
OPN (114100) #44	0	0	2,700	0	0	2,700

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Information Exchange Project (IEP) B-80 between US and UK to share operations and tactics information is being expanded to include R&D information specific to Naval Special Warfare.

J. (U) MILESTONE SCHEDULE: N/A

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft
Project Nubmer: S1684 Project Title: Special Warfare Combatant Craft

NO PICTURE AVAILABLE

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

SCHEDULE	FY 88	FY 89	FY 90	FY 91	To Complete
Program Milestones	M/S I 2Q/88	M/S IA 2Q/89	M/S II 1Q/90		
Engineering Milestones			Contract Design 2Q		
T&E Milestones					
Contract Milestones					

BUDGET (K)	FY 88	FY 89	FY 90	FY 91	Program Total To Complete
Major Contract					
Support Contract					
In-House Contract					
GFE/ Other					
Total	2,800	9,400	22,300	35,700	Cont.

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft

B. (U) BRIEF DESCRIPTION MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develops specialized combatant craft with equipment and systems to operate in shallow water, riverine areas, coastal approaches, and the open ocean in [redacted]. Such craft must be capable of extended mission and low probability of detection. 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 minimize detectablity.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Continue hull performance improvement efforts. Continue high performance propulsion system development. Continue development of light-weight electronics and combat systems. Develop advanced concepts for air launched craft. Continue Signature Reduction analysis and feasibility studies. Continue High Speed Boat and Submersible/Recoverable Craft development. Develop Special Warfare Craft Riverine and Coastal Advance Concepts. Initiate studies for New Class SPECWAR Patrol Boats, Unmanned Craft and SEAL Tactical Insertion Craft (STIC).

2. (U) FY 1989 Program: Continue performance improvement evaluations (hull systems and propulsion systems), Signature Reduction Systems development and tests, Advance Combat Systems Evaluations, High Speed Boat Product and Submersible/Recoverable Craft Pre-Planned Product Improvements. Develop Air Launch, Unmanned and Semi-Submersible Craft prototype concepts and conduct model tests. Develop product improvements for SPECWAR Riverine and Coastal Craft and develop requirements for new class SPECWAR Patrol Boats. Develop prototype design for SEAL Tactical Insertion Craft (STIC).

3. (U) FY 1990 Plans: Initiate Prototype development of the SEAL Tactical Insertion Craft, incorporating the latest features for threat and signature reduction and human factors. This will include incorporating classified advanced research features currently under development. 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 Pre-Planned Product Improvements for the High Speed Boat and Submersible/Recoverable, Riverine, Combat Rubber and Coastal Patrol craft and complete tests of the Air Launch and Unmanned craft. Develop the prototype design for the Semi-Submersible Craft.

4. (U) FY 1991 Plans: Continue development of the prototype SEAL Tactical Insertion Craft including test and evaluation. Continue performance improvements for SPECWAR craft systems including the advanced concepts to save weight and reduce production costs. Continue with Pre-Planned Product Improvements for existing SPECWAR craft designs including the advanced combat system for SEAL delivery/coastal patrol craft. Continue the development of prototypes for the Air Launch, Unmanned and Semi-Submersible Craft.

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

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSEA Combat Systems Engineering Station, David Taylor Research Center, Naval Warfare Center, and Naval Ship Systems Engineering Station. CONTRACTORS: Resource Consultants Inc., Stanley Associates and Advanced Marine; various commerical.

E. (U) COMPARISON WITH AMENDED BY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 90 Cost
TECH	N/A	N/A	N/A
SCHD	N/A	N/A	N/A
COST	See Below	Accelerates 5 months	+22,206

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: N/A
2. (U) SCHEDULE CHANGES: N/A
3. (U) COST CHANGES: Additional funding will initiate prototype development of the SEAL Tactical Insertion Craft (STIC).

F. (U) PROGRAM DOCUMENTATION:

		TOR**	OR	DCP	TEMP
CCRC(S)*	NA	06/27/88	NA	06/28/88	
CCRC(L)*	NA	05/26/88	NA	04/28/88	
HSB	NA	04/22/88	NA	02/08/88	
Meteor	NA	TBD	NA	TBD	
MFOB	NA	09/87	NA	TBD	
PCC	NA	06/27/88	NA	TBD	
SRC	NA	04/08/87	NA	08/17/88	
SSC	NA	TBD	NA	TBD	
STIC		06/03/88	TBD	TBD	TBD
SWCC	NA	07/06/88	NA	02/09/88	
SWCR	NA	05/06/88	NA	TBD	
UMC		NA	TBD	NA	TBD

*Programs initiated with Non Acquisition Category Program Planning Document (NAPPD).
**Programs without TORs are implemented by Operational Requirements Letters (LOR) per CNO memo Ser 09/6U301207 of 8 Aug 86 and CNO ltr Ser 098R/7U0353879 of 13 Jul 87.

FY 1990/1991 BIENNIAL RDT&E NAVY DESCRIPTIVE SUMMARY
Program Element: 1110011N Budget Activity: 4-Tactical Programs
Program Element Title: Special Warfare Combatant Craft

G. (U) RELATED ACTIVITIES: S0416, SEAL Weapons System; S0417, SEAL Support System.

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

	FY 1988 Actual	FY 1989 Est	FY 1990 Est	FY 1991 Est	To Comp	Total Program
1. (U) PROCUREMENT						
MILCON	0	250	1,600	0	0	1,850
SCN	0					
OPN #44	Procurement justification material does not contain this level of detail.					

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

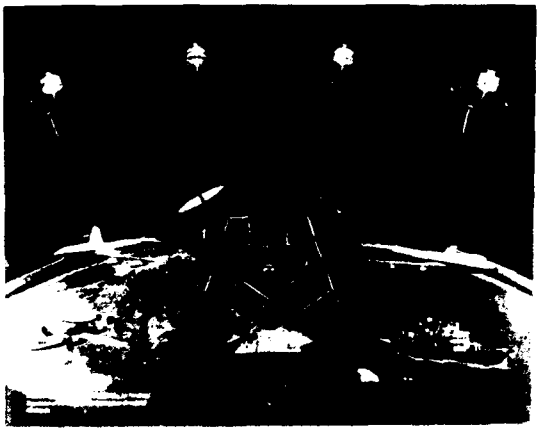
J. (U) MILESTONE SCHEDULE: (Quarter and FY)

	S*	A*	D* (Lead)	MSIII FP*	IOC
CRRC(S)	4th 87	2nd 88	3rd 88	1st 89	4th 89
CCRC(L)	2nd 89	3rd 89	1st 90	3rd 90	3rd 91
HSB	3rd 89	1st 90	3rd 90	1st 91	4th 91
Meteor	TBD	TBD	TBD	TBD	TBD
PCC	TBD	TBD	TBD	TBD	TBD
SRC	NA	1st 89	3rd 89	4th 90	3rd 92
SSC	TBD	TBD	TBD	TBD	TBD
STIC	2nd 89	4th 90	4th 92	4th 93	3rd 94
SWCC	1st 89	2nd 89	3rd 90	4th 89	3rd 91
SWCR	4th 88	2nd 89	3rd 89	1st 90	4th 90
UMC	TBD	TBD	TBD	TBD	TBD

*S=Solicitation
A=Award
D=Delivery
FP=Full Production Decision

FY 1990/1991 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: FLTSATCOM

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS-II Mini-DAMA		TADIXS Phase IV IOC 11/89		Mini-DAMA MS III 1Q/93
Engineering Milestones		Mini-DAMA PDR 8/89	Mini-DAMA CDR 3/90		
T&E Milestones					Mini-DAMA DT/OT FY92
Contract Milestones	Mini-DAMA Award 12/88			TACINTEL II Award 12/90	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total to Complete
Major Contract	(5,524)*	14,730	11,175	9,537	Continuing
Support Contract	(1,735)*	1,679	2,799	3,444	Continuing
In-House Support	(3,082)*	3,552	1,902	1,106	Continuing
GFE/ Other	0	0	0	0	
Total	(10,341)*	19,961	15,876	14,087	Continuing

*Funded under PE 0604232N in FY88

FY 1990/1991 BIENNIAL 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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Fleet Satellite Communications provides satellite communications worldwide for fleet operations. The project supports development of 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 these efforts provide for development of Ultra High Frequency (UHF) Terminals, network controllers, time division multiplexers, and tactical support for super high frequency terminals. The Fleet Satellite Communication System 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. 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. Officer in Tactical Command Information Exchange Subsystem (OTCIXS) phase II software will be developed to include OTCIXS in the Demand Assign Multiple Access (DAMA) channel on the satellites. Tactical Intelligence Radio Direction finding (TACINTEL) II will expand the role of TACINTEL to allow multi-media and sub-netting in transmission of special intelligence information to ships, aircraft, and afloat command centers.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded in PE 0604232N)
   a. (U) Continued development of the TADIXS Phase IV software.
   b. (U) Started AN/WSC-3 transceiver vulnerability modification kit development.
   c. (U) Developed improvements to the Navy terminal control element used with the AN/WSC-6 for Defense Satellite Communication system control.
   d. (U) Prepared Mini-DAMA procurement package.

2. (U) FY 1989 Program:
   a. (U) Begin Mini-DAMA Full Scale Development.
   b. (U) Prepare TACINTEL II procurement package.
   c. (U) Continue TADIXS Phase IV/V development.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303109N Budget Activity: 5
Program Element Title: Satellite Communications
Project Number: X0731 Project Title: Fleet Satellite Communications

3. (U) FY 1990 Plans:
   a. (U) Continue Mini-DAMA Full Scale Development.
   b. (U) TADIXS Phase IV IOC.
   c. (U) Release TACINTEL II RFP.

4. (U) FY 1991 Plans:
   a. (U) Complete TADIXS Phase IV development.
   b. (U) Continue Mini-DAMA Full Scale Development.
   c. (U) Award TACINTEL II Full Scale Development contract.

5. (U) Program to Completion:
   a. (U) Complete development of TACINTEL II, conduct DT/OT FY94-95.
   b. (U) Complete development of Mini-DAMA, conduct DT/OT FY92.
   c. (U) Achieve MS III for Mini-DAMA (1Q/FY93)
   d. (U) Achieve TACINTEL II MS III (1Q/FY96).
   e. (U) Begin development of Enhanced Battle Group Network.
   f. (U) This is a continuing program for improving efficiency of numerous SATCOM sub-systems in accordance with concepts of the Communications Support Systems (CSS) Architectural plan.

D. (U) WORK PERFORMED BY: Contractors: Advanced Digital Systems, Inc., San Diego, CA; Computer Science Corporation, Falls Church, VA; Advanced Communication Systems, Inc., Arlington, VA; In-House: Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Engineering Activity, St. Inigoes, MD; Naval Electronic Systems Engineering Center, Vallejo, CA; Naval Electronic Systems Engineering Center, Charleston, SC; Naval Underwater Systems Center, New London, CT.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	Mini-DAMA	1 year delay	-14,616
	TACINTEL II	2 year delay	
	Arctic Comms-Milstar Interoperability	Deferred to Outyears	
	Auto-DAMA capability	Deferred to Outyears	
	Replacement UHF Transceiver & Antenna development	Deferred to Outyears	

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303109N Budget Activity: 5
Program Element Title: Satellite Communications
Project Number: X0731 Project Title: Fleet Satellite Communications

NARRATIVE DESCRIPTION OF CHANGES

Impact of changes:

1. (U) TECHNOLOGY: NONE

2. (U) SCHEDULE: NONE

3. (U) COST: Navy and Department reductions totaled $14,616K for FY-90. Program starts delayed to outyears for Arctic Comms-Milstar interoperability, Auto-DAMA capability, and Replacement UHF transceiver & antenna development due to reduced funding.

F. (U) PROGRAM DOCUMENTATION:

DCP 99R5	3/77	SOR 32-98	7/72
JOR H-C123-75 (DAMA)	12/75	TEMP 252-6 (TACINTEL)	6/78
CNO LTR 094/C339306 (OTCIXS/TADIXS)	4/81	TEMP 252-8 (OTCIXS)	1/81
OR 174-094-87 (Mini-DAMA)	8/87	TEMP 252-9 (UHF DAMA)	2/81
OR 184-094-89 (TACINTEL II)	9/87		

G. (U) RELATED ACTIVITIES: None.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
(U) PROCUREMENT					
OPN #140(Excluding NN107)	25,144	10,337	15,852	20,214	Cont.
OPM #141(Excluding NP109)	8,553	0	4,993	3,402	Cont.
Quantities (Various)					

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0734	Communications Security R&D					Cont.	Cont.
X1237	TEMPEST OP					Cont.	Cont.
	Total					Cont.	Cont.

* Funded under PE 0604232N in FY 1988

B. (U) BRIEF DESCRIPTION OF ELEMENT: The goal of the Navy Communications Security (COMSEC) program is to ensure the continued protection of Navy and Joint communications systems from hostile exploitation in accordance with DOD and Navy COMSEC objectives. The program accomplishes this by analyzing and evaluating currently deployed and future C3I and EW systems to identify vulnerabilities; developing and testing new cryptographic and related non-cryptographic equipments, systems and techniques; and developing and testing new equipment and techniques to protect against compromising emanations. Major emphasis will focus on achieving an interoperable, more secure key distribution capability between Army, Air Force, and Navy.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303401N Budget Activity: 5
Program Element Title: Communications Security
Project Number: X0734 Project Title: North Star

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete Cont.	Total Program Cont.
North Star						

* Funded in P.E. 0604232N FY 88

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Communications Security R&D Project includes developments and studies designed to implement applicable Navy, Department of Defense and National directives relating to the protection of classified communications from adversary exploitation. The project is a continuing effort to modernize obsolete or unsupportable equipment with state-of-the-art replacements. Under this program Navy communications are constantly improved to meet the evolving and aggressive threat via development of cryptologic equipment and ancillaries including: implementation of state-of-the-art secure voice communications equipment (example: Secure Terminal Unit Third Generation STU III and Secure Conferencing Project (SCP)); development of the Navy Key Distribution System (NKDS) to secure Navy key variables; development of the Modular Security Device (MSD) and the acquisition and integration of KG-66/KGR-66/KGV-68

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded under PE 0604232N)
   a. (U) Continued acquisition and system integration support.
   b. (U) Initiated STU-III test and evaluation.
   c. (U) Developed Navy Single Point Keying specifications.
   d. (U) Defined MSD architectural concepts.
   e. (U) Completed Phase II of the SCP.

2. (U) FY 1989 Program:
   a. (U) Award NKDS full scale development contract.
   b. (U) Develop MSD specifications.
   c. (U) Complete STU-III test and evaluation.

3. (U) FY 1990 Plans:
   a. (U) Continue devices and system integration to support Navy weapon system test.
   b. (U) Continue MSD Development.
   c. (U) Define functional/performance requirements for Modular Secure Voice Terminal (MSVT).
   d. (U) Accelerate NKDS IOC.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303401N Budget Activity: 5
Program Element Title: Communications Security
Project Number: X0734 Project Title: North Star

4. (U) FY 1991 Plans:
a. (U) Continue] devices and system integration to support Navy weapon system tests.
b. (U) Continue MSD Development.
c. (U) Continue accelerated NKDS effort.

5. (U) Program to Completion:
a. (U) Continue] devices and system integration to support Navy weapon system tests.
b. (U) Complete development of the MSD.
c. (U) Complete development of the Navy NKDS.
d. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: In-house: NRL 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHED	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:

NDCP (SVIS)	9/80
OR #03309487 Operational Requirement for STU III	1/86
COMSEC RESOURCES PROGRAM (CRP)	5/86
OR #14409486 FOR NKDS	2/87
CNO CONSOLIDATED SECURE VOICE & RECORD/DATA PLAN	3/87
NSA INFOSEC MANUAL	7/87

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0303401N Budget Activity: 5
Program Element Title: Communications Security
Project Number: X0734 Project Title: North Star

G. (U) RELATED ACTIVITIES: Program element 0303401G applies. Cryptographic equipments developed by the programs will be directly involved with the Navy Communications Security program. Additional equipments, techniques and/or technical advances resulting from the will be applied to this development. The Communications Security R&D project develops advanced components and techniques for all future Communications Security developments.

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 #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	1/Q FY88	1/Q FY89
Navy Key Dist Sys	2/Q FY89	4/Q FY92	4/Q FY92
Modular Security Dev	1/Q FY90	1/Q FY94	4/Q FY96
Modular Secure Voice	4/Q FY92	1/Q FY95	4/Q FY96

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: The TEMPEST OP DEV project investigates the TEMPEST characteristics of operational and developmental Navy Systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded under PE 0604232N)
   a. (U) Evaluated developmental and operational equipment/systems for use in TEMPEST assessments.
   b. (U) Initiated Navy Automated Tempest II (NAVAUTEMP II) system development.
   c. (U) Completed development of the wide-open front end receiver.
2. (U) FY 1989 Program:
   a. (U) Develop test initiatives, instrumentation, and countermeasures for identified developmental and operational problems.
   b. (U) Complete NAVAUTEMP II development.
3. (U) FY 1990 Plans:
   a. (U) Initiate development of the applique for the [redacted]
   b. (U) Develop analysis and test instrumentation and techniques for controlling compromising electro-magnetic emanations.
4. (U) FY 1991 Plans:
   a. (U) Define the TEMPEST hazards associated with [redacted] systems.
   b. (U) Complete development of the applique for the [redacted]
5. (U) Program to Completion:
   a. (U) Develop instrumentation and techniques to resolve identified problem areas.
   b. (U) Initiate/complete development of [redacted] TEMPEST instrumentation.
   c. (U) This is a continuing program.

E. (U) WORK PERFORMED BY: In-House: NAVELEXECCEN, Washington, DC.

F. (U) RELATED ACTIVITIES: PE 0303401G applies. [redacted] 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

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1880	Joint Terminal Program Office	4,545	4,263	5,001	4,517	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: The Milstar program is comprised of satellites, control stations and air/ship/land user terminals to provide worldwide, secure, antijam, survivable communications for national and military commanders of the four services. The JTPO establishes technical standards, develops logistics support plans, assures configuration management, assures interoperability, coordinates joint testing, and reviews terminal designs for the Army, Navy and Air Force terminal development programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Updated network connectivity database.
   b. (U) Conducted tri-service terminal tests.
   c. (U) Audited three service terminal designs.
   d. (U) Revised Joint Integrated Logistic Support and Training Plans.
   e. (U) Coordinated interoperable protocol development.
2. (U) FY 1989 Program:
   a. (U) Conduct terminal interoperability testing.
   b. (U) Continue development of interoperable terminal protocols.
   c. (U) Identify/resolve systems engineering issues.
   d. (U) Establish technical support for MILSTAR users.
3. (U) FY 1990 Plans:
   a. (U) Continue ongoing efforts.
   b. (U) Identify/test/resolve interoperability/compatibility issues.
4. (U) FY 1991 Plans:
   a. (U) Expand user/OJCS liaison and technical support to include operational planning and implementation.
   b. (U) Support tri-service transition to production.
5. (U) Program to Completion:
   a. (U) Identify and resolve system engineering issues, conduct system interoperability tests, support physical and functional configuration audits, and pursue advanced technology efforts.
   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, Extremely High Frequency Communication Terminals; Program Element 0604577N, Navy Extremely High Frequency Satellite Communications Terminals.

F. (U) OTHER APPROPRIATION FUNDS: This is a non-acquisition program. Program efforts do involve ensuring interoperability of terminals procured in other programs.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X1752	TESS ENG	4,150	2,574	2,850	2,394	Cont.	Cont.
X1779	ROTHR	26,670	9,665	19,919	10,959	Cont.	Cont.
X1847	Afloat Corr. Sys (ACS)	2,406	11,583	8,309	5,796	Cont.	Cont.
X1979	EW Coor. Mod. (EWCM)	297	4,193	2,916	956	Cont.	Cont.
TOTAL FOR PE		33,523	28,015	33,994	20,105	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Warfare Support Systems (WSS) program element was created in FY-88 to improve the Navy's of command, control and communications programs through the consolidation of projects previously funded in other Program Elements and through focused management. WSS includes command and control systems, surveillance sensors, fusion sensors, technical data bases, and environmental support. The development of the Warfare Support System will yield a common system that supports: establishing and maintaining common data bases; collection of non-organic data; developing an all-source tactical picture; intelligence analysis and environmental data collection. The program provides support for the analysis and interpretation of the data being collected. WSS supports automated multi-source data fusion with the use of correlation algorithms and technical data bases and distributes the results to fleet and shore users to support tactical command decisions and weapons targeting.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 15

Program Element Title: Warfare Support Systems

Project Number: X1752 Project Title: Tactical Environmental Support System

C. (U) PROJECT 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. As a part of the Warfare Support System, TESS will interface with the Tactical Command System, the Information Transfer System, and the intelligence and combat system. Through these 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 1988 Accomplishments:

a. Continued development of applications software for the Ocean/Atmosphere Master Library to meet emerging fleet requirements.

b. Awarded Contract for TESS FSED.

c. Completed System Design Review (SDR).

2. (U) FY 1989 Program:

a. Build four Engineering Developmental Models (EDM).

b. Begin applications software integration, verification and validation.

c. Conduct Preliminary Design Review (PDR) and Critical Design Review (CDR).

d. Install EDM #2 at the Naval Environmental Prediction Research Facility and at the Naval Eastern Oceanography Center.

e. Continue development of applications software.

3. (U) FY 1990 Plans:

a. Install EDM #3 aboard an aircraft carrier, conduct TECHEVAL and OPEVAL and achieve Milestone III Approval for Full Production (AFP).

b. Continue development of applications software.

4. (U) FY 1991 Plans:

a. Continue development and integration of applications software.

5. (U) Program to Completion:

a. Continue development and integration of applications software.

b. Complete production and installation of 71 systems.

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Environmental Prediction Research Facility, Monterey, CA; Naval Electronic Systems Engineering Center, Vallejo, CA. CONTRACTORS: Lockheed, Austin, TX.

F. (U) RELATED ACTIVITIES: PE 0603704N, Anti-Submarine Warfare Oceanography; PE 0604218N, Air Ocean Equipment Engineering; PE 0603207N, Air/Ocean Tactical Applications.

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

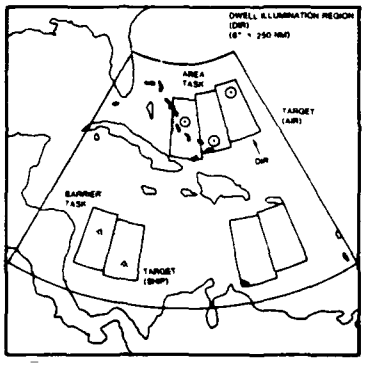
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) APPN/P-1						
OPN #207	0	0	10,500	11,500	10,000	32,000

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

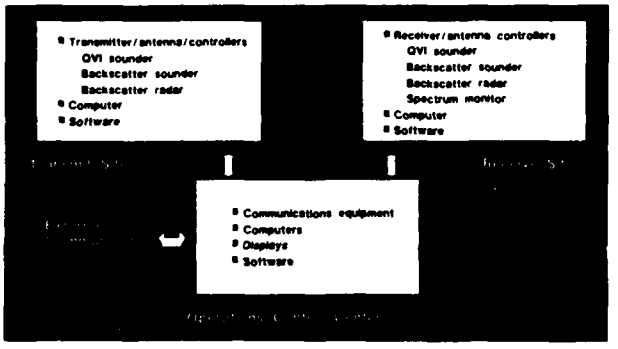
FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support Systems
Project Number: X1779 Project Title: Relocatable Over-the-Horizon Radar

Primary Coverage Area



System Block Diagram



POPULAR NAME: Relocatable Over-the-Horizon Radar (ROTHR)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS IIIA 4/89	MSIIIB 10/89		
Engineering Milestones		SPT COMP 2/89			
T&E Milestones		DTIIB 11/88 OTIIA 11/88 OTIIB 4/89	OTIII 3/90		Block Upgrade DTII 4Q92 OTII 2Q93
Contract Milestones		ALP 9/89	AFP 11/89		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	23,810	7,306	16,200	8,000	Cont.
Support Contract	-	-	-	-	Cont.
In-House Support	2,860	2,359	3,719	2,959	Cont.
GFE/ Other	-	-	-	-	-
TOTAL	26,670	9,665	19,919	10,959	Cont.

FY 1990/1991 BIENNIAL 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

B.(U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The Relocatable Over-the-Horizon Radar (ROTHR) is a tactical wide-area surveillance system which will provide an active surveillance capability 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 1988 Accomplishments:

a. (U) Continued contractor System Performance Tests (SPT).
b. (U) Initiated TECHEVAL.
c. (U) Implemented software corrections necessary to complete TECHEVAL.

2. (U) FY 1989 Program:

a. (U) Complete contractor System Performance Tests (SPT).
b. (U) Complete TECHEVAL (DTIIB).
c. (U) Conduct operational assessment (OTIIA).
d. (U) Obtain approval for limited production (ALP) (MS IIIA).
e. (U) Award limited production contract.
f. (U) Conduct OPEVAL (OTIIB).
g. (U) Deploy prototype system to first operational site at Amchitka, AK.

3. (U) FY 1990 Plans:

a. (U) Obtain approval for full production (AFP) (MS IIIB).
b. (U) Correct deficiencies identified during OPEVAL.
c. (U) Conduct OTIII to test corrections for deficiencies noted in OPEVAL and evaluate system relocatability.
d. (U) Complete development of the ROTHR Operations Control Center (OCC) tape replay training capability required under the ROTHR FSED program and conduct operational test of this capability as part of OTIII.
e. (U) Initiate development 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, and increased resistance to countermeasures.

FY 1990/1991 BIENNIAL 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

f. (U) Initiate development of a ROTHR OCC training system to provide computer aided training with ROTHR OCC Console Emulators. The OCC Trainer will provide a fully interactive training capability for operator schoolhouse training.

g. (U) Initiate development of improved direct data link to tactical forces.

4. (U) FY 1991 Plans:

a. (U) Continue development of block upgrade to the ROTHR system.

b. (U) Continue development of the ROTHR OCC training system.

c. (U) Continue development of a direct data link to support tactical forces.

5. (U) Program to Completion:

a. (U) Complete development and operational testing of the block upgrade to the ROTHR system.

b. (U) Complete development and testing of the ROTHR OCC training system.

c. (U) Complete development and operational testing of direct data link to support tactical forces.

D. (U) WORK PERFORMED BY: In-House: Naval Electronic Systems Engineering Center, Portsmouth, VA; Naval Ocean Systems Center, San Diego, CA. Contractors: Raytheon Company, Wayland, MA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: (Dollars in Thousands)

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	See Narrative	6 month slip	+12,104
SCHED	NONE	NONE	NONE
COST	NONE	NONE	NONE

FY 1990/1991 BIENNIAL 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

NARRATIVE DESCRIPTION OF CHANGES

IMPACT OF CHANGES:

1. (U) TECHNOLOGY CHANGES: In addition to the system upgrades planned in the follow-on RDT&E program, development of an improved direct data link to tactical forces will be initiated in FY 90. Due to the identification of system performance deficiencies and damage sustained by the transmit antenna during technical testing, completion of TECHEVAL and operational testing was delayed to permit implementation and test of software corrections. These corrections involved adjustments to software algorithm parameters, increase in size of the ionospheric model data base and revisions to operator displays. This delay affects schedule of OPEVAL, MS III decisions, completion of the OCC training capability, initiation of planned system upgrades, and budget year costs. Department increases totaled $12,104K to pay for listed changes.
2. (U) SCHEDULE CHANGES: NONE
3. (U) COST CHANGES: NONE

F. (U) PROGRAM DOCUMENTATION:

MENS	1/81
NDCP	2/88
TEMP	4/88

G. (U) RELATED ACTIVITIES: ROTHR (X1779) is one of several surveillance sensors, deployed around the world, which provide data to tactical users through the Navy Command and Control System. Related programs are PE 0604711N (Command and Control Systems (ENG)), PE 0603717N (Command and Control Systems (ADV)) and PE 0102417F (CONUS Over-the-Horizon Backscatter Radar).

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

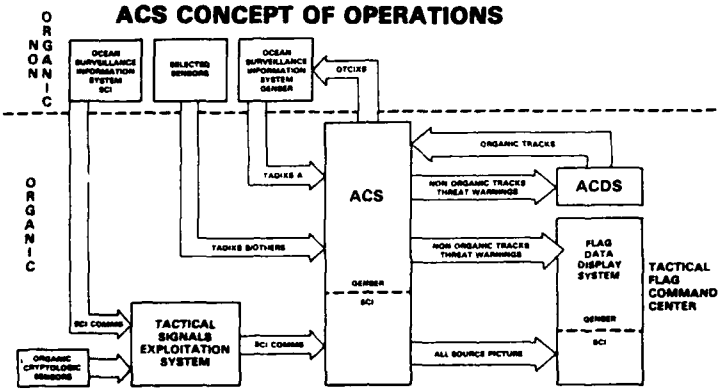
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) APPN/P-1						
OPN #121(332926)	88,100	161,225	86,557	79,615	521,500	950,200
Quantity	1	2	1	1	6	11

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
o IEP AA-10: Governmental information exchange agreement with Australia for Over-the-Horizon Radar performance and operational data.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System (WSS)
Project Number: X1847 Project Title: Afloat Correlation System (ACS)



POPULAR NAME: Afloat Correlation System (ACS)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			Core MSII	PH I MSIII PH II MSII	PH II MSIII
Engineering Milestones		PDR PH I	CDR PH I	PDR PH II	CDR PH II
T&E Milestones				PH I DT/OT II	PH II DT/OT II
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	1,384	9,380	6,237	4,116	Cont.
Support Contract	557	400	228	140	Cont.
In-House Support	465	1,333	1,744	1,490	Cont.
GFE/ Other	0	470	100	50	Cont.
Total	2,406	11,583	8,309	5,796	Cont.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System
Project Number: X1847 Project Title: Afloat Correlation System (ACS)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(U) ACS develops an automated correlation and information management system to integrate multi-source contact and threat warning data and provide a tactical plot. ACS will be installed on Tactical Flag Command Center (TFCC) equipped ships and is the specific component which is designed to integrate information from both local and remote sensors. ACS provides a fused, dynamic, tactical display to TFCC and sanitized track updates to the Combat Direction System.
(U) ACS development will be coordinated with TFCC, the Electronic Warfare Coordination Module (EWCM) and the Naval Intelligence Processing System (NIPS) programs and use Evolutionary Acquisition (EA). The Core portion of this evolutionary development will prototype tactical command and control capabilities providing limited interim correlator capabilities. This will be accomplished using the desktop computer based Prototype Ocean Surveillance Terminal (POST). In FY-92, POST will be replaced on TFCC-equipped ships by ACS Phase I, which will field an improved version of the POST correlation algorithm on a TFCC-compatible workstation. Phase II will field the advanced multi-source, multi-hypothesis correlation/tracker and add interfaces with other shipboard systems. Phase III will add mainframe computers and parallel processing capabilities to meet throughput requirements. Phase IV will complete development of tactical analysis and threat warning capabilities and complete the currently planned program.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Defined content and implementation schedule for each evolutionary phase of software development.
b. (U) Established hardware requirements and schedules for ACS support of TFCC/FDDS.
c. (U) Continued development of advanced multi-source correlator/tracker algorithm.
d. (U) Began multi-hypothesis correlator/tracker development.
e. (U) Supported POST prototyping.

2. (U) FY 1989 Program:

a. (U) Initiate interim (POST based) correlator/tracker system development.
b. (U) Continue multi-hypothesis correlator/tracker development.
c. (U) Initiate development of collection management and tactical intelligence analysis support tools.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System
Project Number: X1847 Project Title: Afloat Correlation System (ACS)

d. (U) Plan and initiate development support for the ACS portion of the NCCS Afloat land-based test site.

3. (U) FY 1990 Plans:

a. (U) Complete Critical Design Review of interim correlator/tracker.
b. (U) Continue multi-hypothesis based correlator/tracker development.
c. (U) Continue development of collection management and tactical intelligence analysis support tools.
d. (U) Continue development of the ACS portion of the NCCS Afloat land-based test site.

4. (U) FY 1991 Plans:

a. (U) Conduct DT/OT of interim correlator/tracker system with initial increment of collection management and tactical intelligence analysis support tools.
b. (U) Complete Critical Design Review of multi-hypothesis correlator/tracker system.
c. (U) Continue development of the NCCS Afloat land-based test site.

5. (U) Program to Completion:

a. (U) Achieve initial operational capability of interim correlator/tracker system with initial increment of collection management and tactical intelligence analysis support tools.
b. (U) Complete development of the associative processor-based correlator/tracker interfaced with TFCC/FDDS hardware and achieve initial operational capability.
c. (U) Continue development of enhanced collection management and tactical intelligence analysis support tools.
d. (U) Continue development of correlator/tracker, tactical threat warning, collection management and intelligence analyst support software.
e. (U) Incorporate state-of-the-art technological advances supporting wide-area-networking, multi-level security interests and computer assisted, knowledge based decision aids as part of individual development phases.
f. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Fleet Combat Direction System Support Activity, San Diego, CA. CONTRACTORS: Martin-Marietta Aerospace and Naval Systems, Baltimore, MD; Science Applications International Corporation, McLean, VA.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System
Project Number: X1847 Project Title: Afloat Correlation System (ACS)

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	Interim correlator	1 year early	-3,000

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: NONE

2. (U) SCHEDULE CHANGES: NONE

3. (U) COST CHANGES: The program $3,000M reduction resulted in adoption of an evolutionary acquisition strategy which in turn resulted in fielding a limited interim correlation capability one year ahead of the original schedule.

F. (U) PROGRAM DOCUMENTATION: Operational Requirement, May 83; Navy Decision Coordinating Paper, Sep 85; TEMP, Oct 85; Navy Training Plan, Feb 87.

G. (U) RELATED ACTIVITIES: PE 0604231N, Tactical Command Systems; PE 0205670N, NIPS; PE 0604321A Joint Tactical Fusion Program.

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

APPN/P-1 OPN/#93	FY-88 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
	Procurement justification material does not provide this level of detail.				Cont.	Cont.

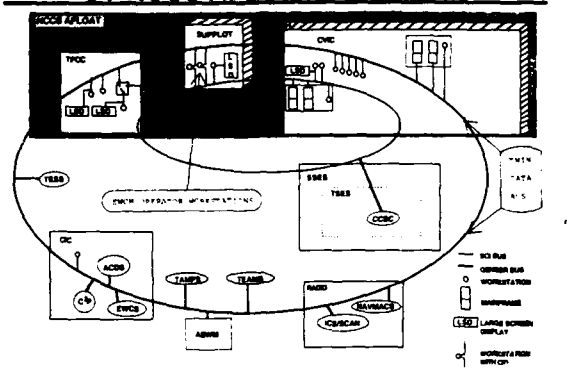
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System (WSS)
Project Number: X1979 Project Title: EW Coordination Module (EWCM)

CV NCCS AFLOAT NETWORK



POPULAR NAME: Electronic Warfare Coordination Module (EWCM)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones			Data Bus MS II	Data Bus MS III	*Cont.
Engineering Milestones	Data Bus CDR			Comp Data Bus	*Cont.
T&E Milestones			DT I Data Bus	DT/OT II Data Bus	*Cont.
Contract Milestones	CDR			AFP	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	204	960	1,822	732	Cont.
Support Contract	40	400	122	107	Cont.
In-House Support	53	2,263	767	117	Cont.
GFE/ Other	0	570	205	0	Cont.
Total	297	4,193	2,916	956	Cont.

* Continue development, DT/OT and deployment of evolutionary EW/C3CM support software for implementation on hardware compatable with TFCC/FDDS

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System (WSS)
Project Number: X1979 Project Title: EW Coordination Module (EWCM)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(U) This project develops software to provide planning, decision aids and automated data processing support to the Composite Warfare Commander/Officer in Tactical Command (CWC/OTC) and his Electronic Warfare Coordinator (EWC) for the purpose of tactical planning, direction and redirection of EW and Command, Control and Communications Countermeasures (C^3CM) assets for staff coordination of counter-threat EW/C^3CM operations. Also included in this effort is the design and development of a prototype Twin Data Bus (TDB) which will support a controlled local area network connectivity between SCI and GENSER systems. EWCM design maximizes the capture of existing software for reuse to reduce developmental cost/risk and is designed for use on fleet operational Non-Developmental Item (NDI) equipment. EWCM will be developed under Evolutionary Acquisition and coordinated with the Afloat Correlation System (ACS), TFCC/FDDS and Naval Intelligence Processing System (NIPS) programs. The Core portion of this program will field the TDB. Phase I will develop EW/C^3CM software and Phase II will incorporate state-of-the-art technical advances and will conclude the planned program.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Defined content and implementation schedule for each evolutionary phase of software development.
b. (U) Established hardware requirements and schedules for EWCM support of TFCC/FDDS.
c. (U) Established acquisition milestone and schedules.
d. (U) Conducted Critical Design Review and initiated prototype Twin Data Bus development model.

2. (U) FY 1989 Program:

a. (U) Begin EW/C^3CM software prototyping.
b. (U) Complete prototype SAFENET Twin Data Bus development for integration with hardware/software compatible with TFCC/FDDS.
c. (U) Plan and initiate development support for the EWCM portion of the NCCS Afloat land-based test site (LBTS).

3. (U) FY 1990 Plans:

a. (U) Continue EW/C3CM software development.
b. (U) Integrate Twin Data Bus development into UNIX/C/ADA environment and hardware/software compatible with TFCC/FDDS.
c. (U) Continue planning and initiate development support of the EWCM portion of the NCCS Afloat LBTS.
d. (U) Conduct DT I in preparation for TDB MS II decision.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System (WSS)
Project Number: X1979 Project Title: EW Coordination Module (EWCM)

4. (U) FY 1991 Plans:

a. (U) Continue EW/C3CM software development.
b. (U) Complete development, test and evaluation of Twin Data Bus.
c. (U) Conduct DT/OT II for TDB MS III.

5. (U) Program to Completion:

a. (U) Continue development, DT/OT and deployment of evolutionary EW/C3CM support software for implementation on hardware compatible with TFCC/FDDS.
b. (U) Continue development of evolutionary EW/C3CM software.
c. (U) Incorporate state-of-the-art technological advances supporting wide-area-networking, multi-level security interests and computer assisted, knowledge based decision aids.
d. (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: UNISYS Corp, Reston, VA; UNISYS Corp, St Paul, MN.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	Restructure	-2,138

NARRATIVE DESCRIPTION OF CHANGES

Impact of Changes:

1. (U) TECHNOLOGY: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The $2,138M reduction resulted in restructure of the program to allow for Evolutionary Acquisition.

F. (U) PROGRAM DOCUMENTATION: Operational Requirement March 85; TEMP Nov 86; NDCP Dec 86; NTP Dec 86.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604230N Budget Activity: 5
Program Element Title: Warfare Support System (WSS)
Project Number: X1979 Project Title: EW Coordination Module (EWCM)

G. (U) RELATED ACTIVITIES: PE 0604231N, Tactical Command Systems contains the TFCC program. PE 0205670N contains the NIPS program. PE 0604270N, Consolidated EW Program.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
APPN/P-1 OPN/#93	Procurement justification material does not contain this level of detail.				Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N BUDGET ACTIVITY: 5
Title: Tactical Command Systems (TCS)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0486	ASW Operations Center Upgrade	13,358	9,621	21,983	19,697	Cont.	Cont.
X0709	TFCC	3,099	2,254	2,476	999	0	89,848
X1144	SOCC/SACC	784	1,744	3,694	2,204	Cont.	Cont.
X2009	OSIS OBU (ISG)	9,904	12,254	14,342	10,329	Cont.	Cont.
X2010	TCS WSA&E	47	0	0	0	0	47
X2041	Operations Supp. System (OSS)	0	0	4,980	8,962	Cont.	Cont.
	Total	27,192	25,873	47,475	42,191	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) Tactical Command Systems is composed of the ashore portion of Navy Command and Control System (NCCS) and the afloat Tactical Flag Command Center (TFCC) program to provide tactical information processing, display and decision aids to theater commanders. It supports embarked commanders, the commanders of naval fleets, and subordinate commanders ashore. As a repository of tactical data, the TCS accomplishes a vital role in providing the decision maker with critical information. It doesn't generate data or information other than plans and decisions, but is a user of tactical information provided by other systems, such as the weapons systems, organic and non-organic sensors and WWMCCS Support System (WSS). TCS includes total system definition of each of the major command centers (afloat and ashore) and 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 1990/1991 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) C^3 Upgrade

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ASWOC C^3 Upgrade	13,358	9,621	21,983	19,697	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(U) 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 C^3 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 NATO/Allied Naval Operating Forces, and support new aircraft capabilities.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Awarded fixed priced incentive, firm target (FPIF) contract for FSED of the ASWOC C^3 Upgrade.
   b. (U) Conducted System Requirements Review (SRR) and System Design Review (SDR).
   c. (U) Completed program plans for C^3 Upgrade FSED reliability, maintainability, safety, human engineering, ADP security engineering, configuration management, and quality assurance, and hardware development.
   d. (U) Developed and Coordinated an ASWOC Computer Security Accreditation Plan.
   e. (U) Acquired one suite of equipment for development.
   f. (U) Continued independent validation and verification for C^3 Upgrade software.
   g. (U) Sustained interoperability with Aircraft Weapons Systems capabilities in the currently fielded system.

2. (U) FY 1989 Program:
   a. (U) Continue development of the C^3 Upgrade system and conduct the Preliminary Design Review (PDR).
   b. (U) Prepare Navy Test Plan and begin training course planning.
   c. (U) Continue independent verification and validation for C^3 Upgrade software.
   d. (U) Complete ASWOC C^3 Upgrade Critical Design Review (CDR) for C^3 Upgrade (Basic Capability).

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Budget Activity: 5
Program Element Title: Tactical Command Systems (TCS)
Project Number: X0486 Project Title: AntiSubmarine Warfare Operations Center (ASWOC) C^3 Upgrade

3. (U) FY 1990 Plans:
   a. (U) Begin training course materials development.
   b. (U) Develop Navy Test Specifications.
   c. (U) Complete a Sponsors Program Review (SPR).
   d. (U) Continue efforts to sustain interoperability with new Aircraft Weapons Capabilities in the currently fielded system.

4. (U) FY 1991 Plans:
   a. (U) Install C^3 Upgrade (Basic Capability) software at the Engineering Support Facility, Operational Test System (OTS) #1.
   b. (U) Conduct Systems Performance Testing (SPT).
   c. (U) Conduct communications and ADP security certification tests.
   d. (U) Develop initial training for personnel involved in DT-II and OT-II.
   e. (U) Initiate development of C^3 Upgrade (Full Capability).
   f. (U) Continue efforts to sustain interoperability with Aircraft Weapons Systems capabilities in the currently fielded system.

5. (U) Program To Completion:
   a. (U) Install C^3 Upgrade (Basic Capability) software at ASWOC Brunswick Operational Test System (OTS) II.
   b. (U) Conduct DT-II and OT-II to support Milestone III approval.
   c. (U) Continue development of C^3 Upgrade (Full Capability).
   d. (U) Renew efforts for the design and development of software changes to sustain Baseline Systems Interoperability with the Aircraft Weapon Systems capabilities in the currently fielded systems.
   e. (U) FOC for ASWOC C^3 Upgrade is FY-1996.

D. (U) WORK PERFORMED BY: In House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD.; Naval Ocean Systems Center, San Diego, CA. Contractor: TRW Federal Systems Group, Fairfax, VA; Potomac Systems Engineering, Inc., Annandale, VA.

E. (U) COMPARISON WITH AMENDED FY 1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	Increased to Support P-3C Update	Advance IOC	8,634

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The FY-90 Navy adjustment of +$8,634K will allow for a revised ASWOC C^3 Upgrade IOC of 3rd QTR FY93 and will enable ASWOC Baseline System support for the IOC and OPEVAL of the P-3C Update IV aircraft in FY-91.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Budget Activity: 5
Program Element Title: Tactical Command Systems (TCS)
Project Number: X0486 Project Title: AntiSubmarine Warfare Operations Center (ASWOC) C^3 Upgrade

F. (U) PROGRAM DOCUMENTATION:

Operational Requirement #117-094-86	August 1986
Acquisition Plan #84-22 (C^3 Upgrade)	May 1986
ASWOC Upgrade TEMP 911-2	August 1987
ASW Master Plan	March 1987
Computer Resource Life Cycle Management Plan	May 1986

G. (U) RELATED ACTIVITIES:
PE 0603708N, ASW Signal Processor; PE 0603228N, Aircraft Carrier ASW Module; PE 0604203N, Standard Avionics Development; PE 0604217N, S-3 Weapon System Improvement; PE 0604219N, Airborne ASW Developments; PE 0604221N, P-3 Modernization; PE 0604230N Warfare Support System; OSIS Baseline Upgrade (OBU), PE 0602431N.

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						
NCCS Ashore #118/T4380	0	0	5,929	6,237	Cont.	Cont.
Nodes #118/4381	0	0	0	1,301	Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

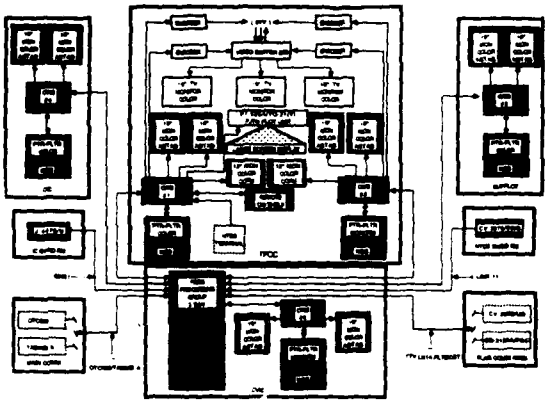
J. (U) MILESTONE SCHEDULE:

Preliminary Design Review	Oct 1988
Sponsor Program Review	Mar 1990
Critical Design Review	Mar 1989
Systems Performance Testing (EDM)	Sep 1991
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	3Q/FY93
Initial Operational Capability	3Q/FY93

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

FY 1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Budget Activity: 5
Program Element Title: Tactical Command Systems (TCS)
Project Number: X0709 Project Title: Tactical Flag Command Center (TFCC)



POPULAR NAME: TACTICAL FLAG COMMAND CENTER

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	MS IIIC Incr. II				FOC 1992
Engineering Milestones	PDR 8/88 SDR 9/88	System Delivery 6/89			
T&E Milestones		FOT&E FY-89 Sftw. Rel.	INC II "PLUS" 1Q90	FOT&E FY-91 Sftw. Rel.	
Contract Milestones		Continue Incr. Cont.	Continue Incr. Cont.	Continue Incr. Cont.	

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total / To Complete
Major Contract	2,810	1,337	1,950	999	59,000 / 0
Support Contract	0	0	0	0	3,000 / 0
In-House Support	289	917	526	0	6,000 / 0
GFE/ Other	0	0	0	0	21,848 / 0
Total	3,099	2,254	2,476	999	89,848 / 0

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Budget Activity: 5
Program Element Title: Tactical Command Systems (TCS)
Project Number: X0709 Project Title: Tactical Flag Command Center (TFCC)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) The Tactical Flag Command Center (TFCC) is the Battle Station/Command Center for the Officer in Tactical Command (OTC) on designated Flagships. The Flag Data Display System (FDDS) is a computer and display system capable of storing, retrieving, manipulating and displaying (geographically and alphanumerically) sensor information. The information is used by the embarked commander for planning, resource allocation and battle management during the warfare planning and execution phases. This command and control information management system requires an architecture which will facilitate the use of advanced developments and improvements in related functional areas such as intelligence, electronic warfare (EW), and C^3 counter-measures. Ongoing efforts provide evolutionary software enhancements and minor hardware modifications to 28 operational systems (CV/CVNs, LHDs, LCCs and shore sites) with full operational capability (FOC) scheduled for FY 1992. The functions provided by TFCC/FDDS are consistent with the Navy's Over-the-Horizon Detection, Classification and Targeting Architecture.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Revised Test and Evaluation Master Plan (TEMP) to incorporate hardware modifications and software enhancements testing.

b. (U) Obtained MS-IIIB decision for Approval for Full Production (AFP).

c. (U) Continued incremental development of software enhancements and interfaces.

d. (U) Initiated development of government specifications for Color Large Screen Display for TFCC/FDDS.

e. (U) Initiated development of government specification for FY 1992 and FY 1994 FDDS software release.

f. (U) Commenced development of embedded JINTACCS message handling capability.

g. (U) Continued Prototype Ocean Surveillance Terminal (POST) ELINT processing development (POST Release 6.0)

2. (U) FY 1989 Program:

a. (U) Complete testing FY 1989 enhanced software release to to include workstation/processor decision aids partitioning, interactive Automated Status Boards (ASTABS) and Battle Group/Force planning aids.

b. (U) Initiate operational deployment for FY-89 enhanced software release.

c. (U) Continue incremental development of software enhancements.

d. (U) Complete development of government specification for Color Large Screen Display for TFCC/FDDS.

e. (U) Continue development of government specifications for FY 1992 and FY 1994 FDDS software releases.

f. (U) Initiate integration and operational testing of the following: TFCC Information Management System (TIMS), Dynamic Data Display (D^3), Joint Operational Tactical System (JOTS), Prototype Ocean Surveillance Terminal (POST) and other applicable DTC based C^2 systems.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Budget Activity: 5
Program Element Title: Tactical Command Systems (TCS)
Project Number: X0709 Project Title: Tactical Flag Command Center (TFCC)

g. (U) Develop dynamic interface of FDDS to Naval Intelligence Processing System (NIPS) including full implementation of Naval Warfare Tactical Data Base (NWTDB).

3. (U) FY 1990 Plans:

a. (U) Complete operational deployment of FY-89 enhanced software release.

b. (U) Commence operational deployment of FY-90 enhanced software release.

c. (U) Complete design definition for FY-92 and FY-94 software enhancements for Afloat Correlation System (ACS) and Electronic Warfare Coordination Module (EWCM) functionality. Incorporate SAFENET Twin Data Bus (TDB) integration with Advanced Combat Direction System (ACDS Block I) and the Command and Control Processor (C^2P).

d. (U) Continue integration, testing and operational deployment of Tactical Information Management Subsystem (TIMS), Dynamic Data Display (D^3) subsystem, Joint Operational Tactical System (JOTS), and Prototype Ocean Surveillance Terminal (POST) capabilities and/or functionalities.

e. (U) Complete integration, testing and operational deployment of the following new interfaces: Tactical Environment Support System (TESS) and Advanced Combat Direction System (ACDS) Block Zero.

f. (U) Commence initial planning for Increment III Development.

4. (U) FY 1991 Plans:

a. (U) Complete operational deployment of FY-90 enhanced software release.

b. (U) Continue integration, testing and operational deployment of Tactical Information Management Subsystem (TIMS), Dynamic Data Display (D^3) subsystem, Joint Operational Tactical System (JOTS), and Prototype Ocean Surveillance Terminal (POST) capabilities and/or functionalities.

c. (U) Continue planning for Increment III.

5. (U) Program to Completion: TFCC/FDDS Increment II program completes in FY-91.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVOCEANSYSCEN, San Diego, CA; NAVELEXACTDET, Philadelphia, PA. CONTRACTOR: UNISYS, Reston, VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989/ DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	ELINT Correlation/Tracking and Dynamic Display	None	None
COST	None	None	None

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Budget Activity: 5
Program Element Title: Tactical Command Systems (TCS)
Project Number: X0709 Project Title: Tactical Flag Command Center (TFCC)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None

2. (U) SCHEDULE CHANGES: The ELINT Correlation/Tracking update for the Flag Data Display System (FDDS) within the Tactical Flag Command Center (TFCC) will be initially deployed with a reduced track-to-track correlation capability (POST 4.2). This capability was planned for deployment in conjunction with the FY-89 Software Release and is now planned for release 900701 using (POST 6.0). The Dynamic Displays currently in TFCC/FDDS do not provide representative graphics and symbology; planned upgrade to be fielded in FY91.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

Navy Development Coordinating Paper	Mar 1980
TEMP (240-2)	Dec 1987
MS-IIIC (AFP)	Dec 1987
TOR Increment III	Jan 1988

G. (U) RELATED ACTIVITIES: The functions being designed and developed into the Afloat Correlation System (X1847, P.E. 0604230N Warfare Support System) and Electronic Warfare Coordination Module (EWCM) (X1979, P.E. 0604230N Warfare Support System) are essential in the ability of TFCC to provide the embarked commander with the organic and non-organic sensor information. The information is used by the embarked commander for planning resource allocation and battle management during the warfare planning and execution phases. Additionally, the Navy Intelligence Processing System (NIPS) (X0521, P.E. 0205670N Tactical Intelligence Processing Support) and ultimately NWTDB, will provide an afloat data base for TFCC/FDDS.

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 #93	Procurement Justification Material does not contain this level of detail.				Cont.	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604231N Title: Tactical Command Systems

Budget Activity: 5 Intelligence and Communications

PROJECT NUMBER: X1144 PROJECT TITLE: Submarine Operations Command Center/ Shore ASW Command Center (SOCC/SACC)

C. (U) PROJECT DESCRIPTION: The Submarine Operations Command Center/Shore ASW Command Center (SOCC/SACC) project will modernize SOCCs, SACCs, and NCCS Ashore intersite communications systems. SOCCs support squadron commanders/Submarine Operating Authorities (SUBOPAUTHs) in directing TOMAHAWK capable submarines and providing ocean surveillance data correlation, fusion, and dissemination. SACCs support ASW Commanders in executing maritime patrol and reconnaissance responsibilities. Current SOCC/SACC project efforts include development of the Navy Command and Control System (NCCS) Front End Processor (NFEP) to interface with the Defense Data Network (DDN), for the incremental upgrade to the SOCC Shore Targeting Terminal (STT), and improvements to the SACC Force High Level Terminal (FHLT).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Updated NFEP documents (e.g., "A" Specification) and defined NFEP User Requirements Data Base and data/traffic flow requirements.

b. (U) Initiated the SOCC Shore Targeting Terminal Improvement program (communications, performance, reliability, and man-machine interface improvements.)

2. (U) FY 1989 Program:

a. (U) Achieve Milestone II decision and commence Full Scale Engineering Development for NFEP.

b. (U) Continue SOCC STT Improvement program. Conduct STT(I) CDR.

3. (U) FY 1990 Plans:

a. (U) Complete NFEP system design and begin system development, coding, and systems integration.

b. (U) Continue SOCC STT Improvement program.

c. (U) Initiate SACC FHLT incremental improvement program.

4. (U) FY 1991 Plans:

a. (U) Complete NFEP System Development, test and deliver system.

b. (U) Continue SOCC STT Improvement program.

c. (U) Continue SACC FHLT Improvement program.

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

E. (U) WORK PERFORMED BY:

(U) In House: Navy Ocean Systems Center, San Diego, CA.

(U) Major Contractor: Booz, Allen and Hamilton Inc., Bethesda, MD; Advance Technology Inc., Reston, VA; Perdie Associates Inc., Vienna VA; Planning Research Corporation, McLean, VA.

F. (U) RELATED ACTIVITIES: PE 0303151N, WWMCCS Automated Data Processing; PE 030315N, WWMCCS Modernization; PE 0603763N, NCCS Systems Engineering and Integration (SE&I); PE 0604779N, Joint Interoperability of Tactical Command and Control System (JINTACCS).

G. (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 #118 T4010	571	442	2,302	2,564	Cont.	Cont.

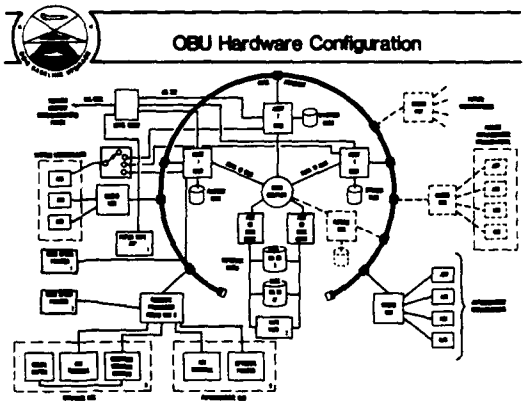
H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 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 Upgrade



POPULAR NAME: OSIS BASELINE UPGRADE (OBU)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones	RTF	MS IIIA Phase I IOC RIM IOC	MS IIIB Phase II IOC NIAS MS II		NIAS IOC
Engineering Milestones	Phase II SRR and SDR	Phase II PDR and CDR	OPEVAL NIAS SRR	NIAS SDR PDR CDR	
T&E Milestones	DT-IIA	OT-IIA	DT-IIB OT-IIB	DT-III OT-III	NIAS DT/OT
Contract Milestones			NIAS Award		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	2,866	8,809	7,851	7,300	Cont.
Support Contract	3,469	1,974	4,694	1,757	Cont.
In-House Support	3,364	1,416	1,797	1,272	Cont.
GFE/ Other	205	55	0	0	Cont.
Total	9,904	12,254	14,342	10,329	Cont.

FY 1990/1991 BIENNIAL 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 Upgrade

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(U) The Ocean Surveillance Information System (OSIS) is a subsystem of the Navy Command and Control System (NCCS) and provides for the analysis of intelligence information from multiple sources covering a number of different events to produce a comprehensive report of activity that assesses its significance. 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. System functions encompass establishing and maintaining technical characteristics and performance data on hostile weapons platforms systems, collection of non-organic data from ashore and afloat sensors, developing an all-source tactical picture, and intelligence analysis. 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. The OSIS Baseline Upgrade (OBU) project improves correlation, throughput, and security processing within the OSIS shore nodes to support growth to accommodate future sensors and additional hardware and software as may be required. This will be accomplished through planned, evolutionary development. OBU consists of the Intelligence Support Group (ISG) for FOSICs and FOSIFs and its enhancements, a Relocatable Over-the-Horizon Radar (ROTHR) Interface Module (RIM) to support operational testing of ROTHR, and an interface to special intelligence processors. Completion of the OBU project will provide tactical commanders, ashore and afloat, the support required to make better informed tactical and weapons targeting decisions.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Began definition of ISG improvements.
   b. (U) Installed Prototype ROTHR Interface Module (RIM) at FOSIC Det CINCLANTFLT.
   c. (U) Continued code and unit test of OBU Phase II.
   d. (U) Started system performance test OBU Phase II.

2. (U) FY 1989 Program:
   a. (U) Begin development of special intelligence processors interface.
   b. (U) Begin development of ISG improvements.
   c. (U) Complete contractor system performance tests for Phase II.
   d. (U) Commenced Phase II Acceptance and Development Testing.
   e. (U) Conduct Phase I Operational Test (OT-IIA).
   f. (U) Achieve OBU Phase I milestone III and IOC.
   g. (U) Continue Prototype RIM installations.

FY 1990/1991 BIENNIAL 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 Upgrade

3. (U) FY 1990 Plans:
   a. (U) Complete Phase II Acceptance and Development Testing.
   b. (U) Conduct Phase II Operational Test (OT-IIB) OPEVAL.
   c. (U) Achieve ISG Phase II IOC and Milestone IIIB Release to Fleet.
   d. (U) Achieve Milestone II decision for Naval Intelligence Analysis System.
   e. (U) Award NIAS development contract.
   f. (U) Conduct NIAS Increment I Systems Design Review (SDR).
   g. (U) Conduct NIAS Increment I Preliminary Design Review (PDR).
   h. (U) Complete RIM deployment to PACOM.
   i. (U) Support Navy/DARPA expert systems development at CINCPACFLT Testbed.

4. (U) FY 1991 Plans:
   a. (U) Complete OPEVAL deficiencies correction/testing.
   b. (U) Conduct NIAS Increment I Critical Design Review (CDR).
   c. (U) Commence NIAS Increment I integration and testing.
   d. (U) Complete RIM site deployments.

5. (U) Program to Completion:

   a. (U) Conduct NIAS Increment I Acceptance Testing (AT), Developmental Testing (DT) and Operational Testing (OT).
   b. (U) Conduct NIAS Increment I Milestone III Release to Fleet decision.
   c. (U) Conduct NIAS Increment II Milestone II.
   d. (U) Conduct NIAS Increment II SDR, PDR and CDR.
   e. (U) Commence NIAS Increment II software coding and unit testing.

D. (U) WORK PERFORMED BY:
In House: NOSC, San Diego, CA; NAVELEXSYSENGACT, St. Inigoes, MD.
Contractor: TRW, Inc., Merrifield VA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	None	-$8,518

FY 1990/1991 BIENNIAL 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 Upgrade

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The Navy adjustment of -$8,518K has no impact on the current OBU development. This effort is now budgeted in the Operations Support System (OSS), P.E. 0604231N Project X2041.

F. (U) PROGRAM DOCUMENTATION:

Program Approval (OP-094)	Oct 81
ROTHR NDCP (OSIS interface)	Dec 84
OBU NDCP	May 87
OBU TEMP	Sep 87
Acquisition Plan	May 88

G. (U) RELATED ACTIVITIES: P.E. 0604230N Project X1779, Relocatable Over-The-Horizon-Radar (ROTHR); P.E. 0604321A and P.E. 0604321F, All-Source Analysis System/Enemy Situation Correlation Element (ASAS/ENSCE); P.E. 0604231N Project X0486, ASW Operations Center Upgrade; P.E. 0604231N Project X2041, Operations Support System; P.E. 0604707N Project X0798 Over-the Horizon Targeting (OTH-T).

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 BA2 #118 Correlation Upgrade		Procurement justification material does not contain this level of detail.			Cont.	Cont

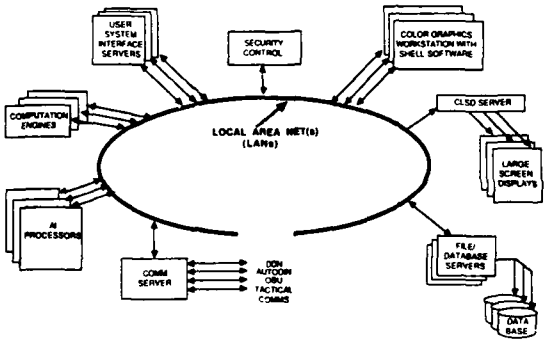
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: U.S. Navy has entered into agreements with the Royal and Royal Australian Navies for delivery of OBU under Foreign Military Sales (FMS) provisions.

J. (U) TEST AND EVALUATION DATA: NIC/DIA Security Accreditation complete. OBU Phase I Developmental Testing (DT-IIA) completed September 88. OBU Phase I System Performance Testing (SPF) complete. OBU Phase I Operational Testing (OT-IIA) will commence February 89.

FY 1990/1991 BIENNIAL 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 INCREMENT II ARCHITECTURE



POPULAR NAME: Operations Support System (OSS)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		NPDM Jul 89	NPDM Aug 90	NPDM Aug 91	Annual Prgm Reviews
Engineering Milestones			OSS INCR.I PDR, CDR		OSS INCR. II PDR, CDR
T&E Milestones			DT/OT	DT/OT	PHASE II DT/OT
Contract Milestones			INCR.I CONT. AWARD		INCR.II CONT. AWARD

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	0	0	0	0	Cont.
Support Contract	0	0	880	1,362	Cont.
In-House Support	0	0	4,100	7,600	Cont.
GFE/ Other	0	0	0	0	Cont.
Total	0	0	4,980	8,962	Cont.

FY 1990/1991 BIENNIAL 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

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) The CNO and Fleet Commander in Chiefs (CINCs) 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 red, white and blue forces. The Operations Support System (OSS) will upgrade the Fleet Command Center information management system's which provides modernized access to WWMCCS and improved integrated command decision aids and displays.

(U) The OSS development will use the Joint Logistics Commanders Guidance (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. The Increment I effort will provide an initial common FCC/NCC baseline system by interfacing existing prototype systems such as the Joint Operational Tactical System (JOTS), Fleet Command Center Battle Management Program (FCCBMP) and Operation Support Group Prototype (OSGP). The Increment II effort will incorporate capabilities identified at all sites to develop an integrated, logistically supportable, and cost effective single FCC/NCC system, to include OSIS Baseline Upgrade (OBU) interface, Navy WWMCCS Software Standardization (NWSS) modular replacement, current system functionality improvement, and multi-level security.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable.
2. (U) FY 1989 Program: Not Applicable.
3. (U) FY 1990 Plans:
   a. (U) Plan the OSS evolutionary approach.
   b. (U) Begin establishing NOSC OSS test bed.
   c. (U) Commence OSGP+ software development.
   d. (U) Commence OSS Increment I development/integration.
   e. (U) Conduct NWSS replacement studies/initiate development.
4. (U) FY 1991 Plans:
   a. (U) Complete establishment of NOSC OSS test bed.
   b. (U) Continue OSGP+ software development.
   c. (U) Continue OSS baseline development/integration.
   d. (U) Initiate OSS Increment II development.
   d. (U) Continue modular NWSS replacement development.
   e. (U) Evaluate/support FCCBMP Test Bed products for transition to OSS.
5. (U) Program to Completion:
   a. (U) Continue/Complete development of OSS baseline system.
   b. (U) Continue development of NWSS modular replacement.
   c. (U) Evaluate/support FCCBMP Test Bed products for transition to OSS.

FY 1990/1991 BIENNIAL 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

d. (U) Continue Increment II and multi-level security
e. (U) This is a continuing program.

D. (U) WORK PERFORMED BY:
In House: Naval Ocean Systems Center (NOSC), San Diego, CA; for FCCBMP, the Defense Advanced Research Projects Agency (DARPA), Arlington, VA;
Contractor: To be determined.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY: This is a FY-90 new start.

F. (U) PROGRAM DOCUMENTATION:
Operational Requirement Dec 87

G. (U) RELATED ACTIVITIES:
PE 0604231N: Tactical Command Systems (TCS); included are ASWOC Baseline Upgrade, Submarine Operations Command Center/Shore ASW Command Center (SOCC/SACC), Ocean Surveillance Information System (OSIS) Baseline Upgrade (OBU); PE 0604232N: Transfer Support System; Joint Interoperable Tactical Communications System (JINTACCS); PE 03038210N: WWMCCS Automated Data Processing; Other efforts include Fleet Command Center Battle Management Program (CINCPACFLT), Joint Operational Tactical System (JOTS), Operations Support Group Prototype (OSGP)(CINCPACFLT).

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
(U) PROCUREMENT					
OPN #118 T4031	0	0	2,050	3,490	Cont.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604514N Budget Activity: 5

Program Element Title: Navigation Systems

Project Number: S0253 Project Title: Navigation Systems

RESOURCES: (Dollars in Thousands)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0253	Navigation Systems	0	0	5,700	5,216	Continue	Continue

B.(U) BRIEF DESCRIPTION OF MISSION REQUIRED AND SYSTEM CAPABILITIES: 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 conventional optics, various electromagnetic spectra, and others, and process that information to be passed through the hull using simple electrical connections. Major subsystems will include: Enhanced Optics package;Video Display Console; Non-hull penetrating mast;mast controls. 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 speed to minimize speed errors being introduced into the fire control solution, and will develop significant improvements in system reliability.

C.(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Not applicable
2. (U) FY 1989 Program: Not applicable.
3. (U) FY 1990 Plans:
   - a.(U) Complete threat assessment and requirement analysis for Photonics Mast
   - b.(U) Develop detailed technical specification
   - c.(U) Prepare FSED RFP
   - d.(U) Re-initiate DSVL Program
   - e.(U) Complete installation and grooming of DSVL aboard SSN 707
   - f.(U) Initiate DSVL Technical Evaluation
4. (U) FY 1991 Plans:
   - a.(U) Conduct Photonics Mast Milestone I (ARB/NPDM)
   - b.(U) Award FSED contract
   - c.(U) Complete Technical Evaluation of DSVL
   - d.(U) Conduct DSVL Operational Evaluation
5. Program to Completion: This is a continuing Program

D. (U) Work Performed By: Contractors: Hughes, Los Angeles, CA; Sperry Marine Systems, Charlottesville, VA; Kollmorgen Corp.,Northampton, MA; Honeywell, Minneapolis, MN; Northrop - Anaheim, CA. In-House: Naval Underwater Systems Center/New London Lab, New London, CT; Naval Ocean Systems Center, San Diego, CA; Naval Ship Systems Enginerring Station, Philadelphia, PA; David Taylor Naval Research and Development Center, Norfolk Naval Shipyard, Portsmouth, VA; Naval Air Development Center, Warminster, PA.

E. (U) Related Activities: None

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) PROCUREMENT						
SCN/BLT #12	0	0	0	2,405	Continue	Continue

P-1 ESGN(Electrically Suspended Gyro Navigation).

G.(U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604577N Budget Activity: 5
Program Element Title: Extremely High Frequency Satellite

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0728	Extremely High Frequency Satellite Communications Terminals	41,352*	27,394	20,269	17,891	60,719	297,962
X1660	Navy Fleet Satellite Communications Extremely High Frequency Package	1,412*	1,311	1,999	0	0	168,181
	Total	42,764*	28,705	22,268	17,891	60,719	466,143

* Funded under PE 0604232N in FY 1988

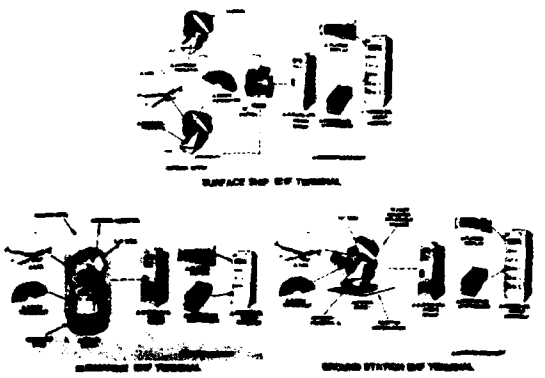
B. (U) BRIEF DESCRIPTION OF ELEMENT:
(U) This program develops Navy Extremely High Frequency Satellite Communications terminals and two Navy satellite communication packages. The terminals will be compatible with the joint service Milstar System. The terminals and satellite system meet a fleet requirement for survivable, reliable, wartime, low probability of intercept, anti-jam communications under projected threat environments. The Fleet Satellite Communications Extremely High Frequency Package (FEP) provides an orbital test and evaluation capability to support Army, Navy and Air Force terminal production decisions prior to Milstar deployment, and provides an early, limited operational capability.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604577N Budget Activity: 5

Program Element Title: Extremely High Frequency Satellite Communications

Project Number: X0728 Project Title: Navy EHF Satellite Comms Program



POPULAR NAME: NESP

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS IIIA 12/88		MS IIIB 12/90	
Engineering Milestones				Complete 1st Article Test	
T&E Milestones	OT-IIA 5/88 DT-IID/E/F	DT-IIG 7/89	TECHEVAL 2/90 OPEVAL 6/90		
Contract Milestones	Network Contract Award 8/88		Limited Prod. Award 10/89		Full Prod. Award 10/91

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Completion
Major Contract	*(32,927)	19,363	13,751	13,230	33,530
Support Contract	*(2,760)	2,536	1,952	1,459	7,150
In-House Support	*(5,665)	5,495	4,566	3,202	20,039
GFE/ Other	*(0)	0	0	0	0
Total	*(41,352)	27,394	20,269	17,891	297,962 60,719

* Funded under PE 0604232N in FY 1988

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604577N Budget Activity: 5
Program Element Title: Extremely High Frequency Satellite Communications
Project Number: X0728 Project Title: Navy EHF Satellite Comms Program

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
(U) Navy Extremely High Frequency Satellite Communications Program provides for the development and production of terminals to provide wartime communications capability for Command and Control of the fleet. The terminals will provide physical and electromagnetically survivable, worldwide anti-jam and low probability of intercept communications in the current and projected electromagnetic and nuclear threat. The increased capability to be provided by Extremely High Frequency 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 1988 Accomplishments: (Funded under 0604232N)
   a. (U) Completed Factory Acceptance Testing - December 1987
   b. (U) Completed System Integration and Performance Testing - (DT-IIB) - October 1987
   c. (U) Completed Technical Performance and Compatability Testing (DT-IIC) - December 1987
   d. (U) Completed Milstar Design Verification Compatability Testing (DT-IID) - April 1988
   e. (U) Completed Interservice Terminal Interoperability Testing (DT-IIE) - July 1988
   f. (U) Completed Operational Assessment (OT-IIA) - May 1988
2. (U) FY 1989 Program:
   a. (U) Commence Information Exchange Systems Interface and Navy Tactical Data System Interface Development - October 1988
   b. (U) Commence Development of Milstar Enhancements -October 1988
   c. (U) Complete Milstar Enchanced Design Verification Model Testing (DT-IIF) - November 1988
   d. (U) Gain approval for limited production - January 1989
   e. (U) Complete Milstar Development Flight Satellite Compatability Testing (DT-IIG) - July 1989
   f. (U) Complete reinstallation of ship terminal on new platform for TECHEVAL/OPEVAL - June 1989.
3. (U) FY 1990 Plans:
   a. (U) Complete TECHEVAL Testing - March 1990.
   b. (U) Complete OPEVAL - July 1990.
   c. (U) Continue development of a Navy Tactical Data System (NTDS) Interface Unit, an Information Exchange Systems Interface Unit and Milstar modifications.
   d. (U) Conduct Milstar joint service testing under Milstar joint test plan guidance.
   e. (U) Begin design of first operator and ship/shore maintenance training system.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604577N Budget Activity: 5
Program Element Title: Extremely High Frequency Satellite Communications
Project Number: X0728 Project Title: Navy EHF Satellite Comms Program

4. (U) FY 1991 Plans:

a. (U) Complete NTDS Interface Unit and Information Exchange Systems Interface Unit development/testing.
b. (U) Continue development of emergent Milstar modifications.
c. (U) Continue follow-on testing with on-orbit EHF package.
d. (U) Study alternative concepts for gyroscope improvements.

5. (U) Program to Completion:

a. (U) Continue Milstar testing.
b. (U) Continue development of emergent Milstar Modifications.
c. (U) Develop and test gyro replacement.
d. (U) Develop and test antenna mounted High Power Amplifier.
e. (U) Complete integration of initial training system.

D. (U) WORK PERFORMED BY: In-House: Lead laboratory is Naval Ocean Systems Center, San Diego, CA, Naval Underwater Systems Center, New London, CT; Naval Electronics Systems Engineering Center, Vallejo, CA; Naval Research Laboratory, Washington, DC; Naval Surface Weapons Center, White Oak, MD; Naval Electronics Systems Engineering Center, Charleston, SC. Contractors: Raytheon, Sudbury, MA; Booz, Allen & Hamilton Inc., Bethesda, MD.

E. (U) COMPARISON WITH AMENDED FY 1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

CHANGE	System Capabilities	Schedule	Budget Year Cost
TECH	NONE	NONE	NONE
SCHED	NONE	NONE	NONE
COST	NONE	NONE	+ 1,860

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: NONE

2. (U) SCHEDULE CHANGES: NONE

3. (U) COST CHANGES: Scope and magnitude of interoperability testing was better defined, resulting in a refinement of cost. Navy and Department adjustments resulted in a $1,860K increase in FY-90.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604577N Budget Activity: 5
Program Element Title: Extremely High Frequency Satellite Communications
Project Number: X0728 Project Title: Navy EHF Satellite Comms Program

F. (U) PROGRAM DOCUMENTATION: Mini-NDCP X0728, 1/82
TEMP Number 784, 3/88
Joint Milstar Communications Control and Operations Concept (JMCCOC) Vol I and II 4/88
Milstar Multi-service TEMP, 2/88

G. (U) RELATED ACTIVITIES:
a. (U) PE 0303601F, Air Force Satellite Communications
b. (U) PE 0303603F, Milstar
c. (U) PE 0303603N, Milstar Joint Terminal Program Office
d. (U) PE 0303142A, Extremely High Frequency Communications Terminal
e. (U) PE 0602721N, Navy Extremely High Frequency Exploratory Development Program

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

	FY 1988 Estimate	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Total Program
(U) PROCUREMENT					
OPN #140 (NN107)	0	0	54,079	51,980	cont
Quantities			12	35	
OPN #141 (NP109)	0	9,124	21,269	5,837	cont
Quantities		2	5	5	

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: Not applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604577N Budget Activity: 5
Program Element Title: Extremely High Frequency Satellite
Project Number: X1660 Project Title: Navy Fleet Satellite Communications Extremely High Frequency Package

C. (U) PROJECT DESCRIPTION: Develop two Fleet Satellite Communications System Extremely High Frequency Packages (FEP) to provide the Army, Navy, and Air Force a space segment to test and evaluate Development Model Terminals prior to awarding terminal production contracts and to provide an early, limited Milstar-like capability for jam-resistant minimum essential communications. The Navy is the Executive Agent for the FEP to be integrated and flown on FLTSAT F-7 and F-8 satellites. The FEPs have been developed by the Massachusetts Institute of Technology Lincoln Laboratory under the management of the Joint Milstar Program Office, with guidance, direction, and funding from the Navy.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: (Funded under 0604232N)
   a. (U) Performed anomaly analysis and simulation on an "as needed" basis on the prototype and test bed at Lincoln Laboratory.
   b. (U) Conducted jammer analysis on the prototype using a jammer simulator.
2. (U) FY 1989 Program:
   a. (U) Launch FLTSAT F-8 satellite with FEP.
   b. (U) Continue anomaly analysis and simulation.
   c. (U) Develop system software enhancements that evolve as a result of the jamming analysis conducted in FY88.
   d. (U) Begin FEP-8 on orbit testing.
3. (U) FY 1990 Plans:
   a. (U) Complete anomaly analysis and simulation.
   b. (U) Complete FEP-8 on orbit testing.
4. (U) FY 1991 Plans:
   a. (U) Program completed in FY1990
5. (U) Program to Completion:
   a. (U) This program completes in FY 1990.

E. (U) WORK PERFORMED BY: Contractors: Lincoln Laboratory, Lexington, MA; TRW Redondo Beach, CA; Raytheon Corp., Marlboro, MA.

F. (U) RELATED ACTIVITIES: PE 0303601F, Air Force Satellite Communications; PE 0303603F, Milstar; PE 0303603N, Milstar Joint Terminal Program Office; PE 0303142A, Extremely High Frequency Communications Terminals; PE 0303109N, Navy Fleet Satellite Communications Program

(U) The Joint Milstar Program Office has overall responsibility for the Department of Defense Milstar Program and manages development of the mission control and satellite segments. The Joint (Milstar) Terminal Program Office has responsibility for joint terminal interoperability.

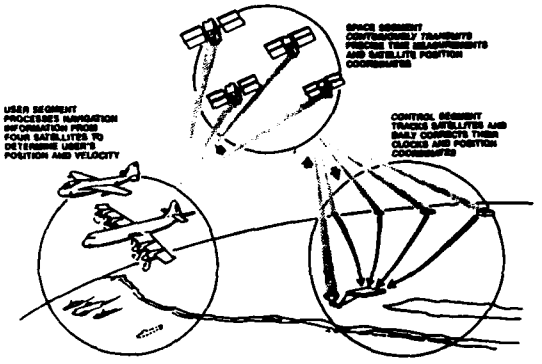
G. (U) OTHER APPROPRIATION FUNDS: This is not an acquisition item.

H. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None

FY 1990/1991 BIENNIAL 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 Global Positioning System (GPS)

A. (U) SCHEDULE/BUDGET INFORMATION:

SCHEDULE	FY 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		IOC Jul 89 M/S IIIB Sep 89			
Engineering Milestones					
T&E Milestones		DT-IIB OT-IIB			OT-III
Contract Milestones					

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	11,819	9,730	28,576	28,329	337,745 117,743
Support Contract	1,292	2,680	2,345	2,110	32,000 14,742
In-House Support	36,396	29,401	12,900	12,308	360,255 56,780
GFE/ Other	0	0	0	0	0 0
Total	49,507	41,811	43,821	42,747	730,000 189,265

FY 1990/1991 BIENNIAL 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) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

(U) The NAVSTAR Global Positioning System (GPS) is a radio positioning and navigation system designed to provide 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. It dramatically improves our strategic target mapping capability, our capability of low level ingress/egress and flexible routing, the probability of target acquisition, and the accuracy of delivered weapons. These features, along with a capability for highly accurate passive operations, enhance the force effectiveness and survivability of many U.S. weapon systems. This program develops user equipment (Navy share) 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Began integration engineering on the ES-3A, VH-60, and VH-3D aircraft.

b. (U) Continued integration engineering on the P-3C Update (UD)III, E-6A, S-3B, SH-60F, SH-60B, HH-65A, HU-25A, EP-3, E-2C aircraft and SSN 637, WMEC 270, T-AGS 38, FFG 7, CV/CVN, LCAC, CG 47, and LST 1179 ships.

c. (U) Completed integration engineering on the T-AGS 29/32/51/52 T-AGOR and MCM ships and A-6F aircraft.

d. (U) Continued systems integration in the AN/WSN-5, Carrier Navigations System (CVNS), Electrostatically Stabilized Gyro Navigation (ESGN), LTN-72, AN/ASN-130/139, Standard Attitude Heading Reference System (SAHRS), Combat Direction System (CDS) and AN/SSN-2.

e. (U) Continued cesium standard development.

f (U) Continued engineering development of ground and flight hydrogen masers.

g. (U) Continued development of the digital to analog converter.

h. (U) Continued efforts in the areas of satellite signal generator systems engineering, integration design support and data reduction, user equipment development/engineering, and platform test support.

2. (U) FY 1989 Program:

a. (U) Begin integration engineering on the MH-53E aircraft.

b. (U) Continue integration engineering on the VH-60, PC-3 UDIII, HU-25A, ES-3A, E-6A, E-2C aircraft and SSN 637, WMEC 270, FFG 7 ships.

c. (U) Complete integration engineering on the HH-65A, EP-3, SH-60B, SH-60F, aircraft and T-AGS 38, CV/CVN, CG 47, LCAC and LST 1179 ships.

d. (U) Continue systems integration in the AN/WSN-5, CVNS, ESGN, AN/ASN 130/139, CDS, and AN/SSN-2.

e. (U) Complete systems integration in the SAHRS.

f. (U) Commence cesium standard tests and deliver qualified units to the Air Force for Block II satellites.

g. (U) Commence government testing of ground masers.

h. (U) Commence and complete TECHEVAL on CG 47, LST 1179, FFG 7, SSN 637 and SWCL ship classes.

i. (U) Complete OPEVAL and achieve Milestone IIIB.

j. (U) Continue development of the digital to analog converter.

k. (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.

3. (U) FY 1990 Plans:

a. (U) Begin integration engineering on the HC-130, OV-10, C-2A, EA-6B and F/A-18 aircraft.

b. (U) Continue integration engineering on the P-3C UDIII, VH-60, VH-3D, MH-53E, E-6A, S-3B, ES-3A aircraft.

c. (U) Complete integration engineering on the E-2C, HU-25 aircraft and SSN 637, FFG 7, ships.

d. (U) Continue systems integration in the CDS, AN/ASN-130/139 and LTN-72.

e. (U) Complete systems integration in the AN/SSN-2, ESGN, CVNS and AN/WSN-5.

f. (U) Continue 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.

h. (U) Begin test and evaluation of NDI mini-receivers.

4. (U) FY 1991 Plans:

a. (U) Begin integration engineering on the P-3A/B aircraft.

b. (U) Continue integration engineering on the VH-3D, HC-130, OV-10, C-2A, EA-6B, E-6A, S-3B, MH-53E and F/A-18 aircraft.

c. (U) Complete integration engineering on the P-3C UDIII, ES-3A and VH-60 aircraft.

d. (U) Continue systems integration in the CDS, AN/ASN-130/139 and LTN-72.

e. (U) Continue clock technology test and analysis.

f. (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.

g. (U) Continue test and evaluation of NDI mini-receiver.

5. (U) Program to Completion:

a. (U) Aircraft integration engineering to be completed FY 92-FY 94: VH-3D, MH-53E, P-3A/B, VP-3, HC-130, OV-10, E-6A, C-2A, EA-6B, S-3B, US-3, F/A-18, C-9B, VC-4, VC-11, C-20, T-34, UC-12, H-57, SH-3H and UH-1N.

b. (U) Aircraft integration engineering to be completed FY 95 and beyond: A-6E, AV-8, F-14D, SH-2F, AH-1J/T/W, SH-2G, RH-53D, CH-53H/D, CH-53E, CH-46, T-44, T-45 and CT-39.

c. (U) Continue clock technology applications to space and control segments.

d. (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.

FY 1990/1991 BIENNIAL 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

e. (U) Complete test and evaluation of the NDI mini and integrated receivers.

f. (U) Continue systems integration in AN/ASN-130/139 and LTN-72.

D. (U) WORK PERFORMED BY:

IN-HOUSE: Air Force Systems Command (Space Division), Joint Program Office, Los Angeles, CA; Naval Air Development Center, Warminster, PA; Naval Electronic Systems Command, San Diego, CA; Naval Air Test Center, Patuxent, MD; Naval Research Laboratory, Washington D.C.

Contractors: Rockwell International (Collins Government Avionics Division), Cedar Rapids, IA; Hughes Aircraft Company, Torrance CA and El Segundo, CA; Kern Company, Danvers, MA: Frequency Electronics, New Hyde Park, NY; Sikorsky Aircraft Corporation, Stratford, CT; Grumman Aerospace Corp., Long Island, NY; The Boeing Company, Seattle, WA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	Delays integration	-35,137

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: None.
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: The FY-90 Department and Navy total adjustment of -$35,137K will result in integration delays on several aircraft.

F. (U) PROGRAM DOCUMENTATION:

° Joint Acquisition Plan	May 1984	° Multi-Service TEMP	Nov 1987
° Joint ILS Plan	May 1984	° DCP #133 (Clock tech.)	Nov 1977
° DCP #133 (user equipment)	May 1986	° Atomic Frequency Std. Development Plan	Oct 1985
° Navy Training Plan	May 1985		

G. (U) RELATED ACTIVITIES:

° Program Element 0903203F (Advanced Avionics for Aircraft)
° Program Element 0603601F (Conventional Weapons Technology)
° Program Element 0305164F (NAVSTAR GPS User Equipment)

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) APPN/BLI						
OPN #99	13,212	12,255	18,117	13,197	45,156	145,759

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605866N Budget Activity: 5
Program Element Title: Navy C^2 Planning Development
Project Number: R0739 Project Title: Navy C^2 Top Level Warfare Requirements

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0739	Navy C^2 Top Level Warfare Requirements	3,630	2,859	3,147	4,339	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element analyzes requirements for and develops plans to implement and operate Navy command and control systems. The program element supports developing and updating the Navy Command and Control Plan and other high level C^2-related planning documents for individual warfare areas. Additionally, it analyzes emerging research and development issues in Navy C^2.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: The program produced several vital policy and program guidance documents to improve the planning for and operations of Navy C^2 systems. This included the Navy C^2 Plan, Navy Communications Mid-Range Plan and studies of several individual systems.
2. (U) FY 1989 Program: The project is continuing development of multi-discipline and individual warfare C^2 plans as well as analysis of the development potential of emerging C^2 technologies.
3. (U) FY 1990 Plans: The project will continue development and production of integrated Navy C^2 plans and will continue to investigate promising C^2 technologies for naval application.
4. (U) FY 1991 Plans: The project will continue to study, assess and refine Navy C^2 planning documents as well as to maintain high-level awareness of new technological potentials.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA and Naval Undersea Systems Center, Newport, RI. Contractors: The Johns Hopkins University Applied Physics Laboratory, Laurel, MD; Booz-Allen, Arlington, VA; MAR, Inc., Arlington, VA; and TRW, McLean, VA.

E. (U) RELATED ACTIVITIES: PE 0603763N, Warfare Systems Architecture and Engineering.

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

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0305111N Budget Activity: 6
Program Element Title: Weather Service

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0523	SATDAT	948	873	1,022	1,060	Cont	Cont

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program supports the establishment of an Integrated Satellite Data Base (ISDB) for operation and research. The software developed by this program enables satellite data to be used by global and regional ocean/atmospheric predictive models.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
(1) (U) FY 1988 Accomplishments:
a. (U) Implemented, tested and evaluated the ISDB
b. (U) Integrated Geophysical/Geodetic Satellite (GEOSAT) derived wind data into Fleet Numerical Oceanography Center (FNOC) products
(2) (U) FY 1989 Program:
a. (U) Meet baseline operational capabilities of ISDB by ingestion of Defense Meteorological Satellite Program (DMSP), Satellite Sounder 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 Oceanography 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
(3) (U) FY 1990 Plans:
a. (U) Link ISDB with AN/SMQ11 Tactical Environmental Support System (TESS(3)).
b. (U) Define ISDB processing requirements for next generation ground satellite processor
(4) (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
(5) (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Environmental Prediction Research Facility, Monterey, CA. CONTRACTOR: NASA (Earth Resources Lab), Bay St. Louis, MS

E. (U) RELATED ACTIVITIES: PE 0305160N, DMSP; PE 0603207N, Air/Ocean Tactical Applications; PE 0603704N, ASW Oceanography.

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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
X0524	DMSP-Navy Support	1,062	1,039	1,223	1,230	Cont.	Cont.
X1452	GEOSAT	2,831	1,079	3,041	3,244	3,456	68,029
	Total	3,893	2,118	4,264	4,474	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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0305160N Budget Activity: 6
Program Element Title: DEFENSE METEOROLOGICAL SATELLITE PROGRAM
Project Number: X0524 Project Title: DMSP; Navy Support

C. (U) PROJECT DESCRIPTION: This project supports DMSP under joint USAF-USN MOA for development/evaluation of Navy unique sensors/algorithms. The Microwave Imager (SSM/I) launched June 1987 and Remote Atmospheric/Ionospheric Detection Sys. (RAIDS) launch due early 1990s will provide measurements of atmospheric, oceanographic, and ionospheric parameters.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. Began development of RAIDS flight qualified sensor.
   b. Continued joint-service SSM/I Calibration and Validation Plan.
   c. Integrated SSM/I algorithms into the Fleet Numerical Oceanography Center (FNOC) Satellite Processing Center.
2. (U) FY 1989 Program:
   a. Complete joint-service SSM/I Calibration and Validation Plan.
   b. Integrate prototype RAIDS onto host satellite.
   c. Install improved SSM/I software at Fleet Numerical Oceanography Center, Monterey, Ca.
3. (U) FY 1990 Plans:
   a. Begin fabrication of a low speed real-time (LSRT) data transmission capability on DMSP spacecraft.
   b. Complete installation of improved SSM/I algorithms at FNOC.
   c. Begin Light Intensification and Ranging (LIDAR) study.
   d. Launch RAIDS and begin data analysis.
4. (U) FY 1991 Plans:
   a. Continue study of LIDAR reception and data processing methods.
5. (U) Program to Completion:
   a. Complete LSRT data transmission capability on DMSP spacecraft.
   b. Continue study of LIDAR reception and data processing methods.
   c. Complete RAIDS data analysis.

E. (U) WORK PERFORMED BY: CONTRACTOR: Hughes Aircraft Corp., El Segundo, Ca.; Harris Corp., Melbourne, FL.; IN-HOUSE: Naval Research Lab, Washington, DC; Navy Space Systems Activity. Los Angeles, CA.

F. (U) RELATED ACTIVITIES: PE 0305160F, Air Force DMSP; PE 0305111N, Weather Service, PE 0603207N, Air-Ocean Tactical Applications; PE 0603704N, ASW Oceanography; PE 0604218N, Air-Ocean Equipment Engineering.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
WPN (302475) #40	19,333	21,575	0	0	0	40,908

H. (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
Project Number: X1452 Project Title: Geodetic/Geophysical Satellite

C. (U) PROJECT DESCRIPTION: This project funds the operation of the Geodetic/ Geophyscial Satellite (GEOSAT), 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. 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-92.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. Continued oceanographic on-orbit operations.
   b. Completed processing of geodetic mission data.
   c. Continued exploitation of oceanographic data.
2. (U) FY 1989 Program:
   a. Continue oceanographic on-orbit operations.
   b. Continue exploitation of oceanographic data.
3. (U) FY 1990 Plans:
   a. Continue oceanographic on-orbit operations.
   b. Continue exploitation of oceanographic data.
4. (U) FY 1991 Plans:
   a. Continue oceanographic on-orbit operations.
   b. Continue exploitation of oceanographic data.
5. (U) Program to Completion:
   a. 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: CONTRACTOR: Applied Physics Laboratory, Johns Hopkins University, Laurel, Md. IN-HOUSE: Naval Astronautics Group, Pt. Mugu, Ca; Naval Research Labortory, Washington, DC; Naval Surface Weapons Center, Dahlgren, VA.

F. (U) RELATED ACTIVITIES: PE 0305160F, Air Force Defense Meteorological Satellite Program; PE 0305111N, Weather Service, PE 0603207N, Air-Ocean Tactical Applications; PE 0603704N, ASW Oceanography; PE 0604218N, Air-Ocean Equipment Engineering.

G. (U) OTHER APPROPRIATION FUNDS: This is not an acquisition program.

H. (U) International Cooperative Agreements: Not Applicable

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0603711N Budget Activity: 6
Program Element Title: Fleet Tactical Development And Evaluation Support

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0138	TAC DEV SPT	4,630	6,027	6,161	6,482	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides funding for the Navy's system for collection, reconstruction, storing and analysis of fleet operational data elements during exercise and real-world operational events; Reproduces and distributes Tactical Decision Aid (TDA) computer software.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Maintained 14 Tactical Information Management Systems (TIMS) for 77 fleet commands for planning, retrieval of lessons learned and data reconstruction and analysis for 219 fleet exercises, operations and projects; maintained 56 data collection systems. Installed/removed 159 data collection systems for 47 exercises.

2. (U) FY 1989 Program: Maintain 14 TIMS and 56 data collection systems in support of 105 fleet commands for analysis of 203 fleet exercises, operations and projects; install/remove 215 data collection systems for 43 exercises.

3. (U) FY 1990 Plans: 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; Upgrade, replace and enhance TIMS hardware and software to improve fleet support.

4. (U) FY 1991 Plans: Same as FY 1990 plans above.

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

D. (U) WORK PERFORMED BY: In-House: Navy Tactical Support Act, Silver Spring, MD. Contractors: United Information Management System, Inc., Silver Spring, MD; Summit Research Corp., Gaitherburg, MD.

E. (U) RELATED ACTIVITIES: Project Element 0605155N, Fleet Tactical Development and Evaluation, funds Technical and Analytic support to develop/revise fleet tactics for use of various weapons systems and force structures. No unnecessary duplication of effort exists.

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: 0603721N Budget Activity: 6
Program Element Title: ENVIRONMENTAL PROTECTION

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0400	Ordnance Reclamation	1,643	325	430	469	Cont.	Cont.
S0401	Shipboard Waste Management	4,273	4,485	8,856	8,890	Cont.	Cont.
T2042	Plastic Substitution	0	0	0	301	Cont.	Cont.
Y0817	Pollution Abatement Shore	2,662	1,355	1,401	1,485	Cont.	Cont.
TOTAL		8,578	6,165	10,687	11,145	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The goal of this program is to develop processes, prototype hardware, systems, and operational procedures that will allow operation 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 polluting 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 military readiness of operational units. Duplication of effort within the Navy or the Department of Defense is avoided through close liaison among the Navy Systems Commands and with the Environmental Protection Agency; Commerce, Transportation, Army, Air Force, 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 a NATO sponsored international symposium.

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:

a. (U) Installed pilot plants for colored smoke and PBX removal.

b. (U) Performed tests on solvolytic breakdown and recovery on TRIDENT propellants, and tests to clear marine life prior to underwater explosion tests.

2. (U) FY 1989 Program:

a. (U) Perform solvolytic breakdown and ingredient recovery on Shrike and Harpoon propellants at the one-pound level.

b. (U) Publish handbook on techniques to clear marine life from explosion test sites and a revised handbook on environmental effects.

3. (U) FY 1990 Plans:

a. (U) Begin fabrication for 20kg pilot plant for PBX solvent extraction.

b. (U) Test solid propellants and new PBX's for sensitivity to water jets.

c. (U) Scale up solvolytic breakdown/extraction of Shrike and Harpoon propellants at 5 lb level.

d. (U) Prepare reconstituted propellant of explosive formulation.

e. (U) Continue data collection and documentation from all sources to provide authoritative response to Navy needs for environmental assessments of explosive testing.

4. (U) FY 1991 Plans:

a. (U) Complete fabrication and installation of 20kg solvent extraction pilot plant.

b. (U) Publish revised handbook on environmental effects of explosive testing.

c. (U) Monitor field tests of controlling sea turtles at East Coast Navy test sites such as Key West.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Surface Warfare Center, Silver Spring, MD and Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Weapons Support Center, Crane, IN; CONTRACTORS: Los Alamos National Labs.

F. (U) RELATED ACTIVITIES: Program Element 0603609N Conventional Munitions.

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

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project develops equipments and procedures which address the total shipboard waste problem with emphasis placed on the development of shipboard systems which permit compliance with national and international regulations.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Program:

a. (U) Completed organotin standards. Tested electrolytic chlorinator system and steam disinfection system.

2. (U) FY 1989 Program:

a. (U) Complete organotin harbor and drydock transport and fate studies for Navy harbors.

3. (U) FY 1990 Plans:

a. (U) Continue shipboard plastics waste disposal program, design and fabricate prototype processing/disposal systems. Receive production approval for vertical trash compactor; TECHEVAL preproduction shipboard solid waste pulper.

b. (U) Continue development of life cycle treatment of organotin coating waste produced during application, usage, and removal cycles.

c. (U) Continue drydock discharge and harbor monitoring for organotin.

d. (U) Continue development of shipboard hazardous waste reduction techniques.

e. (U) Design prototype solid waste thermal destruction system for LABEVAL and waste processing systems for potentially hazardous bilge oily waste.

f. (U) Complete computerized design model for in-tank oil/water separators and design prototype shipboard graywater treatment systems.

4. (U) FY 1991 Plans:

a. (U) Evaluate preproduction model shipboard plastics waste processor and shipboard solid waste pulper.

b. (U) LABEVAL prototype solid waste thermal destruction system, hi-flow bilge oil content monitor, and preproduction prototype laser gas detection system; continue SHIPEVAL of Offship Firefighting System; test salvage oily waste system systems model.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: DTRC, Bethesda, MD; Pearl Harbor Naval Shipyard, HI; CONTRACTORS: GKY Association, Springfield, VA; University of Miami, Miami, FL; Johns Hopkins University, Baltimore, MD; Oakridge National Lab, Oakridge, TN; Argonne National Lab, Chicago, IL.

F. (U) RELATED ACTIVITIES: Program Element 0603513N (Shipboard Systems Component Development).

G. (U) OTHER APPROPRIATION FUNDS: None.

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: The purpose of this project is to reduce the amount of 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). Specifically, Annex V prohibits the discharge of plastics from ships. The Navy has 5 years to comply and must report to Congress in 3 years on progress toward reaching the goal of eliminating plastic waste discharges. 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 1988 Accomplishments: Not Applicable.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Plans: Not Applicable.

4. (U) FY 1991 Plans:
a. (U) Identify those plastic items most susceptible to replacement or in need of technology development for substitution.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: Natick Research and Development Center, Natick, MA.

F. (U) RELATED ACTIVITIES: FY 1989 problem definition and FY 1990/1991 trash compactor and pulper development will be completed under PE 0603721N, Project S0401, Shipboard Waste Management.

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

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

FY 1990/1991 BIENNIAL 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) PROJECT 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 1988 Accomplishments:

a. (U) Completed development of an air emissions model and nitrogen-oxygen control devices for aviation engine test facilities and initial evaluations of Volatile Organic Compound systems.

2. (U) FY 1989 Program:

a. (U) Complete development of automated real time organotin analyzer and portable marine environmental test platform.

3. (U) FY 1990 Plans:

a. (U) Develop fiber optic chemical sensor for organic compounds, in-situ field dosing system for bioassays and toxicity testing, laboratory/field data on treatment parameters for waste streams, and a guide to detoxify/neutralize/delist Navy sludges.

b. (U) Develop, test, and evaluate expert system for environmental assessments.

c. (U) Complete development of coatings and control technologies for compliance with regulations for controlling release of Volatile Organic Compounds from Naval industrial operations.

d. (U) Initiate Biotechnology effort to use indigenous microbial populations to clean-up contaminated sites and Navy-specific drydock waste recycle/minimization and treatment effort.

4. (U) FY 1991 Plans:

a. (U) Develop automated hydride analyzer for organo-metallic compounds, field biochemical assay methods (BIOF1X), and predictive model to forecast the probability of a given Point Source contributing to water quality deterioration.

b. (U) Test and evaluate field dosing system at selected Navy sites.

c. (U) Complete groundwater decontamination decision model.

d. (U) Initiate critical technology research for Navy-specific treatment applications and assessment of Total Toxic Organics in Navy use.

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

E. (U) WORK PERFORMED BY: IN-HOUSE: Naval Ocean Systems Center, San Diego, CA; Naval Civil Engineering Lab, Port Hueneme, CA; CONTRACTORS: University of Oklahoma, Norman, OK; DART, Oxnard, CA; Computer Science Corporation, San Diego CA; San Diego State University Foundation, San Diego CA.

F. (U) RELATED ACTIVITIES: Program Element 0602233N (Mission Support) provides technology base support for environmental protection.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604208N Budget Activity: 6
Program Element Title: Range Instrumentation Systems Development

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0604	Training Range Instr Development	6,813	6,813	9,105	9,647	Cont.	Cont.
W0169	Mobile Sea Range	4,103	0	0	0	0	61,790
Total		10,916	6,813	9,105	9,647	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Requirements for new and improved range instrumentation and systems to meet the needs of fleet training in areas such as: underwater tracking, telemetry, electronic warfare for surface crews, target control and laser training are developed within this program element.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604208N Budget Activity: 6
Program Element Title: Range Instrumentation Systems Development
Project Number: W0604 Project Title: Training Range Instr Development

C. (U) PROJECT DESCRIPTION: This project develops specialized instrumentation systems to maximize fleet readiness training effectiveness, minimize cost of instrumentation systems, and reduce operating and maintenance costs. The project supports a number of tasks for training systems: Range Electronic Warfare Simulators (REWS), telemetry systems, target control systems, laser training systems and underwater tracking range instrumentation systems.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Critical design review for multiplexed hydrophone system development and in-water test. Upgraded telemetry station hardware and software subsystem design and test. REWS TRS development. REWS/Outboard Stimulator subsystem IOC. Continued development of Open Ocean Laser Training System EDM.

2. (U) FY 1989 Programs: Develop telemetry station integration design system specifications. REWS TRS DT&E. Open-Ocean Laser Training System EDM. Complete development and testing of the Large Scale Target Scoring System for Laser Training.

3. (U) FY 1990 Plans: Design of Large Area Underwater Tracking Range (LAUTR). Complete telemetry station subsystem hardware integration and software test. Development of REWS Skin Return and Deceptive Jammer (SR/DJ). REWS/TRS multi-beam antenna upgrade. Complete testing of the Open-Ocean Laser Training System EDM. Initiate development of the Multiple Laser Evaluator System and the Advanced Laser Scoring System.

4. (U) FY 1991 Plans: Telemetry station software integration and test development of REWS Communication, Navigation, Identification Jammer Simulator (CNIJ/S) susbsystem. LAUTR development. Complete development of Multiple Laser Evaluator System EDM, complete Advanced Laser Scoring System ADM testing and commence development of EDM.

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

E. (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, R.I.; CONTRACTORS: SRI International, Menlo Park, CA; Bunker Ramo, Westlake, CA; MITRE Corp., Washington, DC; Ford Aerospace, Sunnyvale, CA; RCA, Moorestown, NJ; SAIC MIRAPRO, Oxnard, CA.

F. (U) RELATED ACTIVITIES: Program Element 0204571N, Special Projects. Development of interface with laser training system to provide debrief on TACTS ranges.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
This is a non-acquisition program						
OPN #214	6,673	20,697	12,682	20,670	Cont.	Cont.

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604208N Budget Activity: 6
Program Element Title: Range Instrumentation Systems Development
Project Number: W0169 Project Title: Mobile Sea Range

C. (U) PROJECT DESCRIPTION: This project develops instrumentation and techniques to support the safe conduct of realistic, open-ocean, live firing battle group exercises.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (a) Complete development of participant interfaces; (b) Replace the prototype master station with a production station; (c) Conduct at-sea tests of the fully integrated system.

2. (U) FY 1989 Program: Program Completed.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0602	EW Environment Simulation (ECHO)	21,465	6,598**	27,678	27,180	Cont.	Cont.
W0672	Effectiveness of Navy EW Systems (ENEWS)	7,178	8,568	11,598	12,066	Cont.	Cont.
W1778	Closed Loop Test Capabilities	3,971	3,341	0*			
	Total	32,614	18,507	39,276	39,246	Cont.	Cont.

* Consolidates with Project W0602
** $20M of FY 1989 funding transferred to OSD Program Element 0605134D. Of this $20M, a total of $17.4 is allocated for Navy EW Simulator Development.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program consolidates the design, fabrication and integration of naval threat radar simulators for increased managerial emphasis and coordination. These simulator development efforts provide realistic developmental and operational test and evaluation of Electronic Warfare (EW) systems in accordance with Service requirements, and General Accounting Office and Congressional recommendations. These developments support flight test and evaluation of airborne EW systems at the Electronic Warfare Threat Environment Simulation (EWTES) complex at the Naval Weapons Center, China Lake, CA and EW systems component test and evaluation at the Electronic Combat Simulation and Evaluation Laboratory (ECSEL) at the Pacific Missile Test Center, Pt. Mugu, CA. The program provides for the continued development of secure, Test & Evaluation (T&E) quality, closed loop radar simulation capabilities for T&E of fully integrated, aircraft installed EW systems at the Naval Air Test Center, Patuxent River, MD. The program also provides for the development of simulation capabilities for naval air defense, EW testing, and simulations of anti-ship missiles and associated threat launch platforms.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ECHO Range	21,465	6,598	27,678	27,180	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides for the development of the Integrated Naval Air Defense Simulation complex (INADS) for flight test and evaluation of airborne EW equipments and tactics development at the Naval Weapons Center (NWC), China Lake, CA. It also provides for the laboratory test simulations for EW component test and evaluation at the Pacific Missile Test Center (PMTC), Pt. Mugu, CA. This project will provide for the 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. This project directly supports HARM, ALR-67, ALQ-126B, ALQ-165, EA-6B ADVCAP, IDAP, expendable jammers, and decoys as well as other EW systems which will IOC in the 1990s. Navy requirements are coordinated through the Navy tri-center (NATC, PMTC, NWC) simulator development concept for mutual support, cost reduction and increased test effectiveness. Requirements are coordinated with the other Services and DoD agencies through the CROSSBOW-S and DoD Joint Executive Committee on Air Defense Threat Simulators (EXCOM).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
   a. (U) Continued IR missile seeker development/integration.
   b. (U) Completed Flycatcher Millimeter Wave Radar integration.
   c. (U) Completed intelligence and engineering investigations and commenced development of one early warning acquisition radar simulation
   d. (U) Continued Semi-active Test System (SATS) development (and integration with
   e. (U) Continued integration of system.
   f. (U) Commenced intelligence and engineering investigations to support development of ,system simulation.
   g. (U) Commenced antenna modifications to CROSSBOW-S Generic Radar (CGR).
   h. (U) Commenced development of J-band emitter simulator control.
   i. (U) Continued EW simulation systems engineering investigations.
   j. (U) Continued Tactical Data System development for C^2 system #1.
2. (U) FY 1989 Program:
   a. (U) Continue development of one early warning acquisition radar simulation.
   b. (U) Complete integration of system and with range control instrumentation.

FY 1990/1991 BIENNIAL 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)

c. (U) Continue engineering support of [redacted] system simulation.
system simulation.
d. (U) Continue antenna modifications to CGR.
e. (U) Continue development of J-band emitter simulators control.
f. (U) Continue EW simulation systems engineering investigations.
g. (U) Commence OSD directed emitter validation/verification program.
h. (U) Complete SATS integration with [redacted] simulation.
i. (U) Continue Tactical Data System Development for C^2 System #1.
j. (U) Complete [redacted] IR missile seeker simulation development and integration.

3. (U) FY 1990 Plans:
a. (U) Continue development of early warning acquisition radar.
b. (U) Continue engineering support of [redacted] system simulation.
c. (U) Continue antenna modifications to CGR.
d. (U) Continue development of J-band emitter simulator control.
e. (U) Continue EW simulation systems engineering investigations.
f. (U) Continue Tactical Data System Development for C^2 System #1.
g. (U) Commence development of NATC [redacted] Closed Loop Test Capability transferred from Project W1778.

4. (U) FY 1991 Plans:
a. (U) Continue development of early warning acquisition radar.
b. (U) Commence hardware development of SA-N-9 system.
c. (U) Continue antenna modifications to CGR.
d. (U) Complete development of J-band emitter simulator control.
e. (U) Continue EW simulation systems engineering investigations.
f. (U) Complete RF background generator integration at NATC.
g. (U) Commence #1 C^2/C^3 Weapon Direction System simulation.

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of Change	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	Reduce simulator diversity; add validation/verification program	None	None
SCHD	None	None	None
COST	Reduce Testing Capability	IOC slip to [redacted]	-6,908

FY 1990/1991 BIENNIAL 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)

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNOLOGY CHANGES: Reduce simulation diversity by reductions in engineering design requirements. Add validation/verification program to upgrade/requalify existing simulation systems.

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: FY 1990 funding decrease of $6,908 was because of Navy and Department adjustments. Planned operational capability of the INADS will be delayed by two years. Impact will be limitations to testing of Tactical Airborne EW systems.

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, Navy and Air Force requirements through the Joint Executive Committee on Air Defense Threat Simulators (EXCOM), the CROSSBOW-S committee, and the Joint Coordinating Committee on Electronic Defense Systems. There is no unnecessary duplication of effort within the Navy or the Department of Defense.

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

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	To Complete	Total
) PROCUREMENT	This is a non-acquisition program.					
(U) MILCON						
P-342	0	5,400	0	0	0	5,400
P-454	0	0	0	16,500	0	16,500

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

1. (U) [illegible] Purchases from Signal Corporation, Netherlands with USAF Contract assistance.

2. (U) U.S. Navy RDT&E funding $7.3M FY86 through FY88.

3. (U) [illegible] operational FY 1988.

J. (U) MILESTONE SCHEDULE: Completions.

1. (U)	[illegible] missile seeker	
2. (U)	CGR Antenna upgrade	
3. (U)	target tracker	
4. (U)	EW Acquisition Radar	2Q/92
5. (U)	[illegible]	4Q/88
6. (U)	IR Seeker Simulation	2Q/89
7. (U)	J-Band emitter simulator control system	2Q/91

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 604255N Budget Activity: 6
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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
ENEWS	7,178	8,568	11,598	12,066	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 Naval air 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 1988 Accomplishments:

a. (U) Completed ENEWS reference library documentation.
b. (U) Completed evaluation of the (AN/ALQ-170(V)2 simulator.
c. (U) Upgraded the (AN/ALQ-170(V)1 simulator in accordance with latest intelligence information.
d. (U) Initiated development of two anti-radiation missile threat simulators
e. (U) Validated IR simulator.

2. (U) FY 1989 Program:

a. (U) Continue development of simulator.
b. (U) Upgrade various missile threat simulators and simulations. This is a continuing process based upon intelligence information provided by the Naval Intelligence Support Center (NISC) and other sources.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604255N Budget Activity: 6
Program Element Title: Electronic Warfare Simulator Development
Project Number: W0672 Project Title: Effectiveness of Navy Electronic Warfare System (ENEWS)

c. (U) Lab and Flight verification of [redacted] Infrared (IR) simulator.

3. (U) FY 1990 Planned Program:

a. (U) Initiate [redacted] simulator development.
b. (U) Complete development of [redacted] tracker.
c. (U) Flight validate [redacted] IR simulator.
d. (U) Flight validate the [redacted] Radio Frequency (RF)/IR hybrid.

4. (U) FY 1991 Planned Program:

a. (U) Complete Outer-Air Battle total engagement scenario.
b. (U) Complete full engagement expendable countermeasures model.
c. (U) Lab test [redacted] IR simulator.
d. (U) Lab test Communications Countermeasures (CCM) variant of [redacted]
e. (U) Continue development of [redacted] missile simulator.

5. (U) Program to Completion:

a. (U) Develop C^3CM effectiveness model.
b. (U) Develop data base for Coordinated EW Simulation (CEWS).
c. (U) Incorporate AN/ALQ-170 intelligence updates.
d. (U) Continue development of [redacted] missile simulator.
e. (U) Develop line-of-sight (LOS) probability of intercept threat missile simulator.
f. (U) Develop Advanced Target Discrimination Simulator.
g. (U) Complete EP-3B aircraft instrumentation.
h. (U) Develop modular seeker for use with the Central Target Simulator (CTS).
i. (U) Expand CTS capabilities to handle real-time large-scale simulations.
j. (U) Modify [redacted] simulator to simulate threat upgrade.
k. (U) Initiate development of IR simulator variant of [redacted]
l. (U) Continue upgrades/modifications of [redacted] simulator.
m. (U) Initiate development of [redacted] IR seeker.
n. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: Naval Research Laboratory, Washington, DC.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604255N Budget Activity: 6
Program Element Title: Electronic Warfare Simulator Development
Project Number: W0672 Project Title: Effectiveness of Navy Electronic Warfare System (ENEWS)

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	Reduce Testing Capability	One year delay in three threat simulator starts	-$3,982

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: None

3. (U) COST CHANGES: FY 1990 funding reduction delays by one years the start of three threat simulators used for both developmental and operational testing of surface Navy EW systems.

F. (U) PROGRAM DOCUMENTATION: MAPDD 049-098

G. (U) RELATED ACTIVITIES: None.
H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) None.

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	TO COMPLETE
This is a non-acquisition program.					

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.
J. (U) MILESTONE SCHEDULE:

	IOC
(U) Digital Simulations	
1. (U) Counter targeting simulation model	2Q/89
2. (U) Inner defense zone model	4Q/93
3. (U) ESM system models	3Q/94
(U) Flyable Simulators	
1. (U) Advanced RF seeker	4Q/89
2. (U) New technology IR seeker	4Q/90
3. (U) RF/IR hybrid seeker	3Q/91
4. (U) Free world seeker	1Q/90
5. (U) Targeting radar simulator	1Q/91

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604255N Budget Activity: 6
Program Element Title: Electronic Warfare Simulator Development
Project Number: W1778 Project Title: Closed Loop Test Capability

A. (U) RESOURCES: Project funding terminates in FY 1989 with efforts consolidated and continued under project W0602 starting in FY 1990.
B. (U) PROJECT DESCRIPTION: Project W1778 provides a secure, closed loop radar simulation test capability to determine the effectiveness of EW and electronic countermeasures systems (ECM) installed in Navy aircraft. By operating a complete aircraft and weapons system in a secure anechoic chamber facility, system and platform integration can be assessed. System development requirements are coordinated through the Navy tri-center (NATC, PMTC, NWC) simulator development concept for mutual support, cost reduction and increased test effectiveness. Major improvements to fleet tactical aircraft survivability result from thorough systems testing achieved at reduced flight hour expenditures, elimination of uncontrolled variables during testing and greater security for developing and testing sensitive jamming equipment and techniques.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:
a. (U) Completed initial missile simulation development and scenario control.
b. (U) Continued installation support and software integration of closed loop simulation.
c. (U) Continue development of RF background environment generator.
2. (U) FY 1989 Program:
a. (U) Continue development of RF background generator.
b. (U) Complete installation support and software integration of closed loop simulation.
3. (U) FY 1990 Plans:
a. (U) Project Number W1778 terminates at the close of FY 1989. Development efforts will consolidate and continue under project W0602 starting in FY 1990.

D. (U) WORK PERFORMED BY: In House: Naval Air Test Center, Patuxent River, MD; assistance provided by Naval Research Laboratory, Washington, DC; Contractors: RCA, Moorestown, NJ.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) None.

APPN/P-1	FY 1988	FY 1989	FY 1990	FY 1991	TO COMPLETE

This is a non-acquisition program.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0609	Aerial Target Systems Dev.	9,546	14,672	10,817	7,508	Cont.	Cont.
W0610	Weapon Systems T&E Targets Development and Procurement	21,487	37,325	22,898	4,566	Cont.	Cont.
W0611	Supersonic Low Alt. Target	37,634	39,562	56,986	67,086	35,381	372,550
S0612	Seaborne Target Dev.	1,524	1,452	1,507	1,061	Cont.	Cont.
TOTAL		70,191	93,011	92,208	80,221	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This element develops and procures 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, BQM-34, and Sea Petrel 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). Development of augmentation systems and a study of the effects of Scintillation and Glint from a large-sized vehicle are included within the Program Element.

FY 1990/1991 BIENNIAL 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 DEV.

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Targets	9,546	14,672	10,817	7,508	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Continued BQM-126A target contractor test and evaluation.
b. (U) Initiated BQM-74C upgrade (BQM-74 PI).
c. (U) Initiated program planning for Full Scale Development of QF-4S Full Scale Aerial Target (FSAT) at Naval Aviation Depots.
d. (U) Continued A/A47U-4A tow reel and auxiliary equipment integration testing.
e. (U) Continued development of ULQ-21 ECM modules.
f. (U) Continued development testing of USQ-104 Scorer.

2. (U) FY 1989 Program:

a. (U) Continue BQM-74C upgrade (BQM-74 PI).
b. (U) Initiate FSED of QF-4S FSAT at Naval Aviation Depots North Island and Cherry Point.
c. (U) Begin testing integration of the TDU-34A target system in the S-3 aircraft.
d. (U) Continue development of ULQ-21 ECM modules.
e. (U) Continue development of USQ-104 Scorer.
f. (U) Complete BQM-126A target TECHEVAL.
g. (U) Continue development of various threat related emitters.

3. (U) FY 1990 Plans:

a. (U) Complete BQM-74C upgrade.
b. (U) Continue QF-4S FSED.
c. (U) Continue development of ULQ-21 ECM modules.
d. (U) Initiate development of advanced command/control transponder.
e. (U) Initiate development of noncooperative vector scorer.
f. (U) Initiate in-house specification development for DPT-Y emitter.

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0609 Project Title: AERIAL TARGET SYSTEMS DEV.

4. (U) FY 1991 Planned Program:

a. (U) Complete FSED on QF-4S.
b. (U) Continue development of advanced command/control transponder.
c. (U) Continue development of noncooperative vector scoring system.
d. (U) Initiate development of single radar antenna.
e. (U) Continue development of ULQ-21 ECM modules.
f. (U) Award FSED contract for DPT-Y emitter.

5. (U) Program to Completion: This is a continuing effort.

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; 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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	None	None	None
SCHD	None	None	None
COST	See Below	None	-$65,518

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Department and Navy adjustments of -$65,518 resulted from restructure of the Target program and transfer of funds within the program element; $5,750 to W0610 and $48,346 to W0611. FY 1990 efforts for the QA-7, Target Launch and Range Support Aircraft, Medium Altitude Supersonic Target, and Close-In Weapons System target have been deferred.

F. (U) PROGRAM DOCUMENTATION:

BQM-126A	BQM-74C	QF-4S
NDCP 7/81	OR 7/74	TOR 6/85
TEMP 11/84	TEMP 4/88	OR 12/86

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0609 Project Title: AERIAL TARGET SYSTEMS DEV.

G. (U) RELATED ACTIVITIES: Test and evaluation of current in-service weapons systems: AIM-7/F, AIM-9H/L/M, AEGIS, AIM-54A, Basic Point Defense, TARTAR, TERRIER, Standard Missile 1, and Close-in Weapons System. Systems currently in test and evaluation: AIM-7M, AIM-54C, AMRAAM, Standard Missile II, Rolling Airframe Missile, SEASPARROW, and AEGIS. Weapons systems to enter test and evaluation: 5" guided projectile, high energy laser. Fleet weapons training with air-to-air, surface-to-air, air-to-surface and surface-to-surface weapons. There is no duplication of effort between this project and others within the Navy or DOD.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN #27	100,600	109,200	124,700	121,200	Cont.

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

J. (U) MILESTONE SCHEDULE:

	I	II	III	IOC
BQM-74 PI	N/A	FY89/3Q	FY90/1Q	FY91/4Q
QF-4S	N/A	FY89/1Q	FY91/3Q	FY91/4Q
USQ-104	N/A	FY85/1Q	FY89/2Q	FY91/1Q
SIN. RAD, ANTENNA	N/A	FY91/1Q	FY93/4Q	FY94/4Q
VECTOR SCORER	N/A	FY90/2Q	FY93/2Q	FY95/3Q
ADVANCE COMMAND/ CONTROL TRANSPONDER	N/A	FY90/2Q	FY92/2Q	FY94/3Q
DPT-Y EMITTER	N/A	FY91/1Q	FY94/3Q	FY95/3Q

FY 1990/1991 BIENNIAL 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.

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Targets	21,487	37,325	22,898	4,566	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 electromagnetic 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.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Completed conversion of 5 aircraft into QF-4N targets. Procured 6 shipsets of installation kits and 10 sets of drone peculiar equipment.
b. (U) Procured 17 MQM-8G VANDALs and 11 MQM-8G(ER) Extended Range VANDALs.
c. (U) Procured 20 BQM-34S targets (1st increment funding).
d. (U) Commenced in-house SCINT and GLINT programmable RCS equipment studies.

2. (U) FY 1989 Program:

a. (U) Complete conversion of 10 aircraft into QF-4N targets, procure 14 shipsets of installation kits and 7 sets of drone peculiar equipment.
b. (U) Continue BQM-34S procurement (2nd increment funding).
c. (U) Procure 20 MQM-8G(ER) Extended Range VANDALs and 12 MQM-8G VANDALs.
d. (U) Continue studies for programmable RCS equipment/SCINT and GLINT.

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0610 Project Title: WPN SYSTEM T&E TARGETS DEV/PROC.

3. (U) FY 1990 Plans:

a. (U) Complete conversion of 5 aircraft into QF-4N targets, procure 7 shipsets of installation kits.
b. (U) Procure (1st increment) programmable radar augmentation systems.
c. (U) Continue BQM-34S procurement (final increment).
d. (U) Procure 20 Firing Error Indicator (FEI) pods.
e. (U) Procure 20 (1st increment) of Sea Petrel targets.
f. (U) Procure 5 (1st increment) programmable RF radar augmentation systems test sets.

4. (U) FY 1991 Plans:

a. (U) Continue procurement (2nd increment) of Sea Petrel targets.
b. (U) Procure 17 FEI pods.
c. (U) Continue procurement (2rd increment) for programmable radar augmentation.

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

D. (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.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	None

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0610 Project Title: WPN SYSTEM T&E TARGETS DEV/PROC.

F. (U) PROGRAM DOCUMENTATION:

QF-4N
TEMP 9/85

G. (U) RELATED ACTIVITIES: Test and evaluation of current in-service weapons: AIM-7E/F, AIM-9H/L/M, AEGIS, AIM-54A, Basic Point Defense, TARTAR, TERRIER, Standard Missile 1, and Close-in Weapon System. Systems currently in test and evaluation: AIM-74M, AIM-54C, AMRAAM, Standard Missile II, Rolling Airframe Missile, SEASPARROW, and AEGIS. Weapons systems to enter test and evaluation: 5" guided projectile, high energy laser. There is no duplication of effort between this project and others within the Navy or DOD.

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

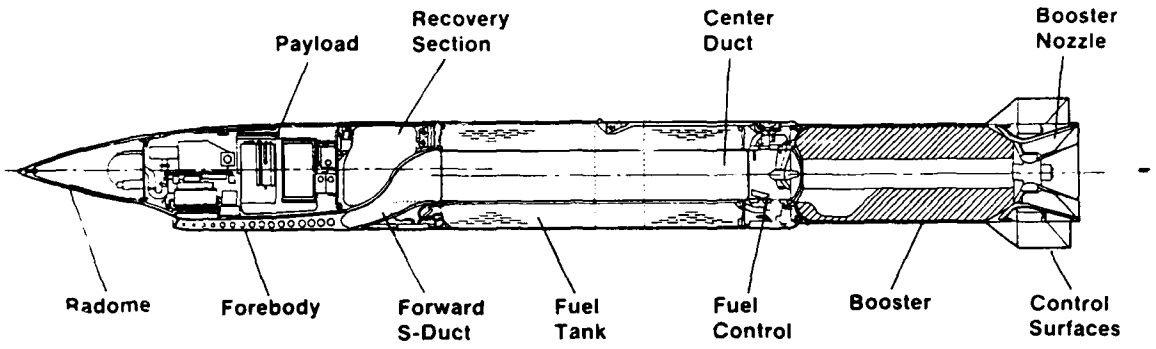
	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete
APPN/P-1 WPN/#29	Not Applicable				Cont.

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

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988	FY 1989	FY 1990	FY 1991	To Complete
Program Milestones		MS IIIA 6/89	IOC 6/90 MS IIIB 3/90		
Engineering Milestones	1st flt 7/88 PRR 6/89				
T&E Milestones	DT IIB/C OT-IIA	DT-IIB/C/D OT-IIA	OT IIB	DT IIIA OT-III	
Contract Milestones		LRIP 6/89	Lot 1 Prod. 3/90		

BUDGET ($K)	FY 1988	FY 1989	FY 1990	FY 1991	Program Total To Complete
Major Contract	30,173	24,782	48,410	58,576	298,190
Support Contract	165	350	350	350	2,400
In-House Support	7,296	14,430	8,226	8,160	71,960
GFE/ Other					
Total	37,634	39,562	56,986	67,086	372,550 35,381

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0611 Project Title: SUPERSONIC LOW ALTITUDE TARGET (SLAT)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishments:

a. (U) First flight July 1988.
b. (U) Continued full scale engineering development.
c. (U) Conducted contractor test and evaluation.

2. (U) FY 1989 Program:

a. (U) Exercise option for technical data package.
b. (U) Exercise option for post-development production of 30 vehicles.
c. (U) Conduct TECHEVAL.
d. (U) Initiate OPEVAL.

3. (U) FY 1990 Plans:

a. (U) Complete FSED.
b. (U) Continue Low Rate Initial Production.
c. (U) Conduct limited operations at Pacific Missile Test Center.
d. (U) Complete OPEVAL.

4. (U) FY 1991 Plans:

a. (U) IOC at PMTC.
b. (U) Complete LRIP deliveries.
c. (U) Provide second increment funding for first production lot.
d. (U) Commence deliveries of first production lot.

5. (U) Program to Completion: This program will complete development and the option for the first production lot of AQM-127A targets will be exercised in March 1990. The procurement will be incrementally funded over three years. The targets will be used for weapons system T&E only, and will not be available for Fleet training.

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.

Program Element: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: W0611 Project Title: SUPERSONIC LOW ALTITUDE TARGET (SLAT)

E. (U) COMPARISON WITH FY 1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	See Below	None	+$40,096

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Department and Navy adjustments of +$40,096 came from within the program element and resulted from a restructuring of the target program and procurement of SLAT targets to support test of new weapons systems.

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. There is no duplication of effort between this project and others within the Navy or DOD.

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

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: 0604258N Budget Activity: 6
Program Element Title: TARGET SYSTEMS DEVELOPMENT
Project Number: S0612 Project Title: SEABORNE TARGETS

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 1988 Accomplishments:
   a. (U) Continued Anti-Radiation Missile Emitter (ARME) support.
   b. (U) Continued development of Digital Control System.
   c. (U) Continued development of Surface Target Radar Simulator (STRS).
   d. (U) Continued development of Command and Control Augmentation.
   e. (U) Completed development of Improved Seaborne Target Control Systems.

2. (U) FY 1989 Program:
   a. (U) Continue ARME development.
   b. (U) Complete Digital Control System development.
   c. (U) Continue STRS development.
   d. (U) Continue Command and Control Augmentation development.

3. (U) FY 1990 Plans:
   a. (U) Complete SEPTAR Improved Control System.
   b. (U) Continue Command and Control Augmentation development.
   c. (U) Commence Ship Simulator Platform (SSP).
   d. (U) Complete ARME development.
   e. (U) Continue STRS.

4. (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 STRS.

5. (U) Program to Completion: This is a continuing effort.

E. (U) WORK PERFORMED BY: IN-HOUSE: Pacific Missile Test Center, Pt. Mugu, CA.

F. (U) RELATED ACTIVITIES: Over-the-Horizon Air Weapons Systems.

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

	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
(U) OPN/#242	Procurement justification material does not contain this level of detail.					

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0604703N Budget Activity: 6
Program Element Title: Personnel, Training, Simulation, and Human Factors
Project Number: R1822 Project Title: Personnel, Training,Simulation, and Human Factors

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

Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Personnel, Training, Simulation, and Human Factors	932	1,017	1,021	1,047	Cont	Cont

B. (U) BRIEF DESCRIPTION OF PROGRAM: This program applies advanced technologies to operational requirements in manpower, personnel, training, and human factors. It focuses on adaptive testing, mathematical optimization, manpower forecasting, computer-based simulation, and decision support systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Analyze impact of computerizing Armed Services Vocational Aptitude Battery. Develop prototype rotation model.
2. (U) FY 1989 Program: Develop Computerized Adaptive Test (CAT) equating procedures. Test prototype rotation models for sample ratings.
3. (U) FY 1990 Plans: Verify score equating for CAT-ASVAB. Develop full-scale sea/shore rotation management model.
4. (U) FY 1991 Plans: Analyze CAT-ASVAB score equating verification data. Test and evaluate full-scale rotation management model.
5. (U) Program to Completion: Continuing program.

D. (U) WORK PERFORMED BY: In-House: NPRDC, San Diego, CA. Contractor: San Diego State University Foundation, San Diego, CA.

E. (U) RELATED ACTIVITIES: 0602722A, Personnel and Training; 0602233N, Mission Support Technology (Personnel and Training Technology); 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. Joint Service CAT-ASVAB Working Group -- Navy is lead service.

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: 0605150N Budget Activity: 6
Program Element Title: Cost Research
Project Number: R2061 Project Title: Cost Research

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R2061	Cost Research	0	0	996	996	Cont	Cont

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This is a dedicated research to develop more effective cost analysis methods and techniques. The goal is to strengthen cost analysis within the Navy and to ensure preparation of credible cost estimates in budgeting and in acquisition mangement. This goal is achieved in two ways: by bringing advances in analytical methodologies and computer software to bear and by collecting, reviewing and analyzing data related to the acquisition process. The Navy's cost research program is broad ranging and multifaceted, covering the progression of weapon systems and subsystems from cradle to grave. Ensuring that the Navy gets the most capability for its investment dollar is the number one priority of this program. It involves research and analysis in such disciplines as operations research statistics, mathematical modelling, econometrics, resource management and ADP. It supports the development of improved system acquisition processes to enable effective integration of system design and support relative to performance, readiness and life cycle costs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: Not applicable.
2. (U) FY 1989 Program: Not applicable.
3. (U) FY 1990 Plans: Conduct the following cost research efforts:
   a. (U) Impact on Ship Cost resulting from Advanced Ship Construction Techniques.
   b. (U) Cost of Advanced Ship Concepts.
   c. (U) Air-to-Air and Underwater Munitions Cost Models.
   d. (U) Composite Material Aircraft Cost Model.
   e. (U) Continue MIS Cost Model Development.
   f. (U) BMC3 Cost Model.
4. (U) FY 1991 Plans: Continue research in costs for Naval weapon systems.
5. (U) Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: Contractors: TBD. In-House: DTRC, Bethesda, MD; NOSC, San Diego, CA; NSWC, Dahlgren, VA; NCSC, Panama City, FL; NUSC, Newport, RI; NAC, Indianapolis, IN.
E. (U) RELATED ACTIVITIES: Not applicable.
F. (U) OTHER APPROPRIATIONS 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: 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0030	Studies/Analysis	1,535	1,904	2,497	3,013	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Program provides 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 blueprint for improvements to doctrine, training, force structure and weapons systems. Program also provides analytical support for resolution of current problems identified by the operating forces.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Completed nine studies/analyses. Initiated ten including: Control of Aircraft Missiles and RPVs, Combined Arms Training Systems, Land Resources Management, Blood Management and Health Services.

2. (U) FY 1989 Program: Initiate eight studies/analyses including: Assault Support, Deployable Automated Information System (AIS), Transportation, Engineer Support, Tactical Communication.

3. (U) FY 1990 Plans: Initiate eight studies/analyses: Security, Counter Mobility, Support, Supply, Maintenance, Manpower, Close Combat and Air Reconnaissance.

4. (U) FY 1991 Plans: Initiate ten studies/analyses including: Tactical C2, Intelligence, Tactical Mobility, Offensive Air Support, Facilities Management, Technology Assessment, Marine Corps Scenarios.

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

D. (U) WORK PERFORMED BY: In-house: MAGTF Warfighting Center, MCCDC, Quantico, VA and Marine Corps and other Service Top Level Schools; FMF Units. Contractors: TBD by competitive contracting.

E. (U) RELATED ACTIVITIES: Program Element 0605153M, Marine Corps Operations and Analysis Group, Center for Naval Analyses which provides supplementary analytic capability.

F. (U) OTHER APPROPPIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
M0106	Naval Medical Support Capability	96	92	97	101	Cont	Cont
R0132	CNO Program Analysis and Evaluation	2,826	1,368	948	1,067	- Cont	Cont
R0133	National Academy of Sciences/Naval Studies Board	902	772	825	828	Cont	Cont
R0147	CNO Operational Strategy and Tactical Effectiveness Analysis	1,081	1,177	1,290	1,323	Cont	Cont
R2040	Soviet Ship Vulnerability (SSVP) Program	0	0	702	741	Cont	Cont
	TOTAL	4,905	3,409	3,862	4,060	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 1990/1991 BIENNIAL 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 1988 Accomplishments:
a. (U) Provided input for establishing policies pertaining to Independent Duty Corpsmen (IDC) training, certification, and use.
b. (U) Completed protocols to assess fixed Medical Treatment Facility (MTF) certification process and obtain fleet IDC baseline.

2. (U) FY 1989 Program:
a. (U) Complete technical report on predictors of corpsmen success in Basic Underwater Demolition/SEALS.
b. (U) Complete assessment of medical requirements for special warfare operations and issue technical report.
c. (U) Initiate/complete data collection (MD preceptors, IDCs, staff, patients) to assess fixed MTF certification process and obtain fleet IDC baseline.

3. (U) FY 1990 Plans:
a. (U) Identify performance criteria and develop protocols to assess training, utilization, and socialization issues.
b. (U) Initiate data collection.

4. (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.

5. (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.

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

FY 1990/1991 BIENNIAL 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: Provide 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 1988 Accomplishments:

a. (U) Conducted 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 readienss measures.

b. (U) Supported Soviet Ship Vulnerability program.

c. (U) Conducted independent parametric cost analyisi. Conducted analyses on the impact of advanced materials and manufacturing techniques on ship and aircraft systems acquisition cost; updated space cost estimating models for advanced sensors, C^{3}I and weapons; developed an aircraft ILS cost estimating model and a missile operations and support cost estimating model.

2. (U) FY 1989 Program:

a. (U) Continue program in manpower, ordnance sustainability and ship readiness research and analysis. Initiate research to evaluate Navy manpower mix and opportunities for restructuring, and to forecast and model Navy combat casualty rates.

b. (U) Support Soviet Ship Vulnerability program.

c. (U) Continue independent parametric cost analysis. Conduct 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.

3. (U) FY 1990 Plans:

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.

4. (U) FY 1991 Plans: Same as FY 1990.

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

E. (U) WORK PERFORMED BY: Contractors: PRESEARCH Inc., Arlington, VA; Stanley Associates, Arlington, VA; WESTEC, 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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N 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 1988 Accomplishments:

a. (U) Completed the study on implications of emerging technology for the Navy of the twenty-first century.

b. (U) Continued studies on implications of emerging technologies.

c (U) Provided support for Naval Hydrodynamics Symposium series.

d (U) Continued studies on opportunities for research for the Office of Naval Research.

e. (U) Provided support for the development of a Navy/Marine Corps program development time model.

2. (U) FY 1989 Program:

a. (U) Issue final report on the Twenty-First Century Navy study.

b. (U) Continue studies on implications of emerging technologies.

c. (U) Provide support for C. H. Davis Lecture series.

d. (U) Continue studies on opportunities for research.

e. (U) Conduct studies in the field of scientific research and development applicable to the Navy.

3. (U) FY 1990 Plans:

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.

4. (U) FY 1991 Plans: Same as FY 1990.

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

E. (U) WORK PERFORMED BY: In-House: Naval Postgraduate School, Monterey, CA. 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 1990/1991 BIENNIAL 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 Analysis

C. (U) PROJECT DESCRIPTION: 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 alternatives 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 1988 Accomplishments:

a. (U) Continued studies on Navy program planning issues in force structures, fleet combat operations, readiness, sustainability, logistics support, C^3, surveillance, intelligence, manpower, personnel, and training.

b. (U) Delivered research/analysis factored into Navy planning and programming decision making process for FY 1990 program development.

2. (U) FY 1989 Program:

a. (U) Continue studies in FY 90 Navy programming issues. Perform further research/assessments of ship, aircraft and base readiness resources to readiness measures and achievements.

b. (U) Analyze a variety of sustainability issues.

c. (U) Initiate research to evaluate the Navy's recruiting strategy and to develop an analysis of capabilities for input to JCS net assessment process.

3. (U) FY 1990 Plans:

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.

4. (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.

5. (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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605152N Budget Activity: 5
Program Element Title: Studies and Analysis Support, Navy
Project Number: R2040 Project Title: Soviet Ship Vulnerability Program

C. (U) PROJECT DESCRIPTION: This program assess effectiveness of U.S. Navy tactical weapons against Soviet Ship and submarine targets. 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 acquisition processes, in-service weapon upgrades, weapon loadout requirements, and for tactical applications of weapons. This is a new project.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (Funded in Project R0132)
   a. (U) Initiated evaluation of ASW weapons against submarines.
   b. (U) Completed target description.
   c. (U) Initiated evaluation of ASUW guided weapons.

2. (U) FY 1989 Program: (Funded in Project R0132)
   a. (U) Develop weaponeering.
   b. (U) Develop target description.
   c. (U) Complete evaluation of ASUW guided weapons.
   d. (U) Continue/update target descriptions.

3. (U) FY 1990 Plans:
   a. (U) Develop/update weaponeering.
   b. (U) Update target descriptions.
   c. (U) Complete weaponeering.
   d. (U) Complete/update target descriptions.

4. (U) FY 1991 Plans:
   a. (U) Update weaponeering.
   b. (U) Develop/update target descriptions.
   c. (U) Initiate weaponeering.
   d. (U) Develop target descriptions.

5. (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.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0031	MCOAG	4,452	5,491	4,796	5,006	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 1988 Accomplishments: Provide support in areas including, but not limited to Computer Adoptive Test/Armed Services Vocational Aptitude Battery (CAT/ASVAB), Selective Reenlistment Bonus (SRB), Professional Military Eduction (PME), Selected Marine Corps Reserve (SMCR) structure, Light Armored Vehicle-Assault Gun (LAV-AG), Advanced Amphibious Assault (AAA), Maritime Preposition Ship (MPS) stock rotations, exercise reconstruction, aviation requirements, Landing Craft Air Cushion (LCAC) operations, and field representatives.

2. (U) FY 1989 Program: Provide 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.

3. (U) FY 1990 Plans: Provide support for Program Objective Memorandum (POM) submission, and issues planned for the FY 1989 Programs with planned growth from 27 to 28 analyst-years of effort.

4. (U) FY 1991 Plans: Provide support for issues listed for the FY 1989 and FY 1990 programs.

5. (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 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
CNA	23,191	21,618	28,678	29,165	Cont	Cont

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, growth in the fleet, and the increasing complexity of weapon systems, 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) Amphibious plans and operations; (i) System planning; (j) Technology assessment; (k) Methodology development; (l) Tactical development and evaluation; (m) Operational testing and evaluation.

CNA's analyses have resulted in substantial improvements in fleet effectiveness and significant cost avoidance. Examples of documented cost avoidances from FY-84 to FY-88 are:

- o Alternative spare parts mixes ($110M)
- o Selective Reenlistment Bonus program benefits ($300M)
- o Procedures for controlled enlisted attrition ($55M)
- o Elimination of apprentice training ($40M)

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:
1. (U) FY 1988 Accomplishments: CNA efforts in FY 1988 included work in all the above noted research areas. Some examples are:
a. (U) Identify, define, and assess the value of target systems in the Soviet Union by determining their criticiality to the accomplishment of Soviet wartime objectives.
b. (U) Apply readiness-based sparing models to enhance aircraft readiness at no additional cost by developing more effective mixes of assemblies and parts.
c. (U) Determine whether concepts of operations are supportable logistically and estimate the likely effects of logistics shortages on combat sustainability.

Program Element: 0605154N Title: Center for Naval Analysis, Navy

d. (U) Identify factors underlying the increase in specialized skill training and potential policies to reduce individual skill training requirements.

e. (U) Develop an anti-air warfare (AAW) warfighting blueprint for the future so that long-range AAW planning is responsive to the threat and in consonance with strategic objectives.

f. (U) Appraise the entire Navy RDT&E program in the context of requirements, as expressed in warfare area appraisals, long-term objectives, and technological opportunities and limitations.

(U) During FY88, CNA could not support a large number of study requests. To meet this demand CNA would have needed to increase the number professional analysts (225) by about 40. We anticipate study requests in FY89 and FY90 to also exceed available CNA resources (i.e., 225 professional analysts).

2. (U) FY 1989 Program: In addition to the research areas noted above, CNA will 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 c 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.

3. (U) FY 1990 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. Specific examples of studies other than those noted above are not available at this time. CNA's research program is updated quarterly and specific studies conducted in FY 1990 will be identified and prioritized during latter part of FY 1989. 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 budgetary climate of FY-1989 and beyond, the Navy must rely even more on CNA in its effort to maximize effectiveness from available resources.

(U) Starting in FY90, CNA's portion of Program Elements 0605152N, Studies and Analysis Support, 0605865N, Operational Test and Evaluation capability, and 0605853N, Management and Technical Support will be consoli-

Program Element: 0605154N Title: Center for Naval Analysis, Navy

dated into this Program Element (0605154N, Center for Naval Analyses). This will allow for visibility and better management of CNA funding. CNA's funds will now be distributed among this Program Element, 0605153M, Marine Corps Operations Analyses Group, and 0605155N, Fleet Tactical Development and Evaluation; with the majority of the money in this Program Element (0605154N).

4. (U) FY 1991 Plans: Same level as FY 1990.

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

Type of CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY1990 Cost
ENG	None	None	None
SCHD	None	None	None
COST	None	None	+5,162

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: The $5.2M increase to this Program Element is the result of program consolidation. This amount along with funding from Program Elements 0605153M and 0605155N is required for CNA to maintain the current level of 225 professional analysts. CNA has been at 225 professional analysts since FY 1987.

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 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605155N Budget Activity: 6
Program Element Title: Fleet Tactical Development and Evaluation

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0151	Tactical Development and Evaluation	12,248	15,493	14,881	15,608	Cont.	Cont.
S2050	Fleet Tactical	967	0	0	0	0	967
Total		13,215	15,493	14,881	15,608	Cont.	967

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Program element supports all naval warfare tasks and provides technical and analytical support to develop and evaluate tactics during fleet operations and excercises. Resulting in new/improved tactics for utilization in various mixes of forces and weapon systems, including those being introduced, in various threat scenarios, directly adding to warfighting effectiveness.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605155N Budget Activity: 6
Program Element Title: Fleet Tactical Development and Evaluation
Project Number: R0151 Project Title: Tactical Development and Evaluation

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

Project Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Fleet Tactical Development and Evaluation	12,248	15,493	14,881	15,608	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element supports all naval warfare tasks and provides technical and analytical support to develop and evaluate tactics during fleet operations and excercises. Resulting in new/improved tactics for utilization in various mixes of forces and weapon systems, including those being introduced, in various threat scenarios, directly adding to warfighting effectiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 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 1989 Program: Develop new/advanced tactics for:

a. (U) SSN's executing ASW and ASUW missions.

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.

Program Element: 0605155N Budget Activity: 6
Program Element Title: Fleet Tactical Development and Evaluation
Project Number: R0151 Project Title: Tactical Development and Evaluation

g. (U) AAW.

h. (U) Redefine TDA software for desk-top computers.

3. (U) FY 1990 Plans: Continue near term efforts to correct tactical deficiencies identified through fleet operations and exercises.

a. (U) Increase emphasis on developing and evaluating tactics as warfighting multipliers.

b. (U) Respond to future tactical development needs to keep pace with rapidly changing tactical scenario.

c. (U) Continue to redefine TDA for desk-top computers to enhance BG commanders' utilization of warfighting resources.

4. (U) FY 1991 Plans: Continue tasks as shown in FY 1990 plans above.

5. Program to Completion: This is a continuing program.

D. (U) WORK PERFORMED BY:

(1) IN HOUSE: NAVTACSUPPACT, Silver Spring, MD, and OPTEVFOR Norfolk, VA.

(2) CONTRACTORS: Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA; Center for Naval Analyses, Alexandria, VA; and OMNI Analysis Inc., San Diego, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 90 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	NONE	-8,159K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Reduction of -8,159K limits program growth.

Program Element: 0605155N Budget Activity: 6
Program Element Title: Fleet Tactical Development and Evaluation
Project Number: R0151 Project Title: Tactical Development and Evaluation

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Program Element 0603711N, Fleet Tactical Development and Evaluation Support, funds data collection, analysis and exercise reconstruction in support of tactics evaluation and tactical deficiency identification efforts. There is no unnecessary duplication of effort within the U. S. Navy or 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: This is a continuing project.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605156M Budget Activity: 6
Program Element Title: Marine Corps Operational Test and Evaluation
Project Number: C0033 Project Title: Operational Test and Evaluation Support (OT&E)

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C0033	OT&E	571	1,294	1,359	1,427	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program supports Marine Corps Operational Test and Evaluation Activity (MCOTEA) field representative for Marine Corps OT&E. It also supports 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 preparation of independent evaluation reports.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Retested Short Term Anti-Jam (STAJ) IOT&E, tested and published Independent Evaluation Reports (IERs) for Digital Communications Terminal (DCT) and Position Locating Reporting System (PLRS). Wrote test plans for Vehicle Magnetic Signature Duplicator (VEMASID), Digital Wideband Transmission System (DWTS), and Portable Collective Protection System (PCPS). OT&E the PCPS.

2. (U) FY 1989 Program: OT&E Trailer Launched Bridge (TLB), VEMASID, continue testing on PCPS and publish IERs. Test plans for Anti-personnel Obstacle Breaching System (APOBS), LAV-AD, HF and VHF/UHF Comm-Electronics Counter Measures (CECM), and High Frequency Communications Center (HFCC).

3. (U) FY 1990 Plans: OT&E VEMASID, LAV-AD, CECM, HFCC and publish IERs. Joint testing of C-17. Test plans for LAV-AG, Container Handler All Purpose (CHAP), and Advanced Tactical Air Command Center (ATACC).

4. (U) FY 1991 Plans: OT&E LAV-AG, CHAP and ATACC and publish IERs. Test plans for Surf Zone Mine Clearing (CATFAE), Joint Tactical Information Distribution Systems (JTIDS), and Small Navigation Units (SUNS).

5. (U) Program to Completion: Test plans for the Portable Mine Detector (PMD), and Digital Data Subsystem (DDS). OT&E PMD and DDS. Continuing.

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Technical Information Services	2,741	2,577	3,630	3,659	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This element influences, through evaluation and feedback by Navy scientists and engineers, the $5 billion industry - investment in Independent Research and Development (IR&D), and supports Navy dissemination of IR&D benefits. Public Law 91-441 requires companies with substantial DOD recovery to present IR&D programs for technical evaluation, with results used in setting of cost pool ceilings. Effort also identifies technological gaps that IR&D projects should address and supports interactions to multiply benefits of industry efforts. The element supports transfer of Navy technology to business and local governments for civil use, according to statutes, government policy, and regulations--Public Law 96-480, OMB Circular A-109, and Federal Technology Transfer Act of 1986--through Navy Acquisition Research and Development Information Centers; Navy technology publications; domestic technology transfer; review of patents and inventions for potential licensing; offices for research and technology transfer assistance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Increased company assignments. IR&D data base to assess neglected technology areas distributed. Promoted domestic tech transfer through symposia, directives, and visual presentations.
2. (U) FY 1989 Program: Develop programs to match Navy mission areas and IR&D projects to direct, concentrate effort for economical support, strengthen evaluation, disseminate results. Implement domestic tech transfer program.
3. (U) FY 1990 Plans: Develop/install computerized IR&D evaluation system. Increase Navy tech transfer via cooperative agreements.
4. (U) FY 1991 Plans: Increase quality of IR&D review and results and lab contributions to tech transfer through linked data bases.
5. (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: Navy efforts coordinated/conducted Army and Air Force. Policy guidance from the Under Secretary of Defense (Acquisition).

F. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) Not applicable.

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

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0115	**Supreme Allied Commander Atlantic, Undersea Research Centre (SACLANTCEN)**						
		1,246	1,239	1,388	1,426	Cont	Cont
R0149	**International Cooperative RDT&E**						
		0	1,895	6,158	6,802	Cont	Cont
TOTAL		1,246	3,134	7,546	8,228	Cont	Cont

B. (U) **BRIEF DESCRIPTION OF PROGRAM ELEMENT:** Provides program management, execution and support 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, not just NATO, 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 1990/1991 BIENNIAL 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) **PROJECT DESCRIPTION**: This project provides support for U.S. civilian scientific and technical personnel assigned to the NATO Supreme Allied Commander Atlantic, Undersea Research Centre at La Spezia, Italy. The Centre's technical program is focused on integrating the latest technologies in advanced ASW systems that can be employed by NATO nations at low cost and with minimum delay.

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 1988 Accomplishments**:
   a. (U) Accepted delivery of new research vessel ALLIANCE. Completed outfitting and sea trials.
   b. (U) Conducted Phase II, NATO Military Oceanography (MILOC) Acoustic Survey, "RESOLUTE SUPPORT". Continued analysis of Phase I data.
   c. (U) Completed calibration/testing of a new array.
   d. (U) Continued advanced research/development programs in military oceanography, underwater acoustics, and systems development.
   e. (U) Continue to advise/assist SACLANT, NATO Naval Commanders and NATO nations in the area of ASW operations.

2. (U) **FY 1989 Program**:
   a. (U) Complete acquisition of RESOLUTE SUPPORT data.
   b. (U) Complete calibration/testing of a new 64 hydrophone array.

3. (U) **FY-1990 Plans**:
   a. (U) Continue oceanographic/acoustic research and ASW studies.
   b. (U) Complete RESOLUTE SUPPORT final report.

4. (U) **FY 1991 Plans**:
   a. (U) Continue oceanographic/acoustic research and ASW studies.

5. (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; NORDA, Stennis Space Center, MS. Contractors: AMRON Corporation, Falls Church, VA.

F. (U) **RELATED ACTIVITIES**: NATO provides project funding.

G. (U) **OTHER APPROPRIATED FUNDS**: N/A

H. (U) **INTERNATIONAL COOPERATIVE AGREEMENTS**: NATO SACLANT ASW Research Centre Charter 31 Oct 1962

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605857N **Budget Activity:** 6
Program Element Title: International RDT&E
Project Number: R0149 **Project Title:** International Cooperative RDT&E

C. (U) **PROJECT DESCRIPTION**: Project provides salaries, training for essential language skill for the ESP Program, administrative, and technical support including work share/cost share analysis, intellectual property rights analysis, balance of payments provisions, 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. Int'l 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. and allied forces.

1. (U) **FY 1988 Accomplishments**: Not Applicable

2. (U) **FY 1989 Program**:
   a. (U) Develop and negotiate 50 MOU with allies nations to develop technology, weapon systems and equipments and acquire allied technology through licensed production in the U.S.
   b. (U) Expand cooperative R&D efforts to achieve 10% of the Navy's R&D budget in international collaborative efforts.
   c. (U) Manage/provide financial support for Navy participation in OSD NAC, FWE, and NCTP and other Congressional initiatives.

3. (U) **FY 1990 Plans**:
   a. (U) Continue FY 1989 plans.
   b. (U) Expand participation in exchange of technology and on-site examination of allied and Latin American R&D efforts.

4. (U) **FY 1991 Plans**:
   a. (U) Continue FY 1989/1990 plans.
   b. (U) Seek new areas for closer cooperation with our allies and Latin America to reduce redundant expenditures of RDA resources.

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

E. (U) **WORK PERFORMED BY**: In-house: NOS,Indian Head, MD; CONTRACTORS: TBD

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**: N/A

H. (U) **INTERNATIONAL COOPERATIVE AGREEMENTS**: N/A

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0135	OCNR Management Support	42,087	46,292	46,203	48,409	Cont.	Cont.
R1855	Science/Engineering Training Support	376	403	836	860	Cont.	Cont.
M0104	NAVMED Management Support	5,792	6,191	7,201	7,196	Cont.	Cont.
X0832	DNL Management Support	1,365	1,733	2,313	2,411	Cont.	Cont.
		49,620	54,619	54,553	58,876		
Total		49,620	54,619	56,553	58,876	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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.

FY 1990/1991 BIENNIAL 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)

Popular Name		FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0135	OCNR Management Support	42,087	46,292	46,203	48,409	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

OCNR Management Support provides basic costs at the Office of the Chief of Naval Research (OCNR) Headquarters, OCNR Branch Office/field detachments and the Naval Ocean Research and Development Activity (NORDA). This project pays for the salaries, rent, utilities and supplies which support direction of the entire Navy Technology Base. Nearly all costs are fixed. Functions performed include: (1) Scientific and technical direction of the nationwide Category 6.1 basic research program with colleges/universities/Navy laboratories; (2) scientific and technical direction of the 6.2 exploratory development programs through the Navy's R&D laboratories and centers; (3) management, resource formulation, program assessment and contract negotiation/administration of the entire research and exploratory development program for the Navy; (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.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS

1. (U) FY 1988 Accomplishments : This project funded basic costs at OCNR Headquarters, the OCNR Branch Office/field detachments and NORDA.

2. (U) FY 1989 Program: The project will continue to provide support for the OCNR Headquarters, the OCNR Branch Office/field detachments and NORDA.

3. (U) FY 1990 Plans : The project will continue to provide basic costs of the OCNR Headquarters and its activities in support of the entire Navy Technology Base mission. Specifically, it pays salaries of scientific/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/asministrative support to SDIO, DARPA, CNO and SBIR. Almost all

the funds in this project are fixed costs, such as salaries, headquarters building rent, communications, etc.

4. (U) FY 1991 Plans: The project will continue to provide support for the OCNR Headquarters, the OCNR Branch Office/field detachments and NORDA.

5. (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; ONRBRO, London, England; ONRFE, Tokyo, Japan; NORDA, Bay St. Louis, MS; ONRDET Boston, MA; and ONRDET Bay St. Louis, MS. Contractors : Not applicable.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	-$3,366

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The reduction of -3,366 will require adjustments in overhead and support.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: The Navy's Technology Base (Categories 6.1 Basic Research and 6.2 Exploratory Development) and 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: This is a non-acquisition program.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS : None.

J. (U) MILESTONE SCHEDULE : Not applicable.

FY 1990/1991 BIENNIAL 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) PROJECT 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:

1. (U) FY 1988 Accomplishments: Provided long term professional training and education to 47 persons.

2. (U) FY 1989 Program: Plan to provide long term professional training and education for at least 50 persons.

3. (U) FY 1990 Plans: Plan to provide long term professional training and education for at least 50 persons.

4. (U) FY 1991 Plans: This is a continuing 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: This is a non-acquisition program.

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: A continuing program which 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 1988 Accomplishments:

(a) (U) Provided management support for operations at Naval Medical Research and Development Command Headquarters, three in-house laboratories and two detachments.

(b) (U) Provided increased support for further development of the Naval Medical Research Institute Detachment in Lima, Peru.

(c) (U) Provided increased support for research efforts in Sudan and Somalia by the U. S. Naval Medical Research Unit No. 3, Cairo, Egypt.

2. (U) FY 1989 Program: Continue to provide support as described above for those activities identified in paragraph E below.

3. (U) FY 1990 Plans: Continue to provide management support for activities identified in paragraph E below.

4. (U) FY 1991 Plans: Continue to provide management support for those activities identified in paragraph E below.

5. (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, Idonesia; U. S. Naval Medical Research Unit No. 3, Cairo, EG; Naval Medical Research Institute Detachment, Lima, PE. Contractors: No major contracts.

F. (U) RELATED ACTIVITIES: Program Element 0605852N, RDT&E Instrumentation & Material Support, funds investment items and general purpose equipment for activities in this program element.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605861N Budget Activity: 6
Program Element Title: RDT&E Laboratory and Facilities Management
Project Number: X0832 Project Title: DNL Management Support

C. (U) PROJECT DESCRIPTION: Support centrally managed interlaboratory projects at the SPAWAR 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, support to 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) FY 1988 Accomplishments: Provided support to the centrally managed interlaboratory projects and for residual costs. This is a continuing level of effort program.

2. (U) FY 1989 Program: Continue to provide support as described above.

3. (U) FY 1990 Plans: Continue to provide support as described above.

4. (U) FY 1991 Plans: Provide support as described above.

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

E. (U) WORK PERFORMED BY: In-House: David Taylor Naval Ships Research and Development Center, Bethesda MD; Naval Surface Weapon Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA; Naval Undersea Systems Center, Newport, RI.; U. S. Office of Personnel Management, Washington, D. C..

F. (U) RELATED ACTIVITIES: None.

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

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

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605862N Budget Activity: 6
Program Element Title: RDT&E,N Navy Instrumentation and Material

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

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0137	OCNR Instrumentation and Material Support	5,990	3,990	5,433	5,679	Cont.	Cont.
R1997	Large Active Acoustic Pool	6,241	0	0	0	0	6,241
M0105	NAVMED Istrumentation and Material Support	3,368	3,639	3,983	4,779	Cont.	Cont.
S0353	NAVSEA Instrumentation and Material Support	1,063	1,104	1,433	1,475	Cont.	Cont.
W0566	NAVAIR Instrumentation and Material Support	1,566	1,804	2,037	2,610	Cont.	Cont.
X0799	SPAWAR Instrumentation and Material Support	273	291	304	314	Cont.	Cont.
X0833	DNL Instrumentation and Material Support	3,048	2,954	2,552	2,915	Cont.	Cont.
X1957	Large Cavitation Channel	20,058	15,906	16,188	0	Cont.	Cont.
Total		41,607	29,688	31,930	17,772	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF ELEMENT: 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 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's space program, and a number of other programs. This program supports general purpose research equipment requirements at the Naval Ocean Research and Development Activity (NORDA), the Navy technology base ocean science laboratory.

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project provides for general purpose research equipment support and equipment installation at NORDA for oceanographic and acoustic research and development programs; for ADP equipment related to OCNR Headquarters; for support equipment and alterations for OCNR Headquarters and its Branch Office/detachments; and for general purpose research equipment and minor construction at NPRDC. Acquisition of new research equipment is essential to conduct experiments and perform analysis for the development of real-time performance prediction systems and prototype data bases required for system design and development.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Acquired measurement equipment and real-time analysis capabilities in support of ASW acoustics, and ocean modeling/oceanographic measurement. Equipment for OCNR offices/detachments was supported.

2. (U) FY 1989 Program: NORDA will obtain general purpose 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 will be supported.

3. (U) FY 1990 Plans: NORDA will purchase acoustic measurement systems in support of environmental acoustic effect in Air Defense Initiative (ADI), High Gain Initiative, and the AEAS program. Equipment for OCNR offices/detachments will be supported.

4. (U) FY 1991 Plans: Norda will continue acquisition of general purpose research equipment to support acoustics and oceanography R&D programs. Equipment for OCNR offices/detachments will be supported.

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

E. (U) WORK PERFORMED BY: In-House: Naval Ocean Research and Development (NORDA) Activity, Stennis Space Center, MS; Navy Personnel Research and Development Center, San Diego, CA; Office of the Chief of Naval Research, Arlington, VA. Contractors: TBD.

F. (U) RELATED ACTIVITIES: The Navy's Technology Base oceangraphic programs; PE 0605861N (RDT&E,N Laboratory and Facilities Management Support) and PE 0603785N, project 2017 (Advanced Underwater Acoustic Model Program) and other Navy R&D programs in oceanography being performed by NORDA.

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: 0605862N Title: RDT&E,N Instrumentation and Material Support
Budget Activity: 6 Defense-wide Mission Support

C. (U) PROJECT NUMBER: R1997 PROJECT TITLE: Large Active Acoustic Pool Facility

D. (U) PROJECT DESCRIPTION: This project provides for the procurement of specialized target echo pool equipment at the Naval Research Laboratory. Such equipment is required for the precise measurement of active target echo characteristics for a very comprehensive range of conditions involving bandwidth and source-receiver placements, the latter including farfield/nearfield receivers and sources and full three-dimensional bistatics.

E. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Completed a new facility to provide capability to conduct experiments that cannot be provided by the upgraded facility. The upgraded facility is still required for experiments involving higher acoustic frequencies.

2. (U) FY 1989 Program: Not Applicable.

3. (U) FY 1990 Planned Program: Not Applicable.

4. (U) FY 1991 Planned Program: Not Applicable.

5. (U) Program to Completion: Not Applicable.

F. (U) WORK PERFORMED BY: Contract: Pittsburgh-Des Moines, Pittsburgh, PA.

G. (U) RELATED ACTIVITIES: This is a non-acquisition program.

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

FY 1990/1991 BIENNIAL 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 Instrument and Material Support

C. (U) PROJECT DESCRIPTION: This continuing 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. Provides funds to meet Congressionally-mandated standards for Laboratory Animal Facilities.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 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 of all laboratory animal facilities toward USD(R&E) directed goal of meeting American Association for Accreditation of Laboratory Animal Care (AAALAC) standards.

2. (U) FY 1989 Program: Continue to provide support as described above for those activities identified in paragraph E below.

3. (U) FY 1990 Plans: Continue to provide management support as for those activities identified in paragraph E below.

4. (U) FY 1991 Plans: Continue to provide management support for those activities identified in paragraph E below.

5. (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. Contractors: No major contracts.

F. (U) RELATED ACTIVITIES: Program Element 0605862N (RDT&E Instrumentation & Material Support) funds investment items for activities supported by this program element.

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

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: Funding in this project is used for procurement of needed safety and station equipment; first destination transportation; and the Hulk program providing storage, special configuration and maintenance of RDT&E ship hulks.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Procurements of a small generic off-the-shelf nature; funding is projected to continue on a level basis; continued to support HULK program.

a. (U) Provided first remotely controlled, powered hulk (ex-STODDARD DD-566), completing CIWS DT and OT.

b. (U) Provided technical, engineering and management services for target hulk pool.

c. (U) Provided modifications to meet user requirements.

2. (U) FY 1989 Program: Procure needed safety and station equipment; complete conversion of ex-SOUTHERLAND DD-743 for HARPOON support; provide technical, engineering and management service for target HULK pool; and provide modifications to meet user requirements first destination transportation.

3. (U) FY 1990 Plans: 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 modifications to meet user requirements.

4. (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.

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

E. (U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Pt. Mugu, CA; Naval Explosive Ordnance Disposal Technology Center, Indian Head, MD. Equipment procured from private vendors.

F. (U) RELATED ACTIVITIES: Operational Test and Evaluation.

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

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This is a continuing project that supports energy conservation related projects at various Navy Research, Development, Test and Evaluation activities. It supports instrumentation/equipment and minor construction/alteration at the Naval Weapons Evaluation Facility, Albuquerque, NM.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

(a) (U) Provided funding for ten energy projects.

(b) (U) Procurement of mission essential equipment for the Naval Weapons Evaluation Facility.

2. (U) FY 1989 Program: Continue to provide support as described above.

3. (U) FY 1990 Plans: Continue to provide support as described above.

4. (U) FY 1991 Plans: Continue to provide support as described above.

5. (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, Bahamas.

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	Total Complete
This is a non-acquisition program						

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

FY 1990/1991 BIENNIAL 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) PROJECT DESCRIPTION: This project provides for shipping of newly procured research and development materials from the manufacturers to its first destination (First Destination Transportation Costs).

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Supported as described above.

2. (U) FY 1989 Program: Continue support as described above.

3. (U) FY 1989 Plans: This is a continuing level of effort.

4. (U) FY 1991 Plans: This is a continuing 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: This is a non-acquisition program.

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

FY 1990/1991 BIENNIAL 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 Material Support

C. (U) PROJECT DESCRIPTION: Funds general purpose equipment and minor construction under $200K. Provides supplemental support for Acoustic Research Center, San Diego, CA. Supports procurements which do not qualify for the Asset Capitalization Program (ACP) at other SPAWAR R&D Centers.

D. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: Provided minor construction and equipment support to NPRDC and support of the Acoustic Research Center and instrumentations not qualifying for the Asset Capitalization Program (ACP) at SPAWAR centers.

2. (U) FY 1989 Program: Support of the Acoustic Research Center and other areas noted in the project description above will continue.

3. (U) FY 1990 Plans: Continue to provide support as described above.

4. (U) FY 1991 Plans: Continue to provide support as described above.

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

E. (U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA and Naval Personnel Research and Development 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: No applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605862N Budget Activity: 6
Program Element Title: RDT&E Instrumentation and Material Support
Project Number: X1957 Project Title: Large Cavitation Channel

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
Large Cavitation Channel (LCC)	20,058	15,906	16,188	0	25,604	84,295

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides a pressure-controlled water channel (similar to a wind tunnel) 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 radiated noise, reduced vibration, and 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 1988 Accomplishments:
   a. (U) Continued fabrication of the channel
   b. (U) Began installation of the channel at Memphis, TN.

2. (U) FY 1989 Program:
   a. (U) Complete fabrication of the channel.
   b. (U) Continue installation of the channel.

3. (U) FY 1990 Plans:
   a. (U) Complete installation of the channel.
   b. (U) Conduct acceptance tests.
   c. (U) Conduct initial calibration.

4. (U) FY 1991 Plans:
   a. (U) Commence operation under lease agreement. (Funded by OMN account).
   b. (U) Continue model testing (Funded by OMN account).

5. (U) Program to Completion: Program will be completed in 1994.

Program Element: 0605862N Budget Activity: 6
Program Element Title: RDT&E Instrumentation and Material Support
Project Number: X1957 Project Title: Large Cavitation Channel

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+16,188

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Funding increases are for property improvements, change orders and initial calibration.

F. (U) PROGRAM DOCUMENTATION:

Acquisition Plan	July 1986
Contract Award Documents	July 1987

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

J. (U) MILESTONE SCHEDULE:

Awarded contract	July 1987
Complete channel fabrication	June 1989
Complete channel installation	May 1990
Complete acceptance testing	July 1990
Complete initial calibration	September 1990
Commence channel operation	October 1990

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S0354	RDT&E Ships Support	9,913	8,049	30,408	19,056	Cont.	Cont.
W0568	RDT&E Aircraft Flight Hours	11,922	10,887	11,607	12,249	Cont.	Cont.
W0569	RDT&E Aircraft Support	51,079	51,544	58,236	58,867	Cont.	Cont.
R1999	Oceanographic Research Ship Support	15,426	14,886	0	0	0	30,312
Total		88,340	85,366	100,251	90,172	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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, 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, which will increase the warfighting capability of the fleet.

FY 1990/1991 BIENNIAL 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 Ship Support

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
RDT&E Ship Support	9,913	8,049	30,408	19,056	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 Site (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 the FY 90-91. This overhaul is scheduled to support the SSN-21 material certification. 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 threat requires self-defense weapon systems that are capable of adequately countering the ASCM's into the year 2000. The National Defense Authorization Act for FY 87, section 910, "Testing of Certain Weapons Systems 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 (USS DECATUR will be converted to the SDTS). The SDTS plans call for testing Rolling Airframe Missile (RAM) (TEIN 286), Close-In-Weapons System (CIWS) (TEIN 142-1), NATO Sea Sparrow/RAM Ordalt (TEIN 0502), and future short range AAW systems against realistic threat presentations in an at-sea environment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments: (a) DOLPHIN supported upper ocean turbulence testing for ONR, "Clipper Shale" program, and "Vorticity Meter" experiments; (b) DOLPHIN conducted sonar propagation measurements. (c) FLIP and ORB conducted underwater acoustic and noise phenomena research to support ASW needs.

Program Element: 0605863N Title: RDT&E Ship and Aircraft Support

2. (U) FY 1989 Program: (a) DOLPHIN will support near bottom operations and RDT&E concerning wake detection, sonar propagation and under ice navigation; (b) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs.

3. (U) FY 1990 Plans: (a) DOLPHIN will support near bottom operations and RDT&E concerning wake detection, sonar propagation and other acoustic research in deep ocean; (b) DOLPHIN will transit to east coast and enter a shipyard for regularly scheduled overhaul (ROH) and a major conversion to include a new bow section for SSN 21 evaluation; (c) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs; (d) DECATUR will start conversion to 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.

4. (U) FY 1991 Plans: (a) DOLPHIN will complete major ROH/conversion and upon completion DOLPHIN will conduct certification tests on the new bow for SSN 21 evaluation; (b) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs; (c) 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.

5. (U) Program to Completion: (a) DOLPHIN will continue SSN 21 program certification tests; (b) DOLPHIN will support near bottom operations and other RDT&E programs testing advanced submarine structures, sensors, weapons and machinery systems; (c) FLIP/ORB will conduct underwater acoustic and noise phenomena research to support ASW needs; (d) DECATUR will conduct SDTS sea trials and RAM weapon system testing. Upon completion of RAM testing in 1993 the SDTS will be available for other short range AAW systems testing as required. This is a continuing program.

D. (U) WORK PERFORMED BY: In-House: Naval Ship Weapon 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. Contractor: Applied Research Laboratories, Austin, TX; Charles Stark Draper Laboratories, Cambridge, MA; Woods Hole Ocean Institute, Woods Hole, MA: University of California, San Diego, CA; Johns Hopkins University, Applied Physics Laboratory, Laurel, MD.

Program Element: 0605863N Title: RDT&E Ship and Aircraft Support

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHD	None	None	None
COST	None	None	+21,401K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: The Navy adjustment of +21,401K in FY 90 is a transfer from O&M,N to properly budget for the overhaul/conversion of USS DOLPHIN.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:
a. DECATUR: Program Element 0604369N, (Rolling Airframe Missile);
b. DOLPHIN: Program Element 0603569N, (Attack Submarine Development).

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

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

J. (U) MILESTONE SCHEDULE: FY 90 Start DECATUR conversion to SDTS
FY 90 Start DOLPHIN new bow conversion/ROH
FY 91 Complete DECATUR conversion
FY 91 DOLPHIN complete bow conversion/ROH and conduct certification trials
FY 92 DECATUR sea trials and RAM testing
FY 93 Complete RAM testing on DECATUR

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
RDT&E ACFT FLT HRS	11,922	10,887	11,607	12,249	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 1988 Accomplishment:

a. (U) Flew a total of 9,942 flight hours for pilot training/ qualifications and for testing in support of RDT&E projects.

2. (U) FY 1989 Program:

a. (U) Continue providing the maintenance and support for aircraft required by RDT&E Projects.

3. (U) FY 1990 Plans:

a. (U) Continue providing the maintenance and support for aircraft required by RDT&E Projects.

4. (U) FY 1991 Plans:

a. (U) Continue providing the maintenance and support for aircraft required by the RDT&E Projects.

5. (U) Program to Completion:

a. (U) Plan to fly a total of 9500 flight hours for pilot training/qualification and for testing in support of RDT&E project each fiscal year during FY 1992 through FY 1994.

b. (U) Will continue to provide maintenance for this project's portion of the aircraft inventory.

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

c. (U) Will continue to provide fuel, oil, and lubricants for these aircraft.

d. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: 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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	None	None	None
SCHED	None	None	None
COST	None	Reduced Flying Hours	-4,871

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The -$4,871K reduction will reduce the flight hours by approximately 820 hours.

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: This is a continuing project.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
RDT&E ACFT SPT	51,079	51,544	58,236	58,867	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides for the depot level maintenance and rework of 202 RDT&E, N aircraft required to accommodate test and evaluation of new weapons systems that are being developed. 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 1988 Accomplishment

a. (U) Eleven aircraft were reworked.

b. (U) The following programs were supported: AVDLRs for all air craft in the RDT&E inventory (202 aircraft), Flight Test Instrumentation Pool Equipment, and bailed aircraft to contractors (40 aircraft) including consumables.

2. (U) FY 1989 Program:

a. (U) Seventeen 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 1990 Plans:

a. (U) Ninteen 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) FY 1991 Plans:

a. (U) Nineteen aircraft will be reworked.

Program Element: 0605863N Budget Activity: 6
Program Element Title: RDT&E SHIP AIRCRAFT SUPPORT
Project Number: W0569 Project Title: RDT&E Aircraft Support

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.

5. (U) Program to Completion:

a. (U) An estimated twenty aircraft will be reworked each out year.

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.

c. (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Air Test Center, Patuxent, MD., 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; 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, Long Island, NY, Bell Helicopter, FT. Worth, TX.

E. (U) COMPARISON WITH FY 1989 DESCRIPTIVE SUMMARY: (Dollars in Thousands)

IMPACT OF CHANGES

CHANGE	System Capabilities	Schedule	Budget Year Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	Delay SDLMs	-9,958K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable

2. (U) SCHEDULE CHANGES: Not applicable

3. (U) COST CHANGES: The -9,958K reduction will result in less SDLMs, AVDLRs IMRL support and bailed aircraft support. This would reduce the number of aircraft available for testing and evaluation of new weapons systems.

Program Element: 0605863N Budget Activity: 6
Program Element Title: RDT&E SHIP AIRCRAFT SUPPORT
Project Number: W0569 Project Title: RDT&E Aircraft Support

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 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
W0541	AUTEC	46,503	49,353	52,167	56,386	Cont.	Cont.
W0653	PMTC	94,307	102,380	108,249	114,624	Cont.	Cont.
W0654	NATC	75,087	77,891	87,598	92,225	Cont.	Cont.
W0655	NAPC	24,085	23,577	25,035	26,528	Cont.	Cont.
W0657	NWC	64,998	69,839	73,864	79,940	Cont.	Cont.
Total		304,980	323,040	346,913	369,703	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: 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 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 to providing weapon systems that will improve the fleet's warfighting capability. This program also provides support for operation and maintenance for the Santa Cruz Radar Cross Section (RCS) range used to measure the RCS of ships or boats in the sea environment.

FY 1990/1991 BIENNIAL 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

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

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
AUTEC	46,503	49,353	52,167	56,386	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The concept of the Atlantic Undersea Test and Evaluation Center (AUTEC) is to enhance submarine and ASW technologies. AUTEC includes three distinct ranges: Weapons Range, Fleet Operational Readiness Accuracy Check Site, and Acoustic Range. The Weapons Range provides three-dimensional (undersea, surface, air) precision tracking capability in support of Anti-Submarine Warfare 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 1988 Accomplishments:

a. (U) Defined a distributed data processing/communication system.
b. (U) Continued upgrades for Operations Security (OPSEC).
c. (U) Continued Sonobouy Tracking System Improvements.
d. (U) Continued to operate and maintain required T&E capability.
e. (U) Funded rent payment to Bahamian government.

2. (U) FY 1989 Program:

a. (U) Implement a distributed data/communication system.
b. (U) Continue OPSEC improvements.
c. (U) Initiate the design configuration for a deep water torpedo noise measurement system.
d. (U) Sustain capability to conduct range test and evaluation by funding required level of maintenance.

3. (U) FY 1990 Plans

a. (U) Maintain and repair physical plant, purchase critical marine spares; perform marine craft maintenance; implement operational safety equipment such as weather radars; continue contract administration support and rental payments to Bahamian government.

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) Implement OPSEC physical security upgrades.
c. (U) Complete torpedo noise measurement system capabilities.
d. (U) Continue a distributed data/communication system.

4. (U) FY 1991 Plans:

a. (U) Maintain and repair physical plant; maintain adequate marine spares and marine craft readiness; OPSEC maintenance and operations; contract administration and facility rental.
b. (U) Procure a Torpedo Launch Tube on board an AUTEC vessel to support new development weapon vehicles.
c. (U) Continue the distributed data/communication system.
d. (U) Complete OPSEC physical security upgrades.

5. (U) Program to Completion:

a. (U) Maintain and repair physical plant; support OPSEC and GPS maintenance and operations; support underwater cable maintenance; contract administration and facility rental.
b (U) Complete OPSEC improvements.
c. (U) Remove the acoustic array at site 1.
d. (U) Develop simulations and computer models to replace some expensive wet measurements.
e. (U) Initiate acoustic countermeasures in weapons T&E testing.
f. (U) Complete the distributed data/communication system.
g. (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; David Taylor Research Center, Bethesda, MD; and Naval Oceanographic Office, Suitland, MD. Contractors: The Maintenance and operation of the AUTEC is being performed by RCA Service Co., Cherry Hill, NJ. Imperial Aviation, West Palm Beach, FL, as a subcontractor to RCA Service, provides aircraft and maintenance services.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
TECH	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	Delay in developing and replacing fixed bottom mounted acoustic array	-11,472K

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

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The FY 90 Navy program adjustment of -11,472K will delay the technical development I&M investments of the range equipment supporting the Navy's ASW RDT&E program.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Program Element 0604940D, Test Instrumentation Development: Initiate a deep water RDT&E ASW range off of Eleuthra as defined in Vol I of Navy's Long Term Under Water Support Resources Plan. Initiate portable tracking system fabrication, logistic support and at-sea-test. Initiate Range GPS Upgrade.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
This is a non-acquisition program						
(U) MILCON	0	0	4,140	0		4,140

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

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
PMTC	94,307	102,380	108,249	114,624	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: 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 provided 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. Additionally, this project will provide support for the maintenance and operations of an ocean environment Radar Cross Section (RCS) Facility.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Initiated procurement of Operational Security (OPSEC) communications, telemetry, scheduling and physical security improvements.
b. (U) Completed the instrumentation on the first of three Extended Area Test System (EATS) aircraft to provide tracking and data collection of multiple participants involved with over-the-horizon test scenarios.
c. (U) Supported range capability through adequate maintenance funding.

2. (U) FY 1989 Program:

a. (U) Sustain capability to conduct range test and evaluation by required maintenance funding level.
b. (U) Continue with metric radar and telemetry upgrades.
c. (U) Continue OPSEC improvements. Complete secure telemetry.
d. (U) Initiate series for procurement of state-of-the-art displays in the range tracking and control rooms.
e. (U) Procure three airborne telemetry systems for the EATS.
f. (U) Initiate improvements to range computer systems.

3. (U) FY 1990 Plans:

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.
c. (U) Complete the instrumentation on the second EATS aircraft.
d. (U) Initiate replacement of the range data processing center's real time computers.
e. (U) Initiate procurement of upgraded Naval Tactical Data System (NTDS) consoles for range surveillance, clearance and control.
f. (U) Initiate support for an ocean environment RCS facility.
g. (U) Initiate range operations control room modernization.
h. (U) Initiate underwater fiber optics link with San Nicolas Island.

4. (U) FY 1991 Plans:

a. (U) Maintain and repair physical plant; over the horizon test areas; OPSEC implementation and range operations, development and support functions.
b. (U) Continue OPSEC voice and data link improvements.
c. (U) Continue range operational control room modernization.
d. (U) Continue procurement of the range data processing center's real time computers.
e. (U) Continue the procurement of NTDS consoles and computer.
f. (U) Continue support for an ocean environment RCS facility.
g. (U) Continue underwater fiber optics link.
h. (U) Implement physical security improvements with OPSEC Milcon Project.

5. (U) Program to Completion:

a. (U) Sustain capabilities with physical plant upgrades; OPSEC and GPS support; over-the-horizon test support; EW Threat Simulation over an ocean range and continued range operations, development and support functions.
b. (U) Complete OPSEC improvements program.
c. (U) EATS airborne and computer improvements to be completed.
d. (U) Replace the range data processing center's computers, supporting non-realtime data processing.
e. (U) Complete fiber optic cable system linking Point Mugu to Vandenberg, San Nicolas Island, Santa Cruz Island and San Clemente Island.
f. (U) Complete range operational control room update.
g. (U) Complete NTDS procurements.
h. (U) Continue support for an ocean environment RCS facility.
i. (U) This is 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 Triga, Camarillo, CA.

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test And Evaluation Support
Project Number: W0653 Project Title: Pacific Missile Test Center

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	Delay Range Computers/Fiber Optic/NTDS Procurements	-21,003K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The FY 90 Navy program adjustment of -21,003K will impact procurement of real time range computers. Range clearance, surveillance and control will be impacted by the delay of procuring all the required NTDS upgrades. Delays in the installation of a fiber optic cable system will impact data return from test programs in outer areas of the sea test range.

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 major strategic missile and space programs.

Program Element 0604940D, Test Instrument Development: Initial development, procurement and implementation for fixed and mobile threat simulators, resource monitoring, jammers and deception simulators and IR target capability. Procurement of two mobile Multiple Obtect Precision Tracking Radars. Initiate Range GPS Upgrade.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
This is a non-acquisition Program						
(U) MILCON	0	20,470	0	2,060		22,530

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

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
NATC	75,087	77,891	87,598	92,225	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Naval Air Test Center performs test and evaluation of the total aircraft, including mission system, 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 costs of the facility not chargeable to the user under the DoD Uniform Funding Policy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Improved aerial drone and Surface Seaborne Target (SEPTAR) control, sea electronic emitter and underwater target simulation.
b. (U) Continued to support capability required for T&E through adequate maintenance funding.
c. (U) Initiated funding to provide improvements to the airfield.
d. (U) Initiated improvements to stimulate Electronic Warfare (EW) avionics.
e. (U) Procure initial phase of a new real time telemetry system.

2. (U) FY 1989 Program:

a. (U) Continue range improvements.
b. (U) Sustain capability to conduct test and evaluation through required maintenance funding (airfield upgrades).
c. (U) Continue Operational Security (OPSEC) improvement.
d. (U) Continue real time telemetry procurement.

3. (U) FY 1990 Plans:

a. (U) Physical plant maintenance and repair (including comprehensive airfield renovation); increase simulation capabilities including: upgrades to the Electronic Warfare Integrated Systems Test Lab (EWISTL), threat emulation for electromagnetic pulse and other directed energy threats; realistic threat emitters; technical training; OPSEC, range operations and support functions.

b. (U) Implement physical security for OPSEC program.
c. (U) Complete funding for telemetry acquisition system.
d. (U) Complete funding of the Manned Flight Simulator complex.
e. (U) Initiate electromagnetic pulse lighting high power microwave and directed energy test capabilities.
f. (U) Initiate procurement of range data computer processors.
g. (U) Initiate compact portable TM station for use aboard carriers.

4. (U) FY 1991 Plans:

a. (U) Sustain support for maintenance and repair (including comprehensive airfield renovation); increased support of simulation capabilities; realistic targets and threat EW emitters; OPSEC implementation; range operations and support functions.
b. (U) Complete secure ADP and physical security for OPSEC.
c. (U) Continue portable TM station.
d. (U) Procure new scientific processor, peripherals and software to improve core data processing computing capabilities.
e. (U) Initiate a range support aircraft instrumentation project to provide extended area coverage over the Atlantic area.
f. (U) Continue improved lightning, high power microwave and directed energy weapons threat simulation capabilities.

5. (U) Program to Completion

a. (U) Sustain capabilities with maintenance and repair; new simulation test facilities; realistic targets; OPSEC; coverage into the Atlantic Ocean areas; range operations and support functions.
b. (U) Complete OPSEC improvements program.
c. (U) Complete refurbishment of airfield pavements and lighting.
d. (U) Complete project for range tracking system improvements.
e. (U) Continue procurement of ground based electronic warfare threat stimulators.
f. (U) Continue improvements to the anechoic chamber electronic warfare.
g. (U) Continue improvements to scientific processor.
h. (U) Complete upgrades to an extended range support aircraft.
i. (U) Complete microwave and directed energy threat test capabilities.
j. (U) Complete range surveillance system.
k. (U) This is a continuing program.

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.

FY 1990/1991 BIENNIAL 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

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	NONE	NONE	NONE
SCHD	Loss of Airfield use	Delays Improvement of Airfield readiness	-2,373K
COST	NONE	Delayed Procurement of Various Fixes	-4,229K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: The spreading out of repair funds for airfield renovation will cause loss of use of one runway for longer time periods.

3. (U) COST CHANGES: The FY 90 Navy Program adjustment of -4,229K will slip initiatives to improve electromagnetic pulse and lightning test capabilities, and extended range aircraft instrumentation.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES: Naval Air Test Center provides support to Naval Aviation Squadrons VX-1 and VQ-4, tests development aircraft; Surface Effects Test Facility supports development of surface effects vehicle projects, and Naval Electronic Systems Command Detachment, Naval Surface Weapons Center.

Program Element 0604940D, Test Instrument Development: Improvement and Modernization of an ACETEF component laboratory to include offensive sensor lab, closed loop test capability, operations and control center, communication, navigation and identification lab with manned flight simulator and aircrew systems evaluation facility. Initiate Range GPS Upgrade.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
This is a non-acquisition program						
(U) MILCON	9,060	2,000	3,000			14,060

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

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
NAPC	24,085	23,577	25,035	26,528	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The mission of the Naval Air Propulsion Center is (1) to test and evaluate air breathing gas turbine propulsion systems, their components and accessories and fuels and lubricants, and (2) to perform applied research and development leading to new propulsion systems and correction of design deficiencies and service problems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Continued support for test and evaluation of engine propulsion systems.

b. (U) Continued support to reduce backlog of maintenance and repair through adequate maintenance funding.

2. (U) FY 1989 Program:

a. (U) Major upgrade of test plant automation.

b. (U) System Rehabilitation and Maintenance (SRAM) for tilt rotor propulsion testing.

c. (U) Sustain capability to conduct test and evaluation by required maintenance funding level.

d. (U) Initiate the procurement of control room and test cell instrumentation upgrades.

3. (U) FY 1990 Plans:

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.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test Evaluation Support
Project Number: W0655 Project Title: Naval Air Propulsion Center

c. (U) Procure advanced measurement systems to meet technological advances in aircraft propulsion systems.

4. (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.

b. (U) Continue cell data acquisition and analysis systems.

5. (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 AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	Delay Plant Automation; repair of Gas Coolers	-5,562K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

FY 1990/1991 BIENNIAL RDT&E, NAVY DESCRIPTIVE SUMMARY

Program Element: 0605864N Budget Activity: 6
Program Element Title: Test Evaluation Support
Project Number: W0655 Project Title: Naval Air Propulsion Center

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: The FY 90 Navy Program adjustment of - 5,562K will impact the phased automation of speed controls on blowers, exhauster motors, and refrigeration system compressors which results in inefficient plan operations. Additionally, the adjustment will cause delays in the repair of critical test cell gas coolers.

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 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
NWC	64,998	69,839	73,864	79,940	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Naval Weapons Center Range, China Lake, CA is the principal Navy facility for the test and evaluation of air-to-air and air-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 test and evaluation costs not directly identified with a specific user program.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Continued to support range capability required for test and evaluation through adequate maintenance funding.
b. (U) Continued Operations Security (OPSEC) and ordnance system test capabilities.
c. (U) Initiated target control improvements to meet realistic target presentation requirements.
d. (U) Initiated technical and operational improvements of the existing Radar Cross Section range (RCS).
e. (U) Continued support to the Integrated Naval Air Defense System (INADS) through Improvement and Modernization and Operational Support.

2. (U) FY 1989 Program:

a. (U) Continue OPSEC improvements.
b. (U) Continue RCS improvements.
c. (U) Sustain capability to conduct range test and evaluation by required maintenance funding level.
d. (U) Continue support of INADS with computers data links and simulation techniques. Support personnel and spare part costs of INADS.
e. (U) Initiate procurements of range instrumentation capable of controlling and evaluating data for day/night operations; low RCS configurations and low altitude testing.

3. (U) FY 1990 Plans:

a. (U) Sustain capabilities with physical plant maintenance and repairs; additional personnel and spare part support for the 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 and physical security implementation.

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.

4. (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 RCS upgrades.

d. (U) Continue static propulsion data acquisition systems and warhead test optical instrumentation.

e. (U) Continue photo/electro optical system installations.

f. (U) Continue target control improvements.

g. (U) Continue range real time processing system upgrades.

5. (U) Program to Completion:

a. (U) Sustain capabilities with physical plant upgrades; spare parts augmented; INADS operation and maintenance costs to continue as threat simulators are installed; and continued range operations and support.

b. (U) Complete OPSEC investments, maintenance and operation.

c. (U) Complete real time processing upgrades.

d. (U) Upgrade EWTES real time computers.

e. (U) Complete photo/electro optical system upgrades.

f. (U) Complete computer and analysis software upgrades at the RCS facility.

g. (U) Continuing update program for propulsion, warhead and environmental testing of ordnance.

h. (U) Continue parachute, escape system and aerodynamic decelerator test and evaluation improvements.

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;

FY 1990/1991 BIENNIAL 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

Raytheon, Ridgecrest, CA; IBM, Los Angeles, CA; General Dynamics, San Diego, CA; Kentron, Mission Beach, CA; General Electronic Corporation, Los Angeles, CA; and Computer Sciences Corporation, Ridgecrest, CA.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	NONE	NONE	NONE
SCHD	NONE	NONE	NONE
COST	NONE	Delay Range TM, Comm, Data Analysis Systems, and Radar Cross Section Improvements	-9,006K

NARRATIVE DESCRIPTION OF CHANGES

1. (U) ENGINEERING CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: The FY 90 Navy Program action of -9,006K will delay range telemetry acquisition and communication systems, and parachute data analysis system upgrades and radar cross section computer upgrades.

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 Instrument Development: Initiate Range GPS upgrade and Anti-Radiation Missile (ARM) target development.

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

APPN/P-1	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
This is a non-acquisition program						
(U) MILCON	0	5,360	17,500	0		22,860

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

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
R0831	Operational Test and Evaluation Force Support	8,720	8,530	8,720	8,986	Cont.	Cont.

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: This program element 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, and the development and validation of tactics to enhance tactical employment of the systems. Operational test and evaluation of new weapon systems and the development and evaluation of tactics are required by directives of Secretary of Defense and by Public Law 98-94.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 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 weapon systems.

2. (U) FY 1989 Program: Continue to perform ongoing T&E for over 900 projects.

3. (U) FY 1990 Plans: Future plans are to operationally test and evaluate Chief of Naval Operations projects as required.

4. (U) FY 1991 Plans: To operationally test and evaluate Chief of Naval Operations projects as required.

5. (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.

FY 1990/1991 BIENNIAL 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 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
C1424	TENCAP	1,702	965	1,223	1,824	Continue	Continue

B. (U) BRIEF DESCRIPTION OF PROGRAM ELEMENT: Funds tactical USMC exploitation of national intelligence gathering systems. Congressionally directed, it requires close liaison with the intelligence community and involves complex and highly-sensitive activities. Involves training with national systems and participation in the JCS test plan for evaluation of capabilities.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS

1. (U) FY 1988 Accomplishments: Prepared Tactical Impact Statement (TIS) on a future national system. Co-sponsored planning for JCS TENCAP Special Project (SP) 1989. Fielded intelligence collection management and secondary imagery dissemination equipment for T&E. Completed Phase I evaluation of a portable imagery receipt and dissemination system.

2. (U) FY 1989 Program: Participate in national intel systems development (NISD). Submit TIS. Pursue emerging tech with Defense Special Project Office (DSPO) and other services to ensure Marine tactical forces fit the Warfighting CINCs intelligence architecture plans. Co-sponsor FY 1989 JCS TENCAP SP. Update Marine Corps Imagery Intelligence Plan (MCIIP) and TENCAP Plan.

3. (U) FY 1990 Plans: Participate in NISD and technology assessments with DSPO. Submit TIS. Evaluate collection management and secondary imagery dissemination equipment tested in FY 1988. Participate in JCS Corrective Actions Review Committee for SP 1989. Revise USMC Master Intelligence Plan.

4. (U) FY 1991 Plans: Participate in NISD technology assessments with DSPO. Submit TIS. Liaison with DSPO and other services. Participate in JCS SP 1991. Update MCIIP and USMC TENCAP Plan.

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

D. (U) WORK PERFORMED BY: In-house: SPAWAR, NAVSUP, and Secretary USAF (SS-8), Washington, DC; NOSC, San Diego, CA. Contractors: None.

E. (U) RELATED ACTIVITIES: None.

F. (U) OTHER APPROPRIATION FUNDS: None.

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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)

Project Number	Title	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
S2006	Productivity Investment	3,213	259	695	700	0	4,867

B. (U) BRIEF DESCRIPTION OF ELEMENT: Provides for productivity enhancing capital investments at specified research and development laboratories. Supports development, purchase and/or implementation of improved equipment, facilities, procedures and labor quality. 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 1988 Accomplishments:

a. Integrated CAD/CAM aircraft test support equipment (52 percent savings is projected).

b. (U) Provided an acoustic sensor system to enhance training capability for airborne ASW platforms, replacing expansive nonrecoverable sonobuoys. (Projected savings: $3.6M through FY 1991; $9.3M in FY 1992 and thereafter).

c. (U) Developed a Sidewinder Missile recovery system. (Projected savings: $4.9M per year).

d. (U) Converted weapon system test tracking instrumentation from 35mm film to high frame video.

2. (U) FY 1989 Program: Restore two 360-foot towers used for test of projectile and missile fuses and guidance systems T&E. (Projected savings: $1.8M FY-1997)

3. (U) FY 1990 Plans.

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 system to allow for receipt, development, review and production of a completed Ordnance Alteration Instruction in a digital medium.

4. (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.

5. (U) Program to Completion: Program completes in FY 1991.

D. (U) WORK PERFORMED BY: TBD.

E. (U) RELATED ACTIVITIES: None

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

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1990/1991 BIENNIAL 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)

Popular Name	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	To Complete	Total Program
MANTECH	41,888	43,310	40,999	41,168	Cont	Cont

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
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 $475M against an investment of $239M. The projected savings against this investment is $5.2B, or a return on investment of better than 22:1. Major areas of endeavor both underway and planned include: electronics assembly, laser metal working, flexible machining, computer integrated manufacturing, advanced composites manufacturing, automated ship propellor manufacturing, repair technology for aircraft, and advanced metal-working technologies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1988 Accomplishments:

a. (U) Established Navy Metalworking Productivity facility.

b. (U) Installed Laser Articulating Robotic System at Navy Metalworking Productivity Facility.

c. (U) Demonstrated a production prototype of automated electronic hybrid circuit manufacturing system.

d. (U) Completed the 3D Optical Parts Digitizing system which can electronically provide for a digital geometry profile of parts.

e. (U) Continued development of the Circuit Card Assembly and Processing System with Interim application of selected system modules.

f. (U) Continued the Best Manufacturing Practice Survey Program.

g. (U) Completed Very High Speed Integrated Circuit projects for third-level interconnect and low dielectric ceramics.

h. (U) Completed MT projects at Grumman relating to their Navy Industrial Modernization Incentive Program (IMIP).

2. (U) FY 1989 Program

a. (U) Continue on-going projects previously started.

b. (U) Initiate advanced repair technologies for aircraft rework.

c. (U) Initiate cost-effective manufacturing of airframe structures and aircraft components.

d. (U) Initiate advanced composites manufacturing.

Program Element: 0708011N Budget Activity: 6
Program Element Title: Industrial Preparedness
Project Number: R1050 Project Title: Manufacturing Technology

e. (U) Initiate silicon substrates packaging project.
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) Demonstrate automated ply laminating system for composite materials.

3. (U) FY 1990 Plans:
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 envirnoment by developing technology for deterministic metrology.
c. (U) Demonstrate advanced casting technology for 16" and 5" projectiles.
d. (U) Initiate project to develop technology for refurbishment of engine parts (turbine blades/vanes and static components).
e. (U) Demonstrate improved manufacturing process for ausrolling gears.
f. (U) Develop technology for automated tape laying of complex shapes.
g. (U) Develop shape melting technology for fabrication of ship and submarine components.
h. (U) Develop improved manufacturing technology for thermoplastic secondary aircraft structures.
i. (U) Continue support of National Shipbuilding Research Program.

4. (U) FY 1991 Plans:
a. (U) Demonstrate Circuit Card Assembly and Processing System.
b. (U) Demonstrate aircraft robotic laser paint stripper.
c. (U) Demonstrate artificial intelligence 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.

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

D. (U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; David Taylor Research Center, Bethesda, MD; Naval Research Laboratory, Washington, DC; Naval Surface Warfare Center, Silver Spring, MD; Naval Surface Warfare Center, Dahlgren, VA; Naval Weapons Support Center, Crane, IN; Naval Weapons Center, China Lake, CA; National Bureau of

Program Element: 0708011N Budget Activity: 6
Program Element Title: Industrial Preparedness
Project Number: R1050 Project Title: Manufacturing Technology

Standards, Gaithersburg, MD: Contractors: e.g. Hughes Aircraft Co., Los Angeles, CA; McDonnell Douglas Aircraft Corporation, St. Louis, MO; Grumman Aerospace Corporation, Bethpage, NY; Westinghouse Electric Corporation, Pittsburgh, PA; IBM, Owego, NY; MTS Systems Corporation, Minneapolis, MN; Robotic Vision Systems Inc., Hauppauge, NY; Metalworking Technology Inc., Johnstown, PA. Approximately 40 additional contractors are involved in the Navy Manufacturing Technology Program.

E. (U) COMPARISON WITH AMENDED FY 1988/1989 DESCRIPTIVE SUMMARY:

IMPACT OF CHANGES

TYPE OF CHANGE	Impact on System Capabilities	Impact on Schedule	Impact on FY 1990 Cost
ENG	Not applicable		
SCHD	Not applicable		
COST		Various	-30,799

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES:: Not applicable.

2. (U) SCHEDULE CHANGES: Not applicable.

3. (U) COST CHANGES: Reduction caused project stretch and new starts delays.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: This is the 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 1990/91 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

Project I.D.	Title (End Item Supported)	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1990 Estimate	Additional Out Year	Estimated Costs
SHIPBUILDING AND CONVERSION, Navy							
M0512	Flexible Mfg. System for Small Batch Metal Parts (All Ship Construction)	5779	3500	4000	4000	Continuing	33100
S1101	Propeller Integrated Computer Aided Mfg. (Ship Construction and Overhaul)	900	1900	2000	1500	200	8750
S0933	Fire Resistant Non-Metallic Bulkhead (All Ship Construction)	345	60	0	0	0	2210
S1218	National Shipbuilding Research Program (All Ship Construction)	500	500	1000	1775	Continuing	Continuing
S1401	Ultrasonic Inspecition of SIR Welds (All Ship Construction)	400	100	0	0	0	1600
S1109	Robotic Adaptive Welding System (URWS) (All Ship Construction)	665	400	1000	1100	0	4000
S1115	Propeller, shafting and Rudder Handling System (All Ship Construction)	60	50	0	0	0	1200
M0520	3D Optical System for IGES Format (Ship/Aircraft Repair or Overhaul)	475	0	0	0	0	1450
TOTAL FOR SUPPORT OF SHIPBUILDING AND CONVERSION, NAVY		9124	6510	8000	8375	Continuing	Continuing
AIRCRAFT PROCUREMENT, NAVY							
X0407	Circuit Card Assembly and Processing System (AN/AYK-14, UYS-1, EMSP, SUBACS, VHSIC)	15240	15850	6000	2000	20000	61453
X0504	Integrated Mfg. Electronic Packaging (EMSP, AN/UYS-1, AN/APG-65, VHSIC)	882	1000	1500	1000	500	7710
X050[illegible]	Advanced Integrated Circuit/VHSIC MT (Navy Electronic Systems)	650	1000	2500	1500	1000	11050
A0903	Masked Ion Beam Lithography (Navy Electronic Systems)	500	75	0	0	100	2754
A0972	Heat Pipes MT (Navy Electronic Systems)	873	75	25	0	0	1904
M0510	A/I for Failure Diagnosis of Electronic Systems (Avionics and Shipboard Electronics)	250	400	100	0	0	1473
Axxxx	Advanced Repair Technologies for A/C Rework Applications (All Navy Aircraft)	0	1000	2000	2500	Continuing	Continuing
Ayyyy	Cost Effective Manufacture of Airframe Structures and Aircraft Components (All Navy Aircraft)	0	1000	2500	3500	Continuing	Continuing
Azzzz	Advanced Inspection Technology for Mfg (Advanced Navy Systems)	0	0	0	1000	Continuing	Continuing
TOTAL FOR SUPPORT OF AIRCRAFT PROCUREMENT, NAVY		18395	20400	14625	11500	Continuing	Continuing

PROGRAM ELEMENT: 0708011N
TITLE: Industrial Preparedness
DOD MISSION AREA: 480 - Production Base Support
BUDGET ACTIVITY: 6 Defense-Wide Mission Support

Procurement Appropriation Support

Project I.D.	Title (End Item Supported)	FY 1988 Actual	FY 1989 Estimate	FY 1990 Estimate	FY 1991 Estimate	Additional Out Year	Estimated Costs
WEAPONS PROCUREMENT, NAVY							
S0806	MT for Laser Assisted Metalworking (Guns, Missiles, and Launchers)	3000	2100	1500	1000	0	19600
M0521	Modern Casting Technology for 16" Projectiles (Mark 142 MOD 0 Projectiles)	504	1000	1300	100	400	6000
Sxxxx	MT for Fiber Optic Microcable (MK 48, Wire Guided Torpedoes)	0	500	800	1000	0	2300
TOTAL FOR SUPPORT OF WEAPONS PROCUREMENT, Navy		3504	3600	3600	2100	Continuing	Continuing
OTHER PROCUREMENT, NAVY							
M0511$	Electronics Manufacturing Productivity Facility	5130	0	0	0	0	N/A
M0522	Metalworking Productivity Facility (Generic Technology for All Navy Systems)	1500	4000	5000	6000	Continuing	Continuing
M0413	Ion Plated MMC (Space Based Systems)	100	0	0	0	0	2620
M0421	Graphite Metal Mill Shapes (Space Based Systems)	100	0	0	0	0	1460
M0422	Missile and Torpedo Shells from Spun SiC/Al (Advanced Missiles and Torpedoes)	500	450	0	0	0	1790
M0416	Guayule Rubber (Navy Aircraft Tires)	976	500	0	0	0	5200
M0523	Superconductivity MT (Advanced Navy Systems)	200	450	500	400	0	2850
M0526	A/I for Welding (Generic Technology for All Navy Systems)	300	725	1000	575	0	2400
Syyyy	Advanced Composites Manufacture for Improved Thermal Management (All Navy Weapon Systems)	0	1500	3500	6134	8866	20000
Mxxxx	Submicron Resist MT (Navy Electronic Systems)	230	1000	1600	1700	265	4795
TOTAL FOR SUPPORT OF OTHER PROCUREMENT, NAVY		9036	8625	11600	14809	Continuing	Continuing
MT PROJECT SUPPORT		1829	4175	3174	4384	Continuing	Continuing
TOTAL NAVY		41888	43310	40999	41168	Continuing	Continuing

NOTE: $ This project transferred to O&MN in FY89.

SECTION II

CONSTRUCTION AT

RDT&E,N FACILITIES

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

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-88 and planned in FY-89, FY-90, and FY-91.

FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	CONTRACTOR	LOCATION	Total Obligation Authority (Thousands of Dollars) FY88	FY89	FY90	FY91
SECTION I PROJECTS ACCOMPLISHED OR UNDERWAY							
Machinery Control System 1/	0604567N S0857	General Electric	NAVSSES Philadelphia, PA	2,800	-	-	-
Data Multiplexing System 1/	0604567N S0857	Rockwell	NAVSSES Philadelphia, PA	500	-	-	-
Integrated Electronic Control 1/	0604567N S0857	General Electric	NAVSSES Philadelphia, PA	1,000	-	-	-

FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	CONTRACTOR	LOCATION	Total Obligation Authority (Thousands of Dollars) FY88	FY89	FY90	FY91
		SECTION II PROJECTS PLANNED OR PROJECTED					
60 HZ Switchboard 1/	0604567N S0857	International Switchboard Corp.	NAVSSES Philadelphia, PA	-	1,100	-	-
TOTAL - PART I				$4,300	$1,100	$ -	$ -

1/ Previously listed in the Amended FY 1988/1989 Biennial Budget, RDT&E,N DON Supporting Data, Book 3 of 3, dated February 1988.

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-88 and planned in FY-89, FY-90 and FY-91.

FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	LOCATION	Total Obligation Authority (Thousands of Dollars) FY88	FY89	FY90	FY91
		SECTION I PROJECTS ACCOMPLISHED OR UNDERWAY				
Machinery Control System 1/	0604567N S0857	Naval Ship Systems Engineering Station Philadelphia, PA	300	500	-	-
Large Cavitation Channel (LCC) 1/	0605862N X1957	CBI Nuclear Co. Facility Memphis, TN	20,058	15,906	16,188	-
LM2500's, Reduction Gear and Waterbrake (Propulsion Training) 1/	0604567N S0857	Naval Ship Systems Engineering Station, Philadelphia, PA	500	200	-	-
Acoustic Pool Facility 1/	0605862N R1997	Naval Research Laboratory	6,241	-	-	-

1/ Previously listed in the Amended FY 1988/1989 Biennial Budget, RDT&E,N DON Supporting Data, Book 3 of 3, dated February 1988.

FACILITY/EQUIPMENT	RDT&E,N PE/PROJ NUMBER	CONTRACTOR	LOCATION	Total Obligation Authority (Thousands of Dollars) FY88	FY89	FY90	FY91
		SECTION II PROJECTS PLANNED OR PROJECTED					
Intake/Exhaust Systems 1/	0604567N S0857	Naval Ship Systems Engineering Station,	Philadelphia, PA	-	500	-	-
Electric Power Distribution 1/	0604567N S0857	Naval Ship Systems Engineering Station,	Philadelphia, PA	-	200	-	-
Electric Power Generation 1/	0604567N S0857	Naval Ship Systems Engineering Station,	Philadelphia, PA	-	400	-	-
TOTAL, PART II				$27,899	$17,906	$16,188	$ -

1/ Previously listed in the Amended FY 1988/1989 Biennial Budget, RDT&E,N DON Supporting Data, Book 3 of 3, dated February 1988.

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-88, and the estimated amounts planned for FY-89, 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)

	FY88	FY89	FY90	FY91
TOTAL, Part III	$4,463	$6,615	$7,565	$7,650
GRAND TOTAL *	$36,662	$25,621	$23,753	$7,650

* Major Improvements to, and Construction of, Government-Owned Facilities funded by Research, Development, Test and Evaluation.

LARGE CAVITATION CHANNEL

DAVID TAYLOR RESEARCH CENTER Bethesda, MD

(CBI NUCLEAR COMPANY FACILITY, MEMPHIS, TN)

(Thousands of Dollars)			
FY88	FY89	FY90	FY91
20,058	15,906	16,188	0

DESCRIPTION OF PROJECT:
This project was started in FY 1987 and will be completed in FY 1990. 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 will be 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. The SSN 21 propulsor testing must be accomplished by CY 1991. 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 site preparation and excavation, completed design of pump and drive motor, completed fabrication and testing of drive motor, procured all channel shell materials, began channel fabrication and modifications to the building.

FY 1989: Complete site preparation, fabricate pump, deliver pump and drive motor to site, complete fabrication of channel and building modifications, install drive motor and pump system. Continue LCC field installation.

FY 1990: Complete the LCC installation, complete acceptance testing, commission LCC.